The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Bilingual Arabic-English Speaking Children in the UK

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in the School of Education, Communication and Language Sciences,

Newcastle University

PhD in Linguistics

October 2018

Abstract

Phonological awareness (PA) is recognised as a key factor contributing to children's development of early literacy skills. The acquisition of reading and spelling, which are cognitive processes, is considered one of the most fundamental targets of the early school years. The increasing number of bilingual children in school has led to a number of cross-linguistic studies that have attempted to investigate the interaction between the languages spoken by bilingual children, the impact on PA skills and the influence on literacy development. A small number of studies have examined the transfer of PA skills between Arabic and English and the effect on literacy development, focusing on reading rather than both reading and spelling. The aim of this study is to examine PA skills in English and Arabic and how they relate to the reading and spelling skills of typically developing bilingual Arabic-English children growing up in the UK.

This study employed an observational, cross-sectional quantitative methodology using norm-referenced assessments and experimental measures. Eighty bilingual Arabic-English children were recruited with fully informed parental consent. The children were aged between 7 years and 1 month and 9 years and 11 months. They were divided into three age groups, 7, 8 and 9 years old, based on their age on the day of the assessment. Parents were asked to complete a language background questionnaire. Measures of PA, reading and spelling were administered in both languages. Spearman's correlation was run to determine the relationship between Arabic and English PA skills. Non-parametric two related samples tests were conducted in order to measure the children's performance level in PA skills, reading and spelling tasks in both languages. In addition, multivariate regression was used to examine if PA in either of the two languages of bilingual children predicts literacy skills in the other language. One-way ANOVA analysis was also used to determine whether there are significant differences in the means of all tasks in both languages across the three age groups.

This study showed that, as expected, there is a significant correlation between PA in English and in Arabic across three age groups. In addition, the children's performance in Arabic PA is better than in English. The findings also showed that Arabic PA predicts all English reading tasks except the real word task and the English PA predicts all Arabic reading tasks. A further important finding of this study is that Arabic PA predicts only English real word, not non-word, spelling, while English PA predicts Arabic real and non-word spelling. The relationship between PA, reading and spelling in Arabic-English bilingual children is discussed in relation to exposure to each language, age and parental education. Educational and clinical implications that emerge from the findings of the current study are also discussed.

Declaration

This thesis is submitted to Newcastle University for the degree requirements of Doctor of Philosophy in Linguistics. The research detailed within was performed during the period of 2014-2018, and was conducted in Newcastle University under the supervision of Dr Helen Stringer and Dr Maria Mroz.

I hereby declare that this thesis is my own work and effort and that it has not been submitted anywhere for any award. Where other sources of information have been used, they have been acknowledged.

Sahar Alkaab

October 2018

Certificate of Approval

I confirm that, to the best of my knowledge, this thesis is from the student's own work and effort, and all other sources of information used have been acknowledged. This thesis has been submitted with my approval for PhD degree.

Dr Helen stringer

October 2018

Dedication

To my late mother

Acknowledgements

First of all, I deeply thank God for invaluable support throughout my life's journey. I am especially grateful to my lovely supervisor, Dr Helen Stringer, for her guidance and encouragement throughout my PhD journey. Without her sincere support this thesis would never have been completed. I would also like to thank my second supervisor, Dr Maria Mroz, for her advice, time and motivation.

I am extremely grateful to the children and their parents, without whose excited participation this research project would have been impossible. Many thanks go to the staff of the Arabic weekend schools for allowing the research to be conducted. I am especially grateful to my PhD colleagues and friends with whom I shared this long and exciting journey. I would also like to acknowledge the financial support of the Higher Committee for Education Development in Iraq (HCED).

Finally, I will forever be thankful to my husband, Ibrahim, and my children, Mina and Abas, for their patience and unfailing love.

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List of Abbreviations

Abbreviations	Explanation
APVT	Arabic Picture Vocabulary Test
SAV	Spoken Arabic Vernacular
AWMA	Automated Working Memory Assessment
APA	Arabic Phonological Awareness
BPVS	British Picture Vocabulary Scale
CAH	Contrastive Analysis Hypothesis
EPA	English Phonological Awareness
L1	First Language
L2	Second Language
LIH	Linguistic Interdependence Hypothesis
LNF	Letter Name Fluency
LR	Lexical Restructuring
LSF	Letter Sound Fluency
M	Mean
MSA	Modern Standard Arabic
PA	Phonological Awareness
PGS	Psycholinguistic Grain Size
QUIL	Queensland University Inventory of Literacy
SD	Standard Deviation
SDH	Script-Dependent Hypothesis
SWST	Single Word Spelling Test
WRAT	Wide Range Achievement Test
WM	Working Memory
YARCT	York Assessment of Reading for Comprehension Test

Chapter 1. Introduction

1.1 Introduction

This thesis examines the relationship between phonological awareness (PA), reading and spelling among Arabic-English bilingual children. This chapter provides an introduction to the study, presenting the background, including specifically the problem and the purpose of the study, followed by its significance. A general comparison between Arabic and English languages is included in this chapter. An overview of the methodology used is also given. The chapter ends with an outline of the structure of the thesis.

1.2 Background to the study

In the reading and spelling research literature, understanding the relationship between reading and spelling skills and phonological awareness (PA) is an increasingly researched topic. Acquiring reading and spelling, which are cognitive processes, is considered one of the most fundamental targets of the early school years. The increasing number of bilingual children in schools has led to a relative increase in cross-linguistic studies that have attempted to investigate the interaction between bilingual children's two languages, which in turn may influence their literacy development. Numerous investigations have been conducted to identify the cross-linguistic transfer of phonological awareness between specific languages. Few studies have examined the transfer of PA skills between Arabic and English and their effects on literacy. The cross-linguistic relationship between PA skills and literacy in Arabic-English bilingual children in the United Kingdom (UK) remains largely unexplored.

According to the most recent census, approximately 159,290 members of the UK population speak Arabic as a first language (Office for National Statistics, 2011) and Arabic is one of the languages most frequently spoken in UK schools (Office for National Statistics, 2011). Although among this population many Arabic children learn English as a second language, no study has examined the relationship between PA and reading and spelling with these children. Hence, the main objective of this study is to examine how PA relates to literacy in the population of typically developing bilingual children speaking Arabic as their first language (L1) and English as their second language (L2) growing up in the UK.

1.3 Significance of the study

This study investigates whether there is a relationship between PA and literacy in typically developing Arabic-English bilingual children. This research is important for a number of reasons:

- The study will fill a gap in studies of cross-linguistic transfer in child language, which is an area of interest within second language acquisition. The literature on the association between PA and literacy of Arabic-English bilingual children is limited compared to the heightened interest examining this association in other bilingual populations. Therefore, this study aims to provide additional evidence concerning the cross-linguistic relationship of PA with reading and spelling in Arabic and English.
- The study aims to understand the cross-linguistic relationship between the basic literacy skills of typically developing Arabic-English bilingual children to determine the developmental factors that may indicate at-risk status for later literacy problems.
- Due to the paucity of research in the field of language acquisition in Arabic-English bilingual speakers, the findings of this study have the potential to contribute important new knowledge about how speaking these two very different languages supports literacy development in both languages.
- The findings from this study may also enable educators and researchers to develop effective pedagogical and research approaches appropriate for this population of bilingual children. Educational and clinical implications can also be drawn from the findings of the study.

1.4 Comparison between Arabic and English Languages, spoken and written

In comparison to other languages, Arabic is a Semitic language. Since it is the language of the Quran, Muslims from different nationalities are familiar with it. Arabic has an alphabetic system known as Abjad (Daniels and Bright, 1996). The Arabic alphabetic orthography consists of 28 letters, including three long vowels (/i:/, /u:/ and /a:/). Arabic short vowels are represented by diacritic marks placed above or below the consonant letters (◌َ= /a/; ◌ُ= /u/; ◌ِ= /i/). These marks may perform syntactic and semantic functions. For example, they change the meaning of a verb (e.g. كُتُب /kutub/ (books); كَتَبَ /kataba/ (he wrote)) (ALGhanem and Kearns 2014).

Depending on their position in the word, letters in the Arabic alphabet may have three or four shapes. For example, the letter (ج) ‘Geem’ has an initial shape, medial shape, final connecting shape and final non-connecting shape, as in the following words:

(جمل, سجادة, ينسج, نساج)

Arabic texts are read from right to left and cursive script is used in writing. Unlike English, there is no capitalisation or use of hyphens in Arabic. Moreover, Arabic letters do not combine to produce a new sound as in English, in which, for example, two letters represent a single sound such as in the word 'photo', with p and h together pronounced as /f/.

In the Arabic writing system, words are classified into: vowelised (a consonantal system with diacritics representing short vowels) and non-vowelised (a consonantal system without vowels). Arabic sentences can contain both types of words. Arabic orthography is characterised by being a shallow or transparent orthography (good one-to-one mapping that exists between graphemes and phonemes and consistent spelling) when vowelised, but it is opaque or deep (many possible correspondences between graphemes and phonemes) when non-vowelised (Abu–Rabia, 2002; Farran, 2010; Mahfoudhi *et al.*, 2011). Therefore, it is important to distinguish between these two aspects of Arabic orthography.

An important point to bear in mind, related to the consistency or transparency of the Arabic orthgrapheme (grapheme-phoneme mapping), is that native Arabic beginning readers first learn to read a vowelised transparent written version (with diacritic markers) and then when they get older they transition to reading and writing using the non-vowelised form of Arabic (Abu-Rabia *et al.*, 2003). By way of contrast, adult readers learn to depend on the context when reading non-vowelised, less transparent written Arabic (Abu-Rabia, 1999). The issue of the transparency of Arabic orthography has a crucial impact on the development of reading skills in Arabic learners (Taibah and Haynes, 2011).

Arabic words are, in fact, all derived from two or three root consonants. The addition of vowels or affixes to the root plays a key role in semantics and phonology. Since it has been suggested that PA interacts with orthographic depth (Frost *et al.*, 1987), the phonological transparency of Arabic orthography should play a role in word recognition, developed by relying on phonological processing skills (Abu-Rabia, 1997).

In contrast to Arabic, English has 26 letters, including 21 consonants and five vowels (a, e, i, o and u), which have upper and lowercase forms. Regardless of their position in a word, English letters maintain their shape. With regard to English vowels, the same vowel letter or group of vowel letters can produce more than one sound and each vowel is represented by several different letter combinations in writing. For example, the letter 'a' represents five different sounds, as in 'late' [leit], 'at' [æt], 'all' [o:l], 'bard' [ba:rd] and 'alone' [ə'loun]. Moreover, the

sound [ei] is represented in writing not only by the letter ‘a’, as in “late” but also by five different combinations of vowel letters, as in ‘day’, ‘pain’, ‘sleigh’, ‘ley’ and ‘steak’.

English texts are read from left to right and written in both print script and cursive script forms. English is considered to be one of the languages with a deep orthography and a far less predictable relationship between letters and sounds than in others. As Share (2008) pointed out, the relationship between letters and sounds can vary to allow for pronunciation options. Thus, each phoneme can be represented by more than one grapheme and every grapheme can represent different phonemes. In addition, English has a transparent derivational system. Derivatives are formed by adding initial and/or final affixations (prefixes and suffixes) of certain morphemes to lexical words. Thus, although Arabic and English are both alphabetical languages, there are fundamental differences in the nature of their linguistic systems.

1.4.1 Arabic dialects and how they relate to Modern Standard Arabic (MSA)

One of the key linguistic properties of Arabic language is diglossia, which is a sociolinguistic phenomenon in which a language has two distinct varieties: (i) Modern Standard Arabic (MSA) (also known as *alfusha*), which is the official version of the language; (ii) Spoken Arabic Vernacular (SAV) (*colloquial dialect or ammia*), which is the spoken form used in everyday communication (Saiegh-Haddad, 2005). The latter has no formal written form. There is also a third variety which is regarded as the original form, Classical Arabic (CA), which is associated with religion and is the language of the Islamic Holy Book, the ‘Quran’. Arabic speakers use the classical language in their five daily prayers. MSA is the modern version of the classical language. Hence, it is clear that that each type of Arabic has exclusive functions (Ferguson, 1959).

It should be noted that MSA has specific phonological, morphological, syntactic and semantic differences compared to the spoken variations. There are various spoken varieties of Arabic, which vary from one region or location to another. The regional dialects differ relatively from each other, whereas the universal literary language of Arabic speakers is MSA.

In the case of diglossia, such as in Arabic, the two varieties of the same language are linguistically very different. In an Arabic speaking diglossic community, therefore, children and adults treat the two forms of Arabic as two separate languages (Eviatar and Ibrahim, 2000; Ibrahim, 2009). The diglossic phenomenon is believed to have an impact on the acquisition of reading, writing and PA among Arabic speaking children (Al Mannai and Everatt, 2005; Abu-Rabia and Taha, 2006). Learning to read in Arabic is very different from native speaking

children learning to read in English. Monolingual English children learn to read and write the language they speak. In contrast, monolingual Arabic children first learn to speak a local variety of spoken Arabic (SAV) and then they must read and write in the MSA (a language in which they are not fluent) when they enter school. It is important to consider that the linguistic distance between spoken and standard Arabic plays a key role in phonological representation and is regarded as a significant reason for the delay in PA development among monolingual Arabic speakers (Saiegh-Haddad, 2005).

It is argued that that all spoken varieties of Arabic are linguistically related to MSA (Saiegh-Haddad, 2012). Kaye (1972) pointed out that the linguistic connectedness between the two versions of Arabic is flexible and changeable. In spite of this linguistic connectedness, a linguistic analysis of the structure MSA and any given SAV reveals that there are differences in all language domains and these differences are most clearly in the following domains: lexicon, phonology and morpho-syntax (Saiegh-Haddad, 2012).

In terms of phonological distance between MSA and SAV, for example, the phonemic inventories of the two language varieties is considered as a major manifestation of that disparity. More specifically, there is no single SAV has the same set of phonemes as MSA, though the MSA shares most of the phonemes with all Arabic spoken vernaculars (Maamouri, 1998). In addition, the phonological composition of the syllable is another phonological difference between MSA and SAV. In MSA the phonological structure of the syllables is subject to diverse phonotactic constraints. For example, word initial consonantal clusters are not acceptable in MSA; however, they are quite frequent in SAV (Saiegh-Haddad, 2012). Thus, Arabic speaking children find that phonological structures that are only available in MSA more difficult to process than those structures of their local spoken vernaculars. It could be argued that these phonological disparities between the two varieties of Arabic suggest that there may be a considerable phonological difference between the forms of shared vocabulary items in written and spoken Arabic (Saiegh-Haddad, 2012).

With regard to typically developing Arabic-English bilingual children growing up in the UK, it is most common for Arabic to be the language spoken at home and for English to be learned when children encounter it as the instructional language at school or pre-school. It is common for Arabic-speaking children to enrol in Arabic weekend schools. The children attend Arabic school for approximately four hours a week and attend two sessions. The first session is an Arabic class, to develop their knowledge of the standard Arabic language through lessons in reading and writing. The second session is a Quran class, focusing on teaching the correct way

of reading the Quran aloud. Therefore, Arabic-English bilingual children speak in the SAV and learn to read in the written form of Arabic (MSA) and English. For the purposes of this study, first language (L1) is any Arabic dialect that can be realised as MSA.

1.5 Overview of methodology

This study is observational and employed cross-sectional quantitative methodology using norm-referenced assessments and experimental measures. Eighty typically developing Arabic-English bilingual children were recruited with fully informed parental consent. They were aged between 7 years and 1 month and 9 years and 11 months. Two types of data collection instruments were used in this study: a language background questionnaire and measures in English and Arabic (PA, language and literacy assessments). Data were analysed using Spearman correlation analysis to test the relatedness of PA skills across the two languages. Non-parametric two related samples tests were performed to assess the children's levels of performance on PA and reading and spelling tasks in both languages. Multivariate regression analysis was also used to examine PA as a predictor of reading and spelling outcomes across the two languages.

1.6 Thesis outline and structure

This thesis is organised in six chapters, including this introductory chapter. This chapter introduces the study to the reader. The remaining chapters of this thesis are structured as follows: the second chapter provides an extensive analysis of the literature relevant to the topic, including what is meant by the concept of PA and its relationship with literacy. Evidence related to this relationship in monolingual and cross-linguistic studies is provided. Detailed information concerning the study methodology is described in the third chapter, including information about the participants, study measures and procedures, analytical techniques and information regarding the pilot study. The fourth chapter describes the results of thorough analyses of the data from the main study to provide answers to the research questions. The fifth chapter presents the discussion of the findings of this study. It also includes the implications and limitations of this study and directions for future research. The last chapter gives a summary of the key findings and includes a discussion of recommendations for educational practice. This is followed by a brief reflection on the research process.

1.7 Summary

This chapter has provided an introduction to the study. It has described the background to the study. It has also provided a rationale for the importance of the study. General comparisons

between Arabic and English and a brief description of the research methods have also been presented. At the end of the chapter, the structure of the thesis has been set out. A review of the literature which provides the background to the topic under examination in this study is presented in the next chapter.

Chapter 2. Literature Review

2.1 Introduction

This chapter begins with a general overview of phonological awareness (PA) and includes definition of PA, the importance of PA as a linguistic skill and levels and skills of PA. Various alternative theories for how PA develops are then put forward. A brief look into PA development in each language and the effect of bilingualism on PA development is given. Another objective of this chapter is to give a detailed description of the cross-linguistic transfer of skills from one language to the other and its impact on bilingual children's literacy development, focusing on the transferability of PA across languages. The crucial importance of PA for literacy acquisition and findings from English and Arabic studies are also reviewed. Finally, concluding remarks are presented.

2.2 What is phonological awareness?

2.2.1 Definition of phonological awareness

The concept of PA refers to the individual's ability to identify and manipulate units of speech sounds (e.g. phonemes) in isolation from their meaning (Torgesen *et al.*, 1994; Goswami and Bryant, 1999; Xuereb, 2009). It is a linguistic skill that is related to the ability to decode the connection between phonemes (auditory) and letters (visual) (Lipka *et al.*, 2005; Chiappe *et al.*, 2002). According to Anthony and Francis (2005, p. 225), PA can be defined as "one's degree of sensitivity to the sound structure of oral language".

McBride-Chang (1995) attempted to clarify what children need in order to perform PA tasks. First, children need to perceive the segments of spoken language in terms of words, syllables and phonemes separate from the meanings of the words; then they need to hold these segments in their working memory in order to process them. Processing takes the form of identification, deletion, blending or manipulation of that speech segment. Ultimately, the child uses corollaries of these operations when speaking.

2.2.2 Importance of phonological awareness as a linguistic skill

Phonological awareness is one aspect of a range of cognitive processes that comprise metalinguistic awareness. Metalinguistic awareness refers to the ability to think about the structural features of language objectively, separate from the meaning (Gombert, 1992). More specifically, metalinguistic awareness involves various linguistic components of language and can be categorised into four awareness levels: phonological, morphological, syntactic and

pragmatic. PA, as explained earlier, represents the ability to identify and manipulate the phonological units in spoken language. Morphological awareness means the ability to manipulate and reflect on the morphemic structure of words (Carlisle, 1995). Syntactic awareness can be described as the ability to perceive and reflect on the grammatical structure of sentences. Finally, pragmatic awareness refers to awareness of the context in which the language is used.

Several studies and reviews have addressed the development of metalinguistic skills at different linguistic levels (Chaney, 1994; Roth *et al.*, 1996) and have argued that they are particularly involved in PA (Anthony *et al.*, 2002). PA has been studied intensively because of its crucial role in the development of children's literacy. In the reading and spelling research literature, the relationship between reading and spelling skills and PA is a growing field. Acquiring reading and spelling skills is considered to be among the most fundamental goals of the early school years. PA has been identified as a reliable predictor of success in reading (Lundberg *et al.*, 1988; Adams, 1990; Durgunoglu and Oney, 1999; Gillet *et al.*, 2004; Sun-Alperin and Wang, 2009) and spelling (Griffith, 1991; Weinrich and Fay, 2007).

PA is also a necessary skill for speech development, although this has received less attention from researchers. Normally, children need to hear and distinguish between the separate sounds before they can produce the sounds themselves; thus, it can be said that PA supports speech development. Research indicates that speech development and PA support each other. Pascoe *et al.* (2001) suggested that a range of speech processing skills are required to complete PA tasks successfully, for example listening, discriminating, remembering, segmenting and producing speech.

It has been suggested that there is also a relationship between PA and the acquisition of vocabulary. As vocabulary increases in childhood, so does the capacity to reflect on and manipulate syllables, rhymes and phonemes (Carroll *et al.*, 2003; De Cara and Goswami, 2003; Lund *et al.*, 2015). More specifically, in the word learning process, the child's language competence depends upon the ability to listen and analyse the phonological forms of words, which can be stored in their existing lexicon (Zens *et al.*, 2009).

There is additional evidence that highlights the association between PA and working memory (WM), a short-term memory system that is assumed to be responsible for storing and processing information (Baddeley, 1997).WM plays an important role in the development of PA. According to the model of WM proposed by Baddeley and Hitch (1974), the interaction between PA and WM creates a phonological loop. The key feature of the phonological loop is

its capacity both to store and rehearse verbal and auditory information, including sound patterns and phonological information that contribute to language learning.

It has consistently been shown that there is a significant correlation between PA and WM (Siegel and Linder, 1984; Oakhill and Kyle, 2000; Alloway *et al.*, 2004; Holliman *et al.*, 2010; Yeung *et al.*, 2013; Zayed *et al.*, 2013). Oakhill and Kyle (2000), for example, examined the associations between children's WM abilities and performance on two PA tasks (phoneme deletion and sound categorisation). The children's reading was also measured. Fixed-order multiple regression analyses revealed that the sound categorisation task makes higher demands on WM compared with the phoneme deletion task. The authors conclude that WM is critical for the performance of PA tasks.

Another study conducted by Zayed *et al*. (2013) investigated the link between the PA and WM of Arabic pre-school children with and without dyslexia. They distributed 40 participants into two groups, 20 children at risk of dyslexia and 20 typically developing children, to compare the children's abilities in PA and verbal WM tasks. The analysis showed a significant correlation between PA and WM measures. However, there were differences between the groups of children who participated in this study: the typically developing children significantly outperformed their peers in the at-risk group on all tasks. This is because children with dyslexia have both poor PA skills and poor WM compared to those not at risk for dyslexia (Bruck, 1992; Jeffries and Everatt, 2003; Jeffries and Everatt, 2004; Beneventi *et al.*, 2010). The results lend strong support to the argument that there is a robust association between PA and WM. Furthermore, these two variables may have a crucial impact on the development of children's reading skills (Kirby *et al.*, 2003).

2.2.3 Levels of phonological awareness

A widely accepted assumption across a variety of linguistic, educational and psychological disciplines is that PA abilities in English can be categorised into three levels: a) syllable awareness, b) intra-syllabic awareness and c) phoneme awareness. Syllable awareness demonstrates a realisation of the syllables in a word. Intra-syllabic awareness includes awareness of onset and rime. The onset is the initial consonant or consonant cluster in a word, while the rime encompasses the remaining vowel (peak or nucleus) and the final consonants or consonant cluster (coda). Another important linguistic unit is the 'body', which consists of the onset and peak of a syllable. Intra-syllabic awareness requires an understanding that words can be split into small units within syllables. Finally, phoneme awareness focuses on the smallest units of sound in spoken words (Goswami and Bryant, 1999). Hence, PA is the understanding

that a word can be divided into smaller sound units. For instance, the word ‘clamp’ can be described phonologically using this hierarchical structure (see Figure 2.1). First, it is a one syllable word. It has the onset /cl/ and the rime /*a*mp/. This rime can also be further divided into the peak /*a*/ and the coda /mp/, while the body of ‘clamp’ is /cla/. With respect to the phoneme level, the word ‘clamp’ contains the following phonemes: /c/, /l/, /*a*/, /m/ and /p/.

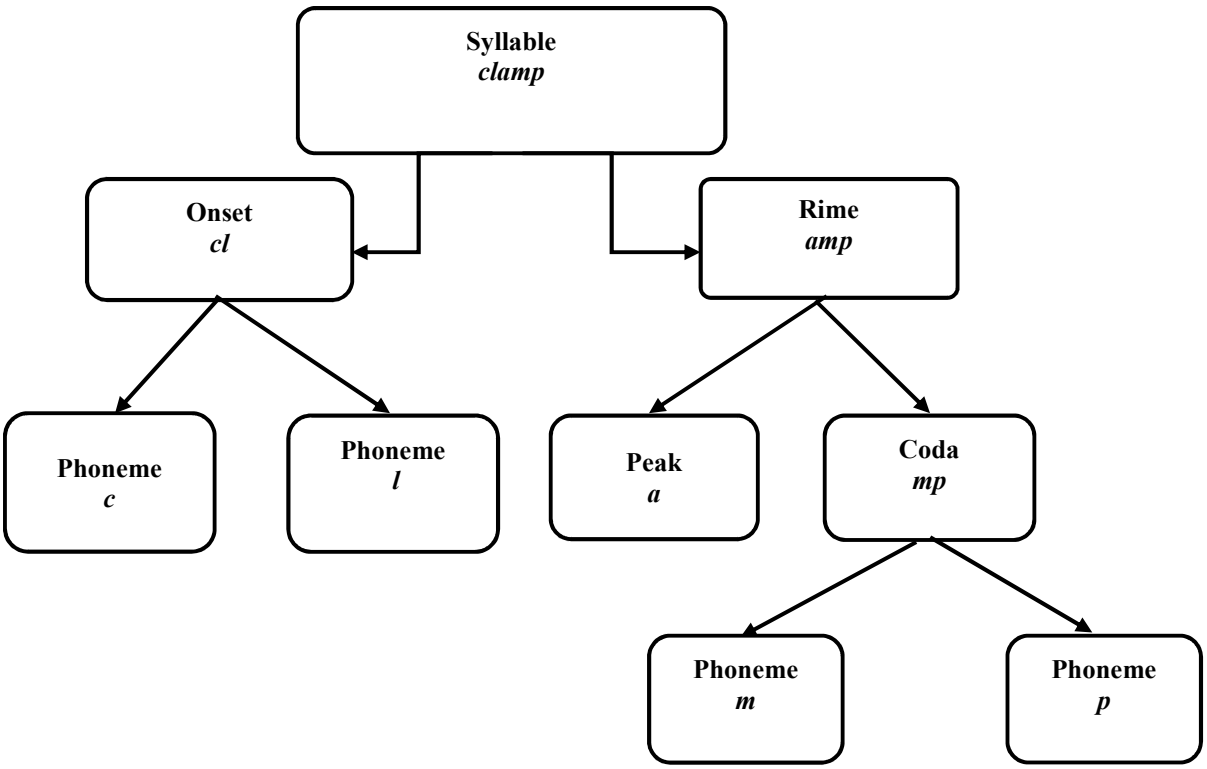


Figure 2.1 Hierarchical structure of the syllable of the mono-syllabic word ‘clamp’

There is controversy concerning the internal syllable structure in terms of whether the onset-rime level is a linguistic reality, or if the latter only concerns the syllable and phoneme. Many psycholinguists and linguists (Treiman, 1984; Fudge, 1987; Treiman and Kessler, 1995; Blevins, 1996; Geudens and Sandra, 2003) have adopted the linguistic onset-rime view, which claims that the syllable does indeed have a hierarchical or constituent structure, as described above. In this linguistic structure, it is proposed that the association between peak and coda is stronger than that between peak and onset (Fudge, 1987). The alternative view is the linear or flat view, which states that the syllable is composed of strings of phonemes and that there is no intermediate level between syllable and phoneme (onset-rime level). For instance, the syllable ‘hat’ is considered to be a string of the phonemes /h /, /a/ and /t/. Terimen and Zukowski (2001) argued that the empirical psycholinguistic and linguistic evidence for this model of English

syllable structure is insufficient. Against this, (Carroll *et al.*, 2003) and Anthony and Lonigan (2004) provide robust empirical evidence to support the linear flat view.

There is also debate concerning which of these levels is the most significant for the acquisition of reading and spelling (Muter *et al.*, 1997; Bryant, 1998; Hulme *et al.*, 1998). However, Goswami and Bryant (1990) argued that levels of PA progress hierarchically during pre-school and early school years (from syllable awareness to intra-syllabic awareness and then to phoneme awareness). Therefore, children's understanding each of these levels is necessary for literacy.

2.2.4 Phonological awareness skills

PA includes a wide variety of skills that enable recognition of the similarities and differences between words, such as onset and rime judgments, the manipulation of the segments of words (e.g. generating new words from blends of other words) and awareness of the component sound units of words, including identifying syllables and phonemes (Alcock *et al.*, 2010). The acquisition of these skills has been proven to be necessary for the development of literacy. The presence of these skills can be demonstrated by the child's ability to perform relevant tasks. To illustrate this further, PA skills can be classified into levels as follows (Vloedgraven and Verhoeven, 2009):

1. Rhyme level: This includes rhyme recognition and can be demonstrated by identifying or generating rhyming words.
2. Word level: This includes word recognition, which can be demonstrated by segmenting sentences into words by counting them.
3. Syllable level: This includes syllable recognition, syllable blending and syllable deletion. Syllable recognition can be demonstrated by counting the syllables in words. Syllable blending is demonstrated by joining a sequence of sounds to produce a word. Syllable deletion is demonstrated by the omission of one syllable in a word.
4. Phoneme level: This includes manipulating the sounds in words, which can be demonstrated by adding, deleting or substituting one or more sounds in words.

Several studies have shown that PA is manifested in different skills at different ages. Children as young as three years seem to show sensitivity to rhymes (Bryant *et al.*, 1989; Dowker, 1989). At four and five years of age, children can segment words into syllables and show an emergent sensitivity to onsets and rimes (Liberman *et al.*, 1974; Bruck and Treiman, 1990). Six- and

seven-year- olds begin to distinguish between phonemes (Liberman *et al.*, 1977; Perfetti *et al.*, 1987).

Since the existing scales used to measure PA are diverse and complicated, McBride-Chang (1995) attempted to provide a range of reliable and accurate measures that can be used to assess PA skills. Three separate tasks were considered good measures of PA skills: position analysis (e.g. what sound comes before */i/* in 'time'?), phoneme deletion (e.g. say 'fox' without */f/)* and phoneme segmentation (e.g. what are the sounds you hear in 'sun'?). McBride-Chang (1995) found that all these tasks require, as stated earlier, cognitive ability, verbal memory and the capacity to hear and decode the different aspects of speech to manipulate the stimuli mentally. However, Sodoro *et al.* (2002) claimed that measuring PA is not a "one size fits all" situation; that is, reliable and valid assessment tools must depend on the purpose of the assessment and the kind of data required.

In closing, it should be noted that PA is an umbrella term that comprises different linguistic levels and a broad range of cognitive skills that are the target of assessment and instruction. Such cognitive skills are assessed using several linguistic tasks.

2.3 Theories concerning the development of phonological awareness

There is no doubt that determining the developmental origins of PA is important because it is so closely connected to speech and language development. There are at least two dominant theoretical principles related to the interpretation of PA developmental progression in the early literacy field, as discussed in the following two sections.

2.3.1 Lexical restructuring model

The lexical restructuring (LR) model (Metsala and Walley, 1988; Walley, 1993) proposes that from an early age children are aware that spoken words are represented holistically. More specifically, children are able to segment large units, such as a whole words, before being able to recognise smaller units (syllables, intra-syllabic units and phonemes) and this ability gradually becomes more fine tuned through the pre-school and school-age years. Another basic concept of this model is that vocabulary growth promotes PA development via the restructuring of the lexicon. That is, the main driver developing the child's understanding of the representation of sounds within words is knowledge of vocabulary. Thus, the range of a child's lexical knowledge has been hypothesised as one of the vital precursors for the development of PA. In line with this claim, vocabulary is positively connected with phonological sensitivity (Metsala, 1997; Chiappe *et al.*, 2004). For example, Chiappe *et al.* (2004) found knowledge of

vocabulary (expressive and receptive) to be correlated significantly with success in blending and phoneme deletion tasks administered to a group of children. These subjects were divided into two groups according to their performance on the reading sub-test of the blue form of the Wide Range Achievement Test (Wilkinson, 1995) (poor readers (N =13) and typical readers (N = 49).

The validity of the LR model has been confirmed by empirical work concentrating on the role of vocabulary growth in the progression of PA. For example, Cooper *et al*.'s (2002) longitudinal study examined whether or not spoken language skills (receptive and expressive semantics, syntax and morphology) and child background factors (intelligence, family literacy, socioeconomic status and primary language) predict PA development (comprising blending and elision skills) among a group of children aged 5.2–6.3 years. The results strongly suggest that, in general, the contribution of oral language skills (e.g. in vocabulary development) significantly influence the development of PA from kindergarten through second grade. Conversely, the predictive influence of the children's background factors on PA was not significant.

Carroll *et al*. (2003) also investigated the association between PA and receptive vocabulary in a sample of 67 pre-school English children (with an age range from 3 years 2 months to 4 years 5 months) and found a significant correlation between the children's performance on larger-segment PA and receptive lexical knowledge tasks. It could be argued that the results of this study are consistent with the view that children's sensitivity to sound structure at an early age may relate to the growth of their vocabulary. The results of this study provide evidence in favour of the LR model. In spite of the proposal that vocabulary is closely tied to PA development at an early age, this study made no predictions about the continuation of this relationship as children grow older.

2.3.2 Psycholinguistic grain size model

The psycholinguistic grain size (PGS) model (Ziegler and Goswami, 2005) is compatible with certain suppositions of the LR model, except for the idea that vocabulary knowledge, as discussed above, promotes PA at the phoneme level prior to the acquisition of reading and writing. Ziegler and Goswami (2005, p. 21) argued that "awareness of sounds at the smallest grain size (phonemes) does not develop automatically as children get older ". The PGS model posits that the development of PA at the phoneme level occurs only through direct literacy instruction in alphabetic languages. During reading instruction, children begin to recognise phonemes in the speech stream by understanding that individual sounds are represented by

letters or letter combinations (phoneme–grapheme correspondences). This understanding is considered to be the basis for PA development, as well as reading acquisition. Accordingly, this hypothesis is largely based upon the correspondence between orthographic units and phonological segments (units of sound) of the language. Evidence in favour of this proposal comes from Goswami and Bryant's (1999) review, which showed that the development of PA at sophisticated phoneme levels occurs only after children have acquired reading and writing. Additional evidence to support this theory comes from developmental studies that deal with reading acquisition and indicate that the reason for poor reading ability in children and adults is that they do not have sufficient awareness of phonemes (Morais *et al.*, 1979; Lukatela *et al.*, 1995; Elbro and Jensen, 2005).

Other studies, however, contradict this assertion by showing that knowledge of the correspondence between orthographic patterns and phonemes is not necessary for awareness at the phoneme level. For instance, Hulme *et al.* (2005) investigated whether or not knowledge of the phoneme-grapheme connection is a necessary precursor for phoneme isolation among a group of Czech- and English-speaking children. Forty children between five and six years of age (24 Czech and 16 English) participated in the study. These children could only name or write 14 or fewer out of 17 target letters in Czech and 16 target letters in English. It should be noted that there is no formal training in phoneme awareness in Czech kindergartens. During the study, tasks in letter recognition, letter writing, phoneme isolation and scoring of letter knowledge were administered. One theme that emerged from this work is that phoneme manipulation ability also occurred in children who were unaware of grapheme-phoneme correspondence. These results would seem to refute the claim that phoneme isolation ability in typically developing children is only possible in the presence of knowledge of letter-sound correspondence.

Another pillar of PGS theory is that literacy instruction plays a pivotal role in the development of PA. In other words, in early language development, the child is first exposed to phonology in oral language skills and the larger grain size units form the most salient phonological cues (whole words, syllables and intra-syllabic units). As the child acquires literacy, smaller grain size units (phonemes) become more salient. Consequently, the instructional practices in teaching reading are likely to play a significant role in giving special consideration to those small grain units, especially in consistent orthographies.

Wise *et al.* (2007) provided further support for this assertion in a study that aimed to examine the influence of semantic knowledge and knowledge of letter-sound connections on the

acquisition of word-blending skills among a sample of 211 children with reading disabilities in the second and third grades. Hierarchical linear modelling statistical techniques were used and the findings suggest that literacy instruction in the mapping between speech sounds and the corresponding symbols is necessary to develop PA at the phoneme level. This model also emphasises the role of understanding the phonological features of one's native language in the development of PA.

2.3.3 Summary

In conclusion, PA development theories place a special focus on vocabulary and orthographic knowledge. The LR model is solidly based on the notion that vocabulary knowledge, as one of the general linguistic abilities, is necessary for the emergence of children's phonological sensitivity, while the PGS model rests on the idea that the child's phonological representational structure and PA skills depend on the phonological and orthographical structures of spoken language.

2.4 Development of phonological awareness

2.4.1 Hierarchy of phonological awareness development

Despite some differences of opinion in the literature, it is generally assumed that PA, particularly in alphabetic languages, develops in a sequence, from awareness of larger linguistic units (words and syllables) to awareness of smaller units (intra-syllabic units and phonemes) (Caravolas and Bruck, 1993 ; Goswami and Bryant, 1999; Gillon, 2004). This view describes the progress of PA through different linguistic levels (syllables, intra-syllabic units and phonemes).

Various factors influence PA development in speakers of alphabetic languages. Two of these factors, as proposed by Caravolas and Bruck (1993), are oral language input and the acquisition of alphabetic literacy. Caravolas and Bruck (1993) justified their claim that oral language proficiency is one of the main contributory factors to PA development by arguing that because languages differ in terms of their phonological features, it is presumed that the consciousness of certain phonological units progresses as "a function of salient structural aspects of the child's native language" (p. 4). Furthermore, the acquisition of alphabetic literacy builds on knowledge of the correspondence between phonemes (speech sounds) and graphemes (letters) and this may increase the child's PA skills. In other words, in contrast to Hulme *et al.* (2005), Caravolas and Bruck (1993) argued that when children learn that phonemes map to graphemes, generally between 6 and 7 years of age, they develop an awareness of the phonemic level. This is the age

at which literacy is formally introduced and hence it is clear that alphabetic literacy plays a pivotal role in the development of the child's PA skills.

2.4.2 Difficulty level of phonological awareness tasks

Consistent with the hierarchical manner of PA progression, there is consensus that PA tasks vary with regard to levels of complexity (Yopp, 1988; Adams, 1990; Simmons and Kame'enui, 1998). Researchers have attributed this variety to the linguistic complexity of the PA task itself, which involves the manipulation of phonological units and depends on the requirements of the task (Runge and Watkins, 2006; Hulme *et al.*, 2012). In terms of the linguistic complexity of PA tasks, McBride-Chang (2004) argued that tasks assessing larger phonological units are easier than tasks assessing smaller phonological units and that tasks requiring judgment are easier than tasks requiring explicit manipulation of the speech units in words.

Similar findings indicating that the manipulation of phonemes is more difficult than the manipulation of rime and onset units, which is in turn more difficult than manipulating syllables, have been reported in many developmental studies (Bruck and Treiman, 1990; Treiman and Zukowski, 1991; Ball, 1993; Signorini, 1998). Several investigators have also suggested that the level of complexity of the task is linked to the location of phonemes in the word (initial, middle or final position) (Lewkowicz and Low, 1979; Skelfjord, 1987; Carroll *et al.*, 2003). For instance, detecting the middle sound is more difficult than either the initial or final sounds (McBride-Chang, 1995).

Seymour *et al.* (1999) argued that it is essential to understand the requirements of PA tasks, which are typically related to the nature of the processing required in each task. According to this claim, there are two types of tasks: an implicit task that requires only sensitivity in terms of of awareness and depends on epilinguistic processing in order to manipulate and produce the distinctive features of phonological units; an explicit task that requires conscious awareness and depends on metalinguistic processing to identify and produce a speech sound within a word. Seymour *et al*. (1999) argued further that implicit perception develops prior to explicit perception and letter perception develops only after the children acquire literacy skills.

2.4.3 Development of phonological awareness in English

On the basis of extensive research into speech perception, early researchers hypothesised that syllable segments are manipulated more easily than phoneme segments (Liberman *et al.*, 1974). In the pioneering work of Liberman and colleagues (1974), 135 children ranging in age from four to six years were recruited. The children were divided into three groups according to age:

nursery (average age 4 years, 11 months), kindergarten (average age 5 years, 11 months) and first grade (average age 6 years, 11 months). They were also placed randomly into two experimental groups at each grade level. In the first group, the children were asked to tap out the number of phonemes in a phoneme segmentation task, whereas the children in the second group were asked to tap out the number of syllables in a word. The results of this study showed that nearly half the children at nursery level could segment words into syllables, but none of them could segment words into phonemes. Moreover, 48% of children at the kindergarten level reached the criterion of six consecutive correct items in syllable segmenting. The results for first grade children showed that 90% were able to segment words into syllables and 70% mastered the phoneme segmentation task. Findings such as these led the researchers to suggest that awareness of syllables develops prior to the awareness of phonemes, which was previously thought to develop gradually through direct literacy instruction during the early elementary grades. This early study significantly increased interest in PA.

In subsequent work by Lonigan *et al.* (1998), it was suggested that young children first detect speech sounds at the lower levels of phonological sensitivity (i.e. syllables), followed by those at higher levels of phonological sensitivity (i.e. phonemes). The sample in this study consisted of 238 children aged 2 to 5 years from different social classes. To measure phonological sensitivity, four tasks (rhyme oddity detection, alliteration oddity detection, blending and elision) were tested. The results indicated that substantial developments in phonological sensitivity take place between three and four years of age and that children's phonological sensitivity increases as they grow older. In addition, there were significant social class differences in the development of phonological awareness.

Carroll *et al.* (2003) provided further support for the idea of the development of phonological sensitivity in their short-term longitudinal study. Over the course of one year, a group consisting of 67 pre-school children was tested three times on measures of syllables, rime and phonemic awareness and speech and language skills, as well as letter knowledge. The results indicated that the development of PA typically follows the same progression pattern from the identification and manipulation of large units to small units. To put it another way, pre-school children tended first to develop awareness of syllables and rhymes and then awareness of phonemes. Hence, this study contributed to knowledge of the early stages of PA development, which are fundamental for reading as well as spelling.

Anthony and Francis (2005) discussed the general developmental sequence of PA in their report, based on multidisciplinary and cross-linguistic studies. They confirmed that there is a

universal hierarchical sequence in PA development across languages. Children seem to acquire an awareness of syllables at an early stage and an awareness of phonemes at a later stage. More specifically, children are generally first able to distinguish words, followed by syllables. After that, they learn to distinguish intermediate sub-lexical units (onsets and rimes) and eventually they can distinguish individual phonemes. Anthony and Francis (2005) also stated that after these stages, children can fine-tune the PA skills which they have already acquired while they are learning new ones. Ziegler and Goswami (2005) agreed that there is a comparatively fixed sequence of PA development. That is, children gradually become able to perceive, detect and manipulate smaller and smaller linguistic units by the time they have begun to receive formal education.

Together, these studies in English provide a clear indication that children's awareness of spoken language develops gradually along a certain continuum over time and the pattern of PA development is the same across languages.

2.4.4 Development of phonological awareness in Arabic

In Modern Standard Arabic (MSA), a syllable is composed of three parts: a) onset, b) nucleus and c) coda. The onset is the initial consonant and no syllable may begin with a consonant cluster (more than one consonant). The nucleus is the vowel that comprises the core of the syllable. The coda is a final consonant or consonant cluster (Ryding, 2014). For example, in the Arabic word *fi:l* (elephant), the onset is /f/, the nucleus is /i:/ and /l/ is the coda. The syllabic structure of Arabic is thus 'largely flat' (Berg, 2009).

There is little research available on the developmental progression of PA skills in Arabic. However, the work that has been done supports the proposal that there is a sequential development of PA skills in alphabetic languages, despite the differences in their structure. For example Tibi (2010) examined the developmental hierarchy of four Arabic PA tasks (identification of initial sounds, rhyme oddity, syllable deletion and word segmentation). Based on the PA training data of a group of 140 native Arabic students from the first to third elementary grades: grade one (N = 58, age 6), grade two (N = 51, age 7) and grade three (N = 31, age 8), Tibi (2010) found a developmental progression in PA tasks across these three grade levels. The outcomes of this study also indicate that these four PA tasks reflect the development of PA in the following order: rhyme, syllable deletion, initial sound identification and phoneme segmentation. This is consistent with the hierarchical sequence development of PA skills in English children. Findings such as these confirm Saiegh-Haddad's (2007) claim that single phonemes are more difficult to learn than larger syllables.

Further evidence for the development of PA in Arabic comes from a longitudinal study undertaken by Al-Sulaihim and Marinis (2017). The study aimed to examine the development of Arabic PA skills and explore whether there is an association between PA and reading skills. Thirty typically developing Arabic-speaking children (mean age = 6 years and 7 months) from Kuwait were recruited for this study. Children were assessed twice during their first grade year (before the introduction of formal literacy instruction and at the end of the school year) on PA tasks at three levels (syllables, rhymes and phonemes), through single word reading and letter knowledge tasks. The results showed that children's performance on PA significantly improved from the first test to the second test. The researchers concluded that PA skills improved over time when the children were exposed to literacy training in their first year of school. It seems possible that these results are due to the critical role of literacy training in improving PA. The findings also showed that there are significant associations between PA tasks and single word reading, as well as between PA tasks and letter knowledge. These results provide important insights into the development of early PA skills among young early readers in Arabic language.

Overall, the studies presented in this section have shed light on the development of PA abilities among Arabic-speaking children.

2.4.5 Effect of bilingualism on the development of phonological awareness

To discuss the nature of PA skills in bilingual children, it is necessary briefly to define the term of bilingualism. Bilingualism is commonly used to refer to people who have the ability to speak more than one language at various levels of proficiency (Butler and Hakuta, 2004). It is widely assumed that bilingual children have greater metalinguistic skills (phonological, orthographic and morphological awareness) compared with monolingual children, because they are simultaneously learning two separate language codes (Chen *et al.*, 2004). In the bilingualism literature, based on theoretical perspectives, it is hypothesised that as the bilingual child is exposed to more than one phonological system, this causes them to develop high levels of PA (Yelland *et al.*, 1993; Bruck and Genesee, 1995; Campbell and Sais, 1995).

In addition, Bialystok and Herman (1999) in their narrative review of literature related to experience with stories and book reading, concepts of print and phonological awareness, noted that it is possible that children with two languages have more advanced PA compared with their monolingual peers because they may be exposed to more activities, such as language games, during their childhood. These activities might increase PA due to increased exposure to oral language and increased knowledge of vocabulary. All of these elements increase sensitivity to the speech-sound units of language and thus promote PA. Based on this facet, it could be argued

that bilingualism allows children to recognise two different sets of sounds, which provides them with more sensitivity to the sound units that make up words.

In the bilingualism literature, there is controversy concerning the age at which the bilingual advantage for PA emerges and disappears. There is evidence to suggest that the advantages for PA development in favour of bilingual children emerge at the age of five, but diminish by the age of six when formal schooling in reading begins (Bruck and Genesee, 1995; Campbell and Sais, 1995). Moreover, Bruck and Genesee (1995) and Campbell and Sais (1995) emphasised that the phonological structure of the two languages involved should be taken into account when explaining the potential influence of bilingualism on PA.

The bilingual advantage of PA skills has been supported in many experimental studies with children from different bilingual backgrounds. Evidence for this, for example, is provided by a study carried out by Canbay (2011) in Turkey. The researcher examined one of the PA skills (word recognition based on initial phoneme identification) in three pre-school children: Turkish-English bilingual (4 years and 5 months), monolingual Turkish (4 years and 4 months) and monolingual English (4 years and 3 months). The study aimed to explore if the bilingual child had an advantage in terms of PA over his monolingual peers. The participants were assessed using a word recognition task through the initial phoneme. The results revealed that the bilingual child outperformed his monolingual peers. However, a limitation of this study was its sample size. The small number of children who participated may affect the interpretation of the findings because a small sample size is inevitably less representative of the population.

Further evidence comes from a longitudinal study conducted by Verhoeven (2007). The researcher investigated the relationships between bilingual development and the PA of 75 Turkish-Dutch bilingual kindergarten children (mean age: 5years and 5 months). The children's proficiency in Turkish (L1) and Dutch (L2) was tested through a series of tasks, examining phonological, lexical, morpho-syntactic and textual abilities on two occasions (at the beginning and end of kindergarten). Phonological awareness abilities were assessed by means of four different tests (rhyming, word objectification, phoneme segmentation and word blending). The results of examining the influence of the two languages on PA and on each other showed the children's L2 knowledge at the end of kindergarten to be a better predictor of PA skills than either L1 or L2 at the start of kindergarten. The findings from this study lend strong support to the linguistic interdependence hypothesis, which claims that developmental patterns of abilities in L1 are significantly related to those in L2 and there is a significant amount of transfer from L1 to L2.

In a more recent study, Laurent and Martinot (2010) examined the PA skills of 44 bilingual French-Occitan and 55 monolingual French speaking children between the ages of 8 and 10 in grades 3–5 of primary school to test the impact of early bilingualism on the development of PA. The performance of these two groups was compared in a set of PA tasks involving syllable deletion (initial, medial and final), phoneme deletion and syllable and phoneme permutation. The results showed that no significant difference in the performance of these two populations at the age of eight on these tasks. One year later, when the participants were nine years old, there were considerable differences in the performance on PA tasks between children exposed to two languages and the monolingual children. From the age of nine, bilingual children scored higher than their monolingual peers in PA tasks. Findings such as these support the assumption that bilingualism has a positive impact on the development of PA skills.

However, it should be noted that a number of researchers have found no bilingual advantage for PA. For example, Lesniak *et al.* (2014) confirmed this in their study of 54 typically developing children aged five to six years. The children were assigned to one of three different groups based on their language background: monolingual English speaking (N = 18), bilingual Polish-English (N = 18) and bilingual Portuguese-English (N = 18). Participants were assessed on a range of PA tasks using standardised assessments (syllable segmentation, syllable identification, alliteration, rhyme detection, phoneme isolation and phoneme segmentation), while the rhyme generation task was developed in the research project. They were also assessed on their knowledge of letters. The findings indicated that English monolingual children had higher scores compared with their bilingual peers on all measures of PA tasks, excluding three tasks: rhyme detection, phoneme isolation and letter knowledge. The monolingual English and Polish-English bilingual groups performed equally well in the rhyme detection task. The findings also indicated that the three groups' scores did not differ on either the phoneme isolation or letter knowledge tasks. The researchers concluded there was no bilingual advantage for PA skills among the bilingual populations studied and they suggested that the language learning context (parental education, socio-economic status and community language) may contribute to the lack of bilingual advantage. It is worth mentioning that the Polish parents were generally highly educated and literate, while the Portuguese parents were mostly illiterate and poorly educated; this difference in parental education in turn may not support bilingual advantage. However, although this research provides further information on how being bilingual and from different backgrounds may affect the development of PA skills, it was conducted with only a small sample. As there were only 18 children in each group, these results might not be representative of the majority of such children.

In another study, Bialystok *et al.* (2003) provided evidence indicating that bilingualism alone is not sufficient to account for differences in the development of PA skills in bilingual children. In one study, the researchers compared the PA skills of 33 English-speaking children and two groups of bilingual children: 25 Spanish-English bilinguals and 31 Chinese-English bilinguals. Each group involved children from different age groups: monolingual English N = 16 (mean age 6 years and 7 months) and N = 17 (mean age 7 years and 5 months); bilingual Chinese-English N = 16 (mean age 6 years and 6 months) and N = 15 (mean age 7 years and 6 months) and bilingual Spanish-English N = 12 (mean age 6 years and 7 months) and N = 13 (mean age 7 years and 4 months). The children were tested on a range of PA and reading tasks (phoneme segmentation, phoneme substitution, sound-meaning, word identification and word attack). The findings showed that the only phoneme substitution task was correlated with the level of performance in reading for the three groups. The results also showed that there were no differences between the groups in the sound-meaning and phoneme substitution tasks and only the phoneme segmentation task produced differences between the three groups. Compared to their monolingual peers, the Spanish-English bilingual group scored higher on this task, while the Chinese-English bilingual group had lower scores. The researchers suggested two possible explanations for these results: first, they could be due to the similarity in the sound structures of English and Spanish in comparison with those of English and Chinese; second, these results could be attributed to the nature of Spanish, in which the simple phonetic structure has an important role in promoting early access to PA.

Thus, Bialystok *et al.* (2003) suggested that the superior PA among bilingual children may be due to other factors, such as the nature of the phonology and orthography of the two languages and the proficiency in each language, rather than bilingualism itself. To support this assertion, Bialystok *et al.* (2003) argued further that the language of literacy instruction may play an important part in PA development among bilinguals rather than bilingualism itself. The researchers tested two groups of children: English monolinguals (N = 39, mean age: kindergarten = 6 years, grade 1 = 7 years, grade 2 = 7 years and 10 months) and French-English bilinguals (N = 36, mean age: kindergarten = 5 years and 9 months, grade 1 = 6 years and 10 months, grade 2 = 7 years and 8 months). The children were assessed on the following tasks: phoneme substitution (segmentation and manipulation of sounds) and working memory tasks (digit span and picture recall). The performance of the subjects showed that there were effects of school year for working memory measures between groups that in turn indicated that working memory develops with age for all children, not just for the bilingual group. One interesting point that emerged from the comparison between the two groups was that the performance of

English monolingual children was better than the bilingual group in the sound condition task, indicating an advantage for the English monolingual children. However, the results showed that the performance of the monolingual and bilingual children was identical in this task when PA was assessed in the same language as that of literacy instruction. As stated by the researchers, this is because of the children's experience of learning to read and the powerful effect specific to the language of literacy instruction. Therefore, it is not only the nature of the two languages and the level of proficiency in each language that exert an effect; rather, the language of literacy instruction may also contribute to development of PA in a bilingual population.

In short, the studies mentioned previously indicate that there are still considerable contradictions in the findings related to the issue of how bilingualism typically affects the development of PA skills. Despite these different views, examining the development of PA in children growing up with two languages can certainly provide an understanding of literacy development in this population (Martin, 2011).

2.5 Cross-linguistic skill transfer

Linguistically, the concept of 'transfer' relates to the carrying over (transfer) of the learner's knowledge in their native language (L1) into the second language (L2) (Corder, 1967). According to Olden (1989, p. 27), transfer can be defined operationally as "the influence resulting from similarities and differences between the target language and any other language that has been previously acquired". The term 'transfer' is generally understood to mean using what is already known about native language speech habits to support L2 comprehension or production (O'Malley and Chamot, 1995).

2.5.1 The contrastive analysis hypothesis

In second language acquisition studies, linguistic transfer is one of the key issues characterising the contrastive analysis hypothesis (CAH) (Lado, 1957). The CAH is based on both psychological and linguistic foundations. The psychological perspective is based on behavioural views of learning. According to behaviourists, transfer or interference essentially involves habit formation and difficulties in language acquisition are due to the differences between the L1 and L2. In other words, the struggle to master certain structures in the L2 may be caused by the differences between the learner's native language and their L2.

The linguistic perspective draws on structural linguistics and is solidly based on the notion that mastering certain structures in the L2 depends on how they compare with those in the L1 (Lado, 1957). To be more specific, this view assumes that it is possible to predict and describe the

features of the L2 that will cause difficulty for the learner of the L2 based on a systematic comparison of the structures of the L2 and the mother tongue (L1).

There are three different versions of the CAH: strong, weak and moderate. The strong version claims that the main difficulty in L2 learning arises due to interference from the L1 system. More specifically, this version is based on the central notion that interference from the learner's L1 is the main factor in L2 learning and in the case of greater distinctions between the L1 and L2, more difficulties will be experienced in learning the L2. The weak version focuses on explanations of errors in language learning (Wardhaugh, 1970). To illustrate further, one of the key precepts of this version is that insufficient knowledge of the L2 is the main source of errors. Finally, the moderate version, as suggested by Oller and Ziahosseiny (1970), focuses on the hierarchy of difficulties in L2 acquisition based on their study of spelling errors. They proposed that wherever patterns in the native and the target languages are minimally distinct in form or meaning, learners may face some problems in L2 learning.

According to the basic conception of the CAH, which compares the features of the L1 and L2 to identify their similarities and differences, there are two kinds of transfer: positive and negative. Positive transfer refers to the similarity found in certain aspects of language (such as phonetics, syntax and semantics) between the L1 and L2. In this case, the L2 will be easier to learn. In contrast, negative transfer or interference occurs when there is a considerable difference between the features of the L1 and L2. In this case, the L2 will be very difficult to learn. A good example of the transfer of grammatical structural knowledge between the L1 and L2 can be found in native Arabic speakers learning English as their L2. They are challenged in mastering the usage of 'wish' in English because of the linguistic differences between Arabic and English. This difficulty is especially evident in dealing with English tenses, in which there are different verb forms according to the time reference. In the case of the verb 'wish', the verb form does not correspond with the time reference. However, Arabic native speakers do not face difficulties in learning conditional sentences. This could be attributed to the structural similarities between Arabic and English in this respect, as the same devices are used in both languages to express non-factual situations in the present (Al-Khawalda and Alhaisoni, 2012). In short, it could be argued that the most useful contribution of the CAH to L2 acquisition is its ability to predict learning difficulties between the L1 and L2.

2.5.2 Hypotheses addressing the relationship between language skills in L1 and L2

There are two major hypotheses that address the relationship between language skills in the L1 and L2. According to the linguistic interdependence hypothesis (LIH), developed by Cummins

(1981), each L1 and L2 contains surface features keeping the two languages separate from each other. Below these surface manifestations, there is a store of proficiencies that are common across languages, including cognitive and linguistic competences, called 'common underlying proficiency'. Therefore, there is a significant association between L1 and L2 and hence an insufficiency in one language should also appear in the other. Furthermore, skills in reading, writing and general linguistic skills (such as PA and vocabulary) that are successfully developed in the L1 should automatically be transferred to the L2, regardless of orthography type. This hypothesis predicts that certain aspects of L1 linguistic knowledge can be transferred positively during the process of L2 acquisition and enhance literacy skills in the L2. Many studies have investigated the cross-linguistic transfer of PA between alphabetic languages and English and support this hypothesis, for example, French-English (Chiang and Rvachew, 2007), Italian-English (D'Angiulli *et al.*, 2001) and Farsi-English (Arab-Moghaddam and Sénéchal, 2001).

Alternatively, the script-dependent hypothesis (SDH) put forward by Geva and Siegel (2000) claims that the orthographic transparency and writing systems of the different languages play an important role in literacy development in L2. Therefore, the problems encountered in reading and writing may be caused by the differences in orthographic rules between languages. For example, Arabic children who are learning English as an L2 may face difficulties in reading and writing due to the differences in the orthographic transparency of the two languages. Evidence supporting the SDH comes from cross-linguistic studies of alphabetic languages and English which have found that cross-linguistic transfer of orthographic knowledge depends on the orthographic features of the languages (Deacon *et al.*, 2009; Abu-Rabia and Sanitsky, 2010; Deacon *et al.*, 2013).

Taken together, the LIH relates to both oral and written language, while the SDH is associated only with written language. In the realm of bilingualism, these two hypotheses have provided theoretical accounts of the processes of learning to read and write in two or more languages.

2.6 Cross-language transfer of phonological awareness

2.6.1 Transfer of emerging phonological awareness skills across alphabetic languages

It is widely accepted that the sequence of PA development is universal across languages (Cisero and Royer, 1995; Anthony and Francis, 2005). The emerging skills in the development of PA in one language can be transferred across alphabetic languages (Adams, 1990; Comeau *et al.*, 1999; Gillon, 2004; Chiang and Rvachew, 2007; Sun-Alperin and Wang, 2009). However, according to Saiegh-Haddad and Geva (2010, p. 266), "many existing studies of cross-language

transfer have proposed that transfer is not a two-way free highway and it may be more likely to occur from the strong to the weak language than vice versa". In addition, linguistic differences in language representation may also constrain the transferability of linguistic insights (Saiegh-Haddad *et al.*, 2010).

2.6.2 Evidence of the transferability of phonological awareness across alphabetic languages

Evidence of the transferability of PA across languages is abundant. For instance, a study carried out by Durgunoglu *et al.* (1993) examined English and Spanish word identification skills and Spanish phonological awareness abilities in 27 Spanish-speaking children who were learning English as an L2 in the first grade (mean age 7 years and 1 months). The children were tested in both Spanish and English reading skills. The results showed that participants who did well on Spanish PA tasks read English words and pseudowords better than participants who performed poorly on these tasks. This indicates that developing PA and word recognition skills in the L1 is likely to enhance L2 word reading. Therefore, this study suggests that Spanish phonological awareness ability seems to be a reliable predictor of reading in English.

A longitudinal study undertaken by Comeau *et al.* (1999) investigated cross-linguistic transfer between English and French. The participants were English-speaking children (N = 122) enrolled in French immersion programmes for one year (N = 40, 6 years; N = 42, 8 years; N = 40, 10 years). The children's phonological processing (cognitive ability, lexical access, verbal working memory and PA) and word decoding skills were assessed in both English and French. Syllabic and phonemic segmentation tests were used as measures of PA. The children were retested one year later in grades 2, 4 and 6 respectively. The results showed that a significant relationship between PA in L1 and reading achievement in both languages. The researchers concluded that PA abilities in the two alphabetic languages were strongly correlated at both time1 ($r = 0.88$) and time 2 ($r = 0.87$). Hence, this evidence confirms the conclusion that cross-language transfer of PA occurs between alphabetic languages.

Another study conducted by Wade-Woolly and Geva (2000) aimed to examine the phonological and orthographic processing skills of English-Hebrew bilingual children (N = 34, age 7 years). The children were assessed for both phonological and orthographic recognition, reading skills, sentence comprehension and PA skills. A phoneme deletion test was used as a measure of PA. The results showed that phonological ($r = 0.51$, $p < 0.05$) and orthographic recognition ($r = 0.44$, $p < 0.05$) tasks in the two languages were correlated with each other. The results also showed a correlation between English and Hebrew in the phoneme deletion task ($r = 0.25$).

Furthermore, there was a significant cross-linguistic correlation (r = 0.47) in the phonological recognition tasks. This finding emphasises that phonological transfer is an important factor in reading. Conversely, there was no cross-linguistic relationship in the orthographic recognition tasks. The likely cause of these results is that cross-linguistic transfer depends on the similarities in certain language elements, including shared phonological and orthographic characteristics.

Hamilton and Gillon (2006) tested the PA skills of 10 school-aged Samoan-English bilingual children (aged from 5 years and 6 months to 7 years and 3 months). They assessed PA skills at three levels (syllable, onset-rime and phoneme) in English and in Samoan. The Test of Phonological Awareness (TOPA) (Torgesen and Bryant, 1994) and the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgesen and Rashotte, 1999) were used to assess children's PA skills in English. The experimental tasks were used to assess Samoan PA skills. Based on the analysis, the researchers stated that there were no observable differences in the participants' scores at the phoneme level in the two languages and suggested that formal literacy instruction in phoneme awareness skills provided in English results in improvement in PA skills in Samoan. Findings such as these are in line with the view that a cross-linguistic transfer of phonemic awareness skills occurres between two alphabetic languages. However, a key limitation of this study was the small number of children, which might have influenced the interpretation of the findings.

In a similar vein, Chiang and Rvachew (2007) hypothesised that there is an association between PA and vocabulary skills in English and French in bilingual children. They recruited 44 kindergarten-aged children ranging in age from 5 years and 5 months to 6 years and 7 months and administered the English Auditory Analysis Test (Rosner and Simon, 1971) and the French version of this test. Receptive and expressive vocabulary tests were also administered. It is clear from the results that English PA explained unique variance in French PA skills. Hence, the results support the existence of linguistic transfer of PA skills across languages and that PA in the L2 is mainly explained by the development of PA in the L1. In terms of vocabulary, Chiang and Rvachew's (2007) findings indicated that expressive vocabulary also explained unique varience in PA compared with receptive vocabulary. These results are compatible with the lexical restructuring hypothesis (Metsala and Walley, 1988; Walley, 1993), which emphasises the critical role of vocabulary growth in the development of PA skills.

Few studies have examined the transfer of PA skills between Arabic and English and its effects on reading acquisition. A study conducted by Saiegh-Haddad and Geva (2008) assessed the relationship between morphological awareness and PA and considered the relevance of these

skills for word and pseudo-word reading accuracy and complex word reading fluency. Their sample comprised 43 English-Arabic bilingual children (aged from 8 years and 7 months to 11 years and 9 months) at a bilingual private school in Canada. The researchers assessed word reading accuracy and complex word reading fluency, but not reading comprehension. They used the Auditory Analysis Test (Geva *et al.*, 2000), modeled after Rosner and Simons' (1971) test, to measure the students' PA in English and adopted a parallel test of PA in Arabic. They concluded that PA skills predict word reading fluency across English and Arabic; moreover, morphological awareness in the two languages predict complex word reading fluency. The results also showed a significant correlation between PA in English and in Arabic. Morphological awareness in the two languages, which differ in morphological transparency and orthographic depth, was not correlated. However, the researchers measured phonological processing skills and did not take into account other variables, such as phonological memory and naming speed.

On the basis of several relevant studies, Farran (2010) examined the connection between oral language (with a focus on PA, morphological awareness and vocabulary) and reading (with a focus on vowelised word reading, unvowelised word reading, pseudoword decoding and reading comprehension) among third-, fourth- and fifth-grade English (L1) and Arabic (L2) bilingual children (N = 83, aged from 8 years and 7 months to 10 years and 9 months). The researcher used norm-referenced assessments and experimental measures for all these skills. The findings of this study are consistent with previous research pointing to the significant cross-linguistic correlation in phonological awareness skills between the two languages. In contrast, no relationship was found between Arabic and English morphological awareness. In addition, phonological skills predicted word reading, pseudoword decoding and complex word reading fluency in Arabic and English; morphological awareness predicted complex word reading fluency in Arabic, but not in English. The results also indicated that vocabulary predicted reading comprehension in Arabic and English.

Jayusy (2012) investigated the relationships between three metalinguistic awareness skills (PA, orthographic awareness and morphological awareness) and within-language and cross-language word reading, pseudoword decoding and reading comprehension in Arabic (L1), Hebrew (L2) and English (L3) among trilingual children. Analysis of the data in this study revealed that only PA was strongly correlated across the three linguistic pathways tested (L1–L2, L1–L3, L2–L3). The researcher stated that orthographic and morphological awareness skills transferred across the three languages tested, regardless of the orthographic transparency of the specific language. Regarding the orthographic data, the results suggest that the similarity

between Arabic (L1) and Hebrew (L2) in the consonant-vowel (CV)-based orthographic structure might influence developmental sensitivity to the orthographic architectures in these two languages compared to English, which has different orthographic patterns. In terms of the morphological data, the results imply that the derivational similarity in the morphological structures of Arabic and Hebrew enhances the development of morphological awareness skills in these two Semitic languages, but not in English, which has a dissimilar derivational structure. Overall, these results would seem to suggest that metalinguistic awareness skills do transfer cross-linguistically.

A cross-sectional and longitudinal study undertaken by Al-Sulaihim (2014) examined the relationship between PA and literacy skills in typically developing monolingual Arabic speaking and bilingual Arabic-English speaking bilingual Kuwaiti children ranging in age from 5 years and 5 months to 6 years and 3 months. The children were divided into four groups: monolingual kindergarten, bilingual kindergarten, monolingual first grade and bilingual first grade. They were assessed on a battery of PA tasks at three levels (syllable, rhyme and phoneme), single word reading and a letter knowledge task. Bilingual participants were evaluated using measures in Arabic and English, whereas monolinguals were only assessed on Arabic tasks. The first-grade groups were tested at two different time points during the school year, while data for the kindergarten groups were collected only once. The bilingual groups achieved higher scores on most PA skills in Arabic, indicating that bilingual children have an advantage in PA skills compared with their monolingual peers. Furthermore, the results showed that Arabic PA skills were associated with reading in English. This means that the findings support the idea of a cross-linguistic transfer effect of PA skills.

Further evidence of the cross-linguistic transfer of PA in Arabic and English comes from intervention studies. For instance, Ghattas (2011) studied the effect of the Lindamood Phoneme Sequencing Programme (LiPS) (formerly called the Auditory Discrimination in Depth or ADD) in improving PA skills. Six Arabic-English bilingual grade 1 children aged from 6 to 7 years had poor PA knowledge in both languages. They were chosen based on their scores in PA tasks. They scored at a lower grade level in one of these tasks. The main aim of this study was to determine the relationship between PA in Arabic (L1) and English (L2). The Sound Awareness Test (Woodcock and Johnson, 1989) was used to assess the children's level of PA in English and an adapted Arabic version was used to assess the children's level of PA in Arabic. The results indicated that there was a significant improvement in the children's PA in English after the LiPS programme. Evidently, the LiPS programme had a positive influence on the children's PA. The results also showed a positive association between Arabic and English PA skills

(rhyming, deletion and substitution). More specifically, Arabic PA skills were significantly correlated with those in English in both pre- and post-tests (rhyme: pre = 0.84 and post = 0.74; deletion: pre = 0.69 and post = 0.45 and substitution: pre = 0.84 and post = 0.872). The small sample size is the main limitation of this study and diminishes the validity of the results.

In several studies of bilingual speakers from various L1 backgrounds, it has been proposed that PA is a predictor of spelling competence. For example, a review of 27 studies carried out by Figueredo (2006) to examine the impact of the first language on the development of English spelling for learners of English as a second language (ESL) found that there may be positive or negative linguistic transfer of PA and spelling ability across languages based on the characteristics of each language. In addition, Figueredo (2006) reported that positive transfer may occur when similarities exist between orthographies and negative transfer may temporarily occur due to the generalisation of certain rules in the L1 to the L2 or lack of awareness of the L2. A similar conclusion was reached by Xuereb (2009), who carried out a study with 50 typically developing Maltese-English bilingual children ranging in age from 8 years 0 months to 10 years 5 months. The participants were assessed on PA, reading and spelling in both their languages. The researcher found that performance in a PA task predicted reading and spelling abilities in both Maltese and English.

Similar results were observed in a cross-linguistic study undertaken by Sun-Alperin and Wang (2009). Their study was designed to investigate how reading and spelling acquisition in English (L2) was influenced by phonological and orthographic processing skills in Spanish (L1). The sample consisted of 89 typically developing Spanish-speaking children learning English as an L2. The researchers found that phonological processing skills in Spanish predicted English word reading and spelling in Spanish-English bilingual children. Conversely, orthographic processing in Spanish did not predict English orthographic processing. Similarly, De Sousa, Greenop and Fry's (2010) findings suggest that phonological processing skills in Zulu predict spelling in English (L2) in typically developing Zulu-English bilingual and monolingual English children. Zulu-English speaking children were assessed in relation to Zulu PA, Zulu and English spelling skills and monolingual English children were assessed in relation to English PA and English spelling skills. The researchers indicated that the findings were consistent with the universal language hypothesis, namely that L1 PA is related to spelling across languages in Zulu-English bilingual children.

To summarise, it is clear from the studies reviewed above that PA is crucial for bilingual children and PA in the L1 predicts the early development of literacy skills in the L2. Therefore,

PA is regarded as a shared factor across alphabetic languages, compatible with both the CAH (Lado, 1957) and the LIH (Cummins, 1981).

2.7 Phonological awareness and vocabulary

It has commonly been assumed that vocabulary knowledge is one of the language acquisition variables that contributes to PA development. Gillon (2004) pointed out that understanding the relationship between PA and vocabulary is a first step in gaining a better understanding of PA and its significance for reading and spelling. As explained earlier (Section 2.3.1), the lexical restructuring model postulates that when children's vocabulary grows, their ability to restructure word representations increases. Metsala and Wally (1998) proposed four factors that affect these representations: sound similarity among words in the child's lexicon, word familiarity, age of acquisition and vocabulary size. It is thought that the growth of vocabulary is predicted by the long-term storage of the phonological representational structure of words (Levelt *et al.*, 1999).

It is well documented that there is a positive association between lexical knowledge and PA in typically developing children (Metsala, 1999; De Cara and Goswami, 2003; Lund *et al.*, 2015). For instance, Metsala (1999) reported that for children aged four to six years, the performance in PA skills at the rime-onset and phoneme levels is positively related to receptive vocabulary size. The findings of this study revealed that older children performed better than younger children in all tasks (PA and vocabulary). These findings may be explained by the fact that PA skills in young children develop gradually because of the growth in spoken vocabulary. That means knowing a larger number of words promotes children's phonological systems to be more aware to the sound differences between the spoken words. In addition, children's performance in PA tasks related to real words was better than those related to non-words. Such as these findings can be interpreted as that the familiar spoken words (i.e. real words) can be more easily accessed in PA tasks than unfamiliar words (i.e. non-words). Therefore, this study argues the importance of growth in spoken vocabulary for promoting development in PA skills.

Further evidence in this regard has also been found in a study by Zens *et al.* (2009). The purpose of this study was to determine the effectiveness of PA and semantic interventions in improving the word-learning skills of children with specific language impairment (SLI) and whether the order of treatment had an influence on outcomes. The sample comprised 19 children with SLI and 19 children with typical language development (aged 6 years and 2 months to 8 years and 3 months) who participated as a control group. The children with SLI were randomly assigned to one of two treatment conditions: group A) PA followed by semantic intervention and group

B) semantic intervention followed by PA intervention. They were assessed using PA and semantic word-learning probes on three times (pre-, mid- and post-test) in order to determine the effectiveness of each intervention. The findings revealed that the performance of children in group A improved significantly for both PA and semantic skills after the PA intervention, but not after the semantic intervention, whereas their word learning improved significantly. In terms of group B, their performance first improved in semantic skills after the semantic intervention and in then PA skills after the PA intervention; however, their performance in word learning vocabulary did not improve. The results also showed that neither group improved in the comprehension of new words and the researchers suggest that this is because the children were actually at a ceiling for that task. The researchers concluded that good PA skills are a necessary foundation for word learning and there is therefore a relationship between PA and vocabulary knowledge in the direction of PA to vocabulary.

In a more recent study that attempted to clarify the correlation between PA skills and lexical knowledge, Lund *et al.* (2015) compared the performance of English monolingual and Spanish-English bilingual pre-school children (ranging in age from 3 years and 3 months to 5 years and 10 months) with and without hearing loss in PA skills and vocabulary. The participants are assigned to four groups: English monolingual with normal hearing (N = 9), English monolingual with hearing loss (N = 9), Spanish-English bilingual with normal hearing (N = 10) and Spanish-English bilingual with hearing loss (N = 9). Rhyme and initial sound tasks were used to measure PA. Comparisons between groups showed that performance of PA skills was positively correlated with vocabulary for the groups with normal hearing, the results supporting the lexical restructuring model of PA development. In contrast, there was no relationship between PA skills and vocabulary for children in the hearing loss groups. The researchers offered three possible explanations for these results: first, the lexical restructuring model is valid only for children with normal hearing and does not explain how children with hearing loss acquire PA. Second, the researchers proposed that if the patterns of PA development of children with hearing loss differ from those of normally hearing children, it seems likely that a different path of development may cause differences in literacy performance. A further possible explanation is that the vocabulary measures used in this study lead to a lack of association between PA and vocabulary knowledge. The results also showed that the performance of both bilingual children with hearing loss and monolingual children with normal hearing was comparable in PA skills and these two groups performed better than other groups. This shows an advantage in PA for bilingual children with hearing loss.

Furthermore, longitudinal studies have concluded that performance on both receptive and expressive vocabulary tasks predicts unique variance in PA (Silvén *et al.*, 2002; Sénéchal *et al.*, 2006). For example, Silvén *et al.* (2002) followed the progress of a group of Finnish children (N = 66) to study how PA is influenced by sensitive mother–child interaction and the child's language development. At 12 and 24 months of age, children were videotaped with their mothers to assess maternal sensitivity (mother–child interactional sensitivity) and with an experimenter to test their vocabulary. A detection of words task was used to assess PA at 36 and 48 months of age. The results indicated that prediction of PA can be attributed to vocabulary learning at the earliest stage. The results also showed a significant relationship between interactional sensitivity and PA development. This seems to indicate that mother–child interaction is one of the factors that may influence the child's ability to distinguish sound patterns in words as early as 3 years of age. The researchers draw the conclusion that children who have high quality play interactions with their mother during the first years of life tend to have a greater awareness of sound patterns in words and their vocabulary knowledge seems to determine the development of awareness. There is, therefore, a correlation between PA and vocabulary acquisition in the direction of PA to vocabulary.

Although it is widely assumed that vocabulary knowledge is related to PA development, it should be noted that some researchers have found no such correlation (Gathercole and Baddeley, 1990; Garlock *et al.*, 2001). For example, Garlock *et al.*'s (2001) study aimed to examine the effect of lexical factors associated with vocabulary growth (age of acquisition, word frequency and neighbourhood density) on spoken word recognition. The sample in the study consisted of pre-school children (N = 64), elementary school children (N = 64) and adults (N = 64) (mean ages 5.6, 7.6 and 25.6 years respectively). The participants were assessed on receptive vocabulary, PA (isolation and deletion of initial phoneme), word repetition and gating tasks (a series of trials with increasing amounts of acoustic-phonetic input from word onset). The results showed that whilst the effect of word frequency in both repetition and gating was minimal, the age of acquisition and neighbourhood density did have some effects for all groups. However, the results suggested that while vocabulary predicted word reading, it was not a predictive factor for PA. This study thus shows that there is no obvious link between children's developing phonological skills and their vocabulary knowledge.

2.8 Phonological awareness and reading acquisition

2.8.1 The importance of phonological awareness for reading

Phonological awareness has been shown to be a good predictor of reading due to its paramount role in connecting spoken and written language. Liberman and Shankweiler (1991) stated that the orthographic writing system in alphabetic language represents spoken language at a phonological level. That is, knowledge of the sound structure of words allows children to make connections between phonological and orthographic representations of words. Consequently, reading alphabetic writing systems requires a priori knowledge of the phonemes that the graphemes represent. This is supported by studies of reading acquisition among deaf and hard of hearing children, who have difficulty making associations between phonics skills and phonemic awareness (Guardino *et al.*, 2011). Consequently, children who are deaf or hard of hearing require explicit instruction in a combination of phonemic awareness and phonics instruction that may benefit early readers (Beal-Alvarez *et al.*, 2012).

There is consensus that the development of children's PA is essential for reading in an alphabetic script (Bialystok and Herman, 1999; Anthony *et al.*, 2002). However, Bus and van IJzendoorn (1999), in their quantitative meta-analysis of experimental training studies examining the influence of PA training on reading, argued that PA is a substantial predictor in the development of early reading; however, it is not the only strong predictor. The researchers argued further that word-specific knowledge of written language is also an important predictor for learning to read.

2.8.2 Studies of monolingual English speaking children

Many studies conducted with monolingual English speaking children have demonstrated overwhelming evidence that PA is typically linked to learning to read and the progress of children in reading skills relies on their phonological skills (Wagner *et al.*, 1994; Goswami and Bryant, 1999; Gillon, 2004; Gillon, 2005). Some studies have focused on whether pre-reading PA knowledge is correlated with early reading ability (MacLean *et al.*, 1988; Stuart and Coltheart, 1988). Other studies have focused on the predictive power of PA skills in reading abilities (Bradley and Bryant, 1983; Bryant *et al.*, 1989). This section considers some evidence drawn from studies of monolingual English speaking children that confirms the importance of PA in learning to read.

The association between PA skills and reading ability has been established in many longitudinal, correlational and intervention studies. One longitudinal study carried out by

Bryant *et al.* (1989) aimed to establish the links between children's early knowledge of nursery rhymes and their progress several years later in reading and spelling. The researchers followed the progress of 64 British children who ranged in age from three to six years on measures of knowledge of nursery rhymes, PA skills (rhyme detection, phoneme awareness), reading and spelling. The results showed that the children's early knowledge of nursery rhymes was closely related to the development of PA skills over the following three years, which was in turn related to the children's success in reading and spelling. The possible explanation for this, as indicated by the researchers, might be that children's early knowledge of nursery rhymes enhances their sensitivity to rhyme and alliteration, which in turn helps in developing their PA skills. These results are compatible with the claim that rhymes, which involve large phonological units, are easier to segment for young children than small units of sounds (phonemes) and that such knowledge is necessary for the subsequent development of phoneme awareness.

Furthermore, the findings of a short-term longitudinal study by Hulme *et al.* (2002) indicated that phonemic awareness is a stronger predictor of word reading performance than onset-rime awareness. Seventy-two children aged 5–6 years were involved in this study. They were assessed on three PA tasks (deletion, oddity and detection) at the phoneme and onset-rime levels. The results revealed that the measures used to test the phoneme awareness level were significant longitudinal predictors of children's early reading skills compared with measures of the onset-rime awareness level.

Taken together, the results from these longitudinal studies suggest that in the beginning stages of reading, English speaking children rely on their onset-rime awareness to help them read because their knowledge of phonemes has yet to develop. Once children have acquired phonemic awareness, they start to read more fluently. This is consistent with the hierarchical nature of PA progression, namely that children's PA ability continuously progresses from awareness of large units (syllables and rhymes) to awareness of small units (phonemes) (Carroll *et al.*, 2003; Anthony and Francis, 2005).

Intervention studies have also considered the relationship between PA and reading skills. McGuinness *et al.* (1995), for example, investigated the impact of training in English phonology on improvements English speaking children's PA and reading outcomes. Children, ranging in age from 5 years and 11 months to 7 years and 9 months, were given explicit instruction in English phonology using the Auditory Discrimination in Depth (ADD) programme (Lindamood and Lindamood, 1975). This method gives children the opportunity to discover and categorise English phonemes and how to link sounds to print. Participants were divided

into three groups, one control group (N = 12) and two experimental groups (N = 15 each). The first experimental group consisted of children who attended a Montessori school (pre-school to primary grade II, 3–13 years) and the other children were enrolled in a local private school (pre-school to high school). The control group also came from the private school. Children were compared before the study using a series of reading development tests that the researchers had developed for this study. The control group was taught using a modified whole-language approach, which was based on prior instruction in phonics for both letter-sound and letter-name correspondences. The two experimental groups were taught by teachers trained in the ADD programme. The children were usually trained for 20–30 minutes each day. They were assessed on a series of tests, which included phonological processing tasks, real word and pseudo-word reading at the beginning and end of the school year. The performance of the experimental groups in reading was better than that of the control group. Surprisingly, after the ADD training the experimental groups did not outperform the control group on the PA test. The authors suggested that the reason for this is that PA training must be associated with knowledge of both alphabetic principles and the relationship between phonemes and graphemes or phoneme-grapheme correspondence in order to improve reading ability in children. Based on these research results, the authors argued that PA instruction facilitates learning to read.

2.8.3 Studies of monolingual Arabic speaking children

The evidence obtained from monolingual Arabic speaking children relates particularly to the critical role of PA skills in learning to read in MSA (Al Mannai and Everatt, 2005; Taibah and Haynes, 2011; Ibrahim, 2013; Tibi and Kirby, 2018). This section presents evidence from Arabic studies showing that PA makes a unique contribution to improvement in the reading of Arabic speaking children in MSA.

Al Mannai and Everatt (2005) examined the predictors of literacy skills (word reading and spelling) among typically developing monolingual Arabic speaking Bahraini children (N = 171, ages ranging from 6.25 to 10.42 years). Measures of PA (rhyme awareness), short-term memory, speed of processing, non-verbal ability (block design and picture completion) and ability to decode letter strings (non-word reading) were administered. The results showed that for the older children, their performance on nonverbal tasks was a better predictor of reading skills in Arabic non-vowelised texts. The researchers suggested that is because non-vowelised texts are difficult in the early stages of reading and writing and older children depend on their necessary nonverbal skills in processing texts such as these that are based on context as well as rich morphology. Regression analysis showed that PA and decoding were the best predictors of

both reading and spelling when other phonological processing variables were controlled, especially in beginning readers. This is therefore clear evidence that PA is a necessary foundation for early literacy among Arabic speaking Bahraini children, supporting the results of studies of English speaking children.

In a subsequent study, Taibah and Haynes (2010) conducted a cross-sectional study with 237 Arabic speaking children from kindergarten to third grade, who ranged in age from 5 years and 3 months to 9 years and 1 month. The children were tested on a range of phonological processing skills: PA (elision and blending), rapid naming (RAN) (object, colour, letter and digit), phonological memory (PM) (non-word repetition and digit span) and basic reading skills in MSA (word recognition, oral passage reading and non-word and comprehension fluency). The results showed a significant correlation between phonological processing abilities and reading skills at all grade levels. Higher correlations were reported for PA tasks compared to phonological memory and rapid naming tasks. Findings such as these support the conclusion that Arabic children depend at an early age on the mapping between letters and the sounds they are associated with in learning to read, whereas by the age of nine (third grade) children begin to rely on other cognitive skills, such as semantic context and visual word recognition, rather than phonological information.

One very recent study by Tibi and Kirby (2018) investigated PA and naming speed as predictors of reading skills in Arabic speaking children (N = 201, 8 years) from the United Arab Emirates. Children were assessed on the following measures: nonverbal ability, verbal ability, vocabulary, PA (syllable deletion, phoneme deletion and blending), naming speed, reading skills (real word, pseudo-word, word reading fluency, text reading fluency and reading comprehension). For predicting reading from PA and naming speed, hierarchical regression analyses were carried out. The results showed that both PA and naming speed measures contributed unique variance to reading outcomes. These results are in line with results from the previously reviewed studies on monolingual English speaking children that suggest PA is a strong predictor of reading.

These recent findings support those of Elbeheri and Everatt (2007), who gave 332 monolingual Arabic speaking Egyptian children a series of tasks comprising PA skills (rhyme detection, phoneme deletion), reading, spelling, non-verbal ability, graph discrimination, backward digit span and rapid naming, in order to examine the association between phonological processing and reading. The children's ages ranged from 9 years 4 months to 11 years 6 months. They were split into a dyslexic group (N = 40) and a non-dyslexic group (N = 292) according to

reading ability and non-verbal ability measures. The results showed correlations between ability in literacy and phonological processing. Pearson's correlation analysis indicated that there were relationships between both PA skills and reading (rhyme detection and reading r = 0.28; phoneme deletion and reading r = 0.28). The comparison between two groups showed that the non-dyslexic group was higher than the dyslexic group on all measures except non-verbal tasks. The authors drew the conclusion that phonological skills are significant for reading among Arabic children.

Not all studies support the view that PA training influences reading development. For instance, Ibrahim (2013) conducted a study with the aim of investigating the effectiveness of PA training on Arabic speaking children's subsequent reading performance. Fifty-four kindergarten children (5 years old) involved in this study were divided into two groups: an experimental group (N = 29) received PA training, whereas the control group (N = 25) did not. The intervention programme was based on the methods of Lyster (2002), which include the use of rhymes, blending, segmenting and general sound recognition. The intervention lasted eight weeks with three sessions of 30–45 minutes each week. Prior to and after the instruction, children were assessed on a range of PA skills and tests of general abilities and reading tests were administered at the beginning of the second trimester of the first year of school. The results revealed that there was no significant improvement across the intervention period for either rhyme matching or syllable counting skills. The most striking result to emerge from this study was that the experimental group improved in certain PA skills (final phoneme matching task and phoneme counting) at the end of kindergarten compared to their peers in the control group. However, there were no significant differences in the performance of these two groups in reading. The researchers attributed the results to the assumption that typically developing Arab children encounter certain difficulties in the acquisition of reading due to factors related to the characteristics of Arabic, such as diglossia (two language varieties: MSA and SVA) and the orthographic patterns of written Arabic words. The results of this study are in contrast to the substantial literature on reading development in monolingual English speaking children, which found that phonological intervention programmes in kindergarten could enhance the subsequent development of early reading abilities (McGuinness *et al.*, 1995; Brennan and Ireson, 1997).

2.8.4 Summary

To summarise, it is thus apparent that studies with Arabic speaking children support the earlier findings from studies of English speaking children. PA is a robust predictor for the development of reading skills in both Arabic and English.

2.9 Phonological awareness and spelling acquisition

It has commonly been assumed that spelling requires recovery of the graphemes (orthographical decoding) from phonemic representations (phonological recoding), while the reading process requires translation of printed words into phonemic representations and recognition of the written word forms (Hulme *et al.*, 2005; Ziegler and Goswami, 2005). Thus, spelling and reading processes both depend upon phonological knowledge about spoken words. Indeed, Toméus (1984) suggested that PA has a greater impact on spelling than on reading development in children at primary school. Montréal (1991) suggested that a possible explanation for the greater influence of PA on the acquisition of spelling is that spelling ability depends heavily on the child's phonological knowledge in the conversion of sound representations to their corresponding letters. Thus, children are required to understand the connection between phonemes and graphemes in spelling.

2.9.1 Studies of monolingual English speaking children

Although the majority of research has emphasised the important role of PA in literacy development by focusing on reading competence, a small number of studies have focused on examining the relationship between PA and spelling acquisition (Griffith, 1991; Castle *et al.*, 1994; Tangel and Blachman, 1995).

Correlation studies have reported the importance of the relationship between PA and success in spelling acquisition. For instance, Griffith (1991) investigated the spelling ability of first- and third-grade children in relation to phonemic awareness. In all, 96 children aged 6 in the first grade and 87 aged 8 in the third grade participated in this study. They were given a dictated spelling test containing regular (generated only one spelling) and irregular (more than one generated spelling) words. They were also assessed on PA tasks, including phonemic segmentation, deletion, blending and substitution. Furthermore, the children were tested on their acquisition of phonemes with more than one rule-governed spelling. The findings revealed four important results. First, PA skills enable children to learn phoneme-grapheme rules, which are important for accurate spelling. Second, PA skills enable beginning spellers to segment a word into its phonemes. Third, for both 6 and 8 year olds, children with greater skills in PA were better spellers than children with poorer PA skills. Finally, PA plays a part in the spelling memorisation process, which is beneficial for later reading development.

Evidence from intervention studies has indicated that children's competence in spelling improves after PA training. Castle *et al.* (1994) conducted a study to investigate whether training in PA has a positive effect on early spelling development in kindergarten children.

Twenty-eight children aged five years participated in this study. All children were identified as having limited phonemic awareness according to their performance in a phonemic awareness pre-test. The children were assigned to two groups based on their performance in the pre-test phonemic awareness: control (N = 14) and experimental (N = 14) groups. Prior to the training, a series of tests were administered for spelling skills: the Wide Range Achievement Test of Spelling (WRAT) (Jastak *et al.*, 1965) as a standardized measure, an experimental spelling test developed specifically for the study, a dictation test and a word writing test (Clay, 1985). The experimental group received training in PA for 20 minutes twice weekly over a 10-week period. The PA training included phoneme segmentation, deletion and rhyme, substitution and sound-letter association. Process writing activities, which included writing a story and invented spelling (spelling words phonetically without following the rules of English spelling), were given to the control group. At the end of the intervention, the participants were retested and the results showed that the experimental group did not score significantly better on Clay's dictation and word writing measures compared to the control group. The researchers argued that the nonsignificant results in dictation may be attributed to the scores of post-tests that were close to the ceiling. Moreover, the nonsignificant results in the word writing measure may be justified by its open-ended nature. The results also indicated that the experimental group performed better on both the WRAT and the experimental spelling test. This led the researchers to suggest that the phonemic awareness instruction had a positive impact on early spelling acquisition.

A similar conclusion was reached by Bryant *et al.* (1989), who examined the connection between PA, reading and spelling in young English speaking children (see section 2.8.2) and found a powerful relationship between the children's early knowledge of PA and their reading and spelling skills development later on. Consistent with this, Kamhi and Hinton (2000) produced a very clear comparison between good and poor spellers and pointed out that there is a correlation between PA and spelling skills. They justified their claim by arguing that spelling mistakes are typically phonetically accurate.

2.9.2 Studies of monolingual Arabic speaking children

In the case of Arabic, the relationship between PA and spelling is considerably less well researched than the relationship between PA and reading. Several studies involving monolingual Arabic speaking children have found that, as in monolingual English-speaking children, the knowledge of PA skills is the best predictor of spelling (Al Mannai and Everatt, 2005; Elbeheri and Everatt, 2007). For instance, Al Mannai and Everatt (2005) examined the potential importance of phonological processes as predictors of early literacy skills (as detailed

earlier in section 2.8.3) and suggested, based on a series of regression analyses, that PA measures (word and non-word rhyming) play a paramount role in the prediction of spelling ability.

In a more recent study, Taha and Saiegh-Haddad (2015) confirmed the conclusions drawn from studies of English speaking children. They investigated the impact of two linguistic intervention programmes (phonological and morphological) on 289 Arabic speaking children's spelling at second grade (N = 96, age 7 years), fourth grade (N = 98, age 9 years) and sixth grade (N = 95, age 11 years). The children were assigned to three groups: morphological intervention, phonological intervention and a non-intervention control group. Prior to the interventions, the children were tested on PA, morphological awareness and spelling abilities. The experimental groups received 45-minute training sessions twice a week for 6 months. The phonological intervention group was given instruction on three phonological features: PA (phonemic blending and segmentation), phonological representations (phoneme articulation and auditory phoneme discrimination) and phoneme-grapheme correspondence rules. The morphological intervention focused on the analysis of root morphemes, derivational morphology (roots and patterns), inflectional morphology and morpho-syntactic analysis and morphological analogy in spelling. The control group did not receive any intervention. At the end of the training period, the researchers retested the children and there was a significant difference between the pre-test and the post-test scores on all tasks for the experimental groups in all grades. However, there were no significant differences between the pre-test and the post-test scores for the control group. The researchers concluded that both linguistic intervention programmes promoted children's spelling skills compared to children who had not received phonological or morphological instruction.

2.9.3 Summary

Taken together, the results of the studies reviewed in sections 2.9.1 and 2.9.2 suggest a substantial association between children's spelling skills development and PA. Therefore, a child's early competence in PA is a robust predictor of later spelling acquisition in both Arabic and English.

2.10 Conclusion

This chapter has provided a review of the existing literature regarding the concept of PA and its significant role in early literacy acquisition. A review of studies regarding the relationship between PA skills and literacy in Arabic and English has been presented. The Arabic evidence shares with that for English the view that PA skills have a role to play in the development of

reading as well as spelling. The term of cross-linguistic transfer of skills between L1 and L2 is defined and alternative theories and hypotheses are put forward as explanations for the transfer of linguistic skills were also discussed. This chapter has also reviewed a substantial body of literature concerned with the transferability of PA across languages. As stated in the literature, there is variation across studies in the direction and causality effects for PA in relation to vocabulary,working memory and literacy skills. However, this is potentailly mediated by the age of the children involved in each of the studies, e.g. preschool children in comparison to those who are learning to read. It is clear from the research reviewed that few studies of English-Arabic and Arabic-English bilingual speakers have examined the transfer of PA skills and the influence on reading acquisition. So far, however, little attention has been paid to examining children with Arabic as an L1 and English as an L2. Moreover, what is not yet clear is the relationship between PA skills and spelling acquisition for Arabic-English bilingual children and whether PA in one of the two examined languages predicts spelling skills in the other language. This indicates a need for more understanding of the transferability of PA and its impact on literacy for this population of bilingual children. Consequently, there are a number of unresolved questions in the area of PA and its association with literacy development. To address these questions, the main objective of the current study is to investigate the relationship between PA, reading and spelling in typically developing Arabic-English bilingual children.

2.11 Research questions

This study seeks to address the following questions:

1. Is there an association between phonological awareness skills in Arabic (L1) and English (L2)?
2. What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and reading tasks in both languages?
3. Does phonological awareness in either of the two languages of bilingual children predict word reading and reading comprehension in the other language?
4. What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and spelling tasks in both languages?
5. Does phonological awareness in one of the two languages of Arabic (L1) - English (L2) bilingual children predict word spelling in the other language?

Five research hypotheses that build on the research questions are examined in this study. They are as follows:

1. Based on existing evidence from cross-linguistic studies, it is hypothesised that the phonological awareness skills would be strongly associated between Arabic (L1) and English (L2).
2. It is hypothesised that children's performance on phonological awareness skills and reading tasks will be better in Arabic (L1) than English (L2) because the children have had longer exposure to Arabic in a broader range of contexts.
3. Based on the hypothesis that phonological awareness in both languages will be correlated, it is hypothesised that phonological awareness in one language will correlate with reading in the other language.
4. It is hypothesised that children's performance on phonological awareness skills and spelling will be better in Arabic (L1) than English (L2) because the children have had longer exposure to Arabic in a broader range of contexts.
5. Based on the hypothesis that phonological awareness in both languages will be correlated, it is hypothesised that phonological awareness in one language will correlate with spelling in the other language.

The methodology required to answer these questions is presented in the next chapter.

Chapter 3. Methodology

3.1 Introduction

This chapter is devoted to the explication of the research methods that were followed in this study. First, it describes the research design adopted. This is followed by information regarding the participants in the study. Data collection methods and the procedures that were used to carry out this study are also described. In addition, the data analysis methods are outlined. Finally, the pilot study and ethical issues are reviewed.

3.2 Research design

This study is followed an observational, cross-sectional quantitative methodology using norm-referenced assessments and experimental measures.

3.3 Participants and research context

The population of the study comprised bilingual children in years three and four attending primary schools in the UK who speak Arabic as their first language (L1) and English as their second language (L2). For children of Arabic heritage, it is most usual for Arabic to be the language spoken at home and for English to be learned when the children encounter it as the instructional language in school or pre-school provision. It is common for Arabic speaking children to enrol in Arabic weekend schools. One unique aspect of these schools is the emphasis on teaching the Arabic language in order to support continued development, particularly in relation to literacy. All teachers at these schools are highly qualified native Arabic speakers to ensure that children are familiarised with the sounds, correct pronunciation and writing of the Arabic language. The children attend Arabic school for approximately four hours per week, where they receive two sessions. The first session is an Arabic class aimed at developing their knowledge of Modern Standard Arabic (MSA) through the sessions in reading and speaking. The second is the Quran class, focusing on teaching the correct way to read the Quran aloud.

From this population, 80 children were recruited with fully informed parental consent. The children were aged between 7 years and 1 month and 9 years and 11 months. Children start their Arabic education when they are at age 6, so in this age range, children are able to read and spell words in both Arabic and English. The site of the study was five Arabic schools in Newcastle upon Tyne, UK. Access to participants was through the head teachers of these schools. To take part in the study, children had to meet the following inclusion criteria:

(a) Arabic as their first language (L1) and English as their second language (L2).

(b) Normal or corrected sight, as reported by parents.

(c) Normal hearing, as reported by parents.

The exclusion criteria were children identified by their teacher or parent as having:

(a) Arabic as their first language (L1) and English as their third language (L3).

(b) Significant visual or hearing difficulties.

(c) Known developmental disorders or learning disabilities.

(d) Physical disability.

3.4 Measures

Two types of data collection instruments were used in this study: a language background questionnaire and assessments in English and Arabic.

3.4.1 Language background questionnaire

After obtaining informed consent from the parents of children who met the selection criteria, a language background questionnaire was sent to them to compleete and return to the researcher. This contained questions regarding the child's language and literacy background, age at the start of the study, the number of years and/or hours attending British and Arabic schools respectively, language environment at home, educational background of the parents and parents' judgment about the proficiency rating of their child's language ability in both Arabic and English. There was also a section which included questions concerning the child's reading background in English and Arabic (see Appendix H).

3.4.2 Language assessments

Two parallel sets of measures of phonological awareness (PA), reading tasks (real word, non-word and reading comprehension) and spelling tasks (real word and non-word) in Arabic and English were used in the study. Three measures of cognitive ability (receptive vocabulary, letter name fluency and letter sound fluency) were also used (see Table 3.1). In addition, the Automated Working Memory Test (Alloway, 2007) was administered to assess the children's working memory. Because comparable standardised tests were not available in Arabic, some experimental tasks that had been developed for other research projects were adopted for use in this study. All tests were administered on an individual basis unless otherwise stated (see procedure below).

Table 3.1 Language and literacy measures

Skill	Measures in English	Measures in Arabic
Phonological awareness	Phonological Awareness Test II (Robertson and Salter, 2007) (rhyming, segmentation, isolation, deletion, substitution, blending) ***(standardised scores are available)***	Translation, Modification and Standardization of Phonological Awareness Test (Ahmed, 2011) (rhyming, segmentation, isolation, deletion, substitution, blending) ***(standardised scores are available)***
Reading tasks	Real word (Wilkinson and Robertson, 1984), non-word (Dodd, 1996), reading comprehension (Snowling *et al.*, 2010) ***(standardised scores are available)***	Real word (Taha, 2008), non-word (Taha, 2008), reading comprehension (Jayusy, 2012) ***(standardised scores are not available)***
Spelling tasks	Real word (Socre and Masterson, 2001), non-word (Dodd, 1996) ***(standardised scores are available)***	Real word (Taha, 2008), non-word (Taha, 2008) ***(standardised scores are not available)***
Vocabulary	Receptive vocabulary (Dunn.L.M. *et al.*, 2009) ***(standardised scores are available)***	Receptive vocabulary (AL-Khammash *et al.*, 1990) ***(standardised scores are available)***
Letter name fluency and letter sound Fluency	Letter name fluency and letter sound fluency ***(standardised scores are not available)***	Letter name fluency and letter sound fluency ***(standardised scores are not available)***
Working Memory	(Alloway, 2007) ***(standardised scores are available)***	

3.4.2.1 Phonological awareness tests

English: The Phonological Assessment Test II (Robertson and Salter, 2007) is a published and norm-referenced test that assesses children's PA in English. The norming sample consisted of 1,582 children from the US. The children were aged between 5 years and 0 months and 9 years,

11 months. The reliability of the test was established using the test-retest method. The average test-retest coefficients for the subtest totals and the total test all exceeded 0.90.

Arabic: The Phonological Assessment Test II (Robertson and Salter, 2007) was translated into Arabic and used to assess Arabic PA skills (Ahmed, 2011). A total of 100 Arabic children between the ages of 5 years to 9 years and 11 months participated in the standardisation of the test. Test-retest reliability estimates and the average test-retest coefficients for the subtest totals and the total test exceeded 0.92.

This test comprises a series of six standardised subtests: rhyming, segmentation, isolation, deletion, substitution and blending. It is an individually administered test and a total of 45 minutes is allowed for its completion. Each subtest is designed to assess different aspects of phonological processing. A brief description of each subtest follows:

1. Rhyme subtest

The rhyme subtest measures a child's ability to identify and produce rhyme in single syllable words. In the rhyme detection task, the child is asked to identify rhyme in each of 10 spoken word pair stimuli (for example, fan/man). In the rhyme production task, the child is asked to say a word that rhymes with each of 10 spoken single word stimuli. Raw scores are computed for the total number of correct items.

2. Segmentation subtest

The segmentation subtest measures a child's ability to segment sentences into words, words into syllables and syllables into phonemes. In the word level task, the child is required to clap once for each word in each of 10 spoken sentence stimuli. In the syllable level task, the child is required to clap once for each syllable in 10 spoken word stimuli. The stimuli include compound and non-compound words and the number of syllables ranges between one and four. In the phoneme level task, the child is required to clap once for each phoneme in each syllable of 10 spoken word stimuli. The stimuli comprise eight single syllable words and two compound words with two syllables. Raw scores are computed for the total number of correct items.

3. Isolation subtest

The isolation subtest measures a child's ability to isolate the initial, middle and final sounds in a word. In the initial sound subtest, the child is asked to say aloud the first sound in each of 10 spoken word stimuli. In the middle sound subtest, the child is asked to say aloud the middle sound in each of 10 spoken word stimuli. In the final sound subtest, the child is asked to say

aloud the final sound in each of 10 spoken word stimuli. Raw scores are computed for the total number of correct items.

4. Deletion subtest

The deletion subtest measures a child's ability to manipulate root words, syllables and phonemes in words. In the compound words and syllables task, the child is asked to say a word and then say it again without one of its parts. In the phoneme deletion task, the child is asked to say a word and then say it again without one of its sounds. There are 10 words in each task, given as spoken stimuli. Raw scores are computed for the total number of correct items.

5. Substitution subtest

The substitution subtest measures a child's ability to isolate a phoneme in a word and then change it to another phoneme in order to form a new word using coloured blocks which represent each sound in the target words. Before the test items are introduced, the examiner places three different coloured blocks in front of the child and provides an example of how to make the word with these coloured blocks and how the child can change this word into a new one by replacing one block. In the test, the child is instructed to follow the examiner's demonstration. More specifically, the child is directed to change the first, middle or last sound and he/she is told which new sound to substitute. In this subtest, therefore, the child is required to change any phoneme in a word to another one to form the required word. The number of words in this task is 10, delivered as spoken stimuli. Raw scores are computed for the total number of correct items.

6. Blending subtest

The blending subtest measures a child's ability to blend units of sound in order to form words. In the syllable blending task, a sequence of syllables is spoken to the child and then the child is asked to say what the word is. In the phoneme blending task, a sequence of phonemes is spoken to the child, who is asked to say what the word is. The number of words in each task was 10. Raw scores are computed for the total number of correct items.

It is important to mention some issues related to the PA test translation and modification process. First, in the rhyming subtest, the instructions of detection and production tasks have been translated into Arabic and other examples have been added. In translation, the English words have been changed to Arabic words that have the same linguistic characteristics of the English words. Another issue concerns the segmentation subtest. The instructions of this subtest have been translated and the child asked to count slowly on his/her fingers instead of clapping. In segmenting sentence into words, some sentences during the translation have been changed

to be easily understood by the child. More examples have been added to the instructions of the segmenting words into syllables to help children understand the question. English words have been substituted with Arabic words that have the same number of syllables. The instructions of segmenting words into phonemes were translated to Arabic and the Arabic words with short vowels were excluded.

For the isolation subtest (initial, middle and final), the instructions and the test items were translated into Arabic. In English test, the children asked to isolate the sound and if the answer is letter name instead of the sound name, the answer is considered wrong. While in Arabic version, the answer of letter name is also considered right. In addition, the instructions and items of compound words and syllables task and phonemes task in deletion subtest have been translated into Arabic.

Lastly, the instructions of both substitution with manipulatives subtest and the blending subtest (syllables and phonemes) were translated into Arabic. Some items of these subtests have been replaced with Arabic words in order to be easily understood by the child.

3.4.2.2 English reading tests

3.4.2.2.1 Real word reading subtest

The real word reading subtest of the Wide Range Achievement Test (WRAT) (Wilkinson and Robertson, 1984) was used to measure word decoding through word recognition. This subtest is part of a published, norm-referenced test. The norming sample consisted of 5,600 individuals aged between 5 and 74 years. Test-retest reliability coefficients ranged from 0.79 to 0.97. The child is asked to read aloud a list of words which gradually progress in phonological complexity of syllabic structure. A score of 0 is given for partially correct or incorrect items and 1 for the correct items. Raw scores are computed based on the total number of correct items.

3.4.2.2.2 Non-word reading subtest

The non-word reading test is a subtest of the Queensland University Inventory of Literacy (QUIL) (Dodd, 1996) a published, norm-referenced test. The standardisation sample was 706 children (aged 6 years and 3 months to 12 years and 3 months). The test-retest coefficient for the non-word reading subtest was 0.98. It is used to measure children's ability to read novel orthographic forms. The child is asked to read aloud a list of non-words which gradually progress in syllable length. A score of 0 is given for partially correct or incorrect items and 1 for the correct items. Raw scores are computed based on the total number of correct items.

3.4.2.2.3 Reading comprehension test

Reading comprehension is a subtest of the York Assessment of Reading for Comprehension Test (YARC) (Snowling *et al.*, 2010) and is used to measure comprehension of reading. It is a published, norm-referenced test. The standardisation sample was 1,376 UK school children (aged 5 to 11 years). The reliability of the reading comprehension subtest was established based on internal consistency (Cronbach's alpha) and gave a value lower than 0.70. In the reading comprehension subtest, the child is instructed to read aloud a short passage, then answer some questions about what he/she has read. A score of 0 is given for an incorrect answer and 1 for the correct answer. Raw scores are computed based on the total number of correct items.

3.4.2.3 Arabic reading tests

3.4.2.3.1 Real word reading test

The Arabic real word reading test is an experimental test developed by Taha (2008) and includes vowelised MSA words. Standardised scores are not availabe for this test. The test is made up of 30 words of increasing length and syllabic complexity (see Appendix J). The children are instructed to read aloud the presented words as accurately and quickly as they can. The total score for this task is the number of correct responses.

3.4.2.3.2 Non-word reading test

This experimental test assesses a child's ability to read Arabic non-words. It was adapted from Taha (2008). Standardised scores are not availabe for this test. The child is asked to read aloud 30 selected fully vowelised Arabic non-words which gradually progress in syllabic complexity (see Appendix K). The total score for this task is the number of correct responses.

3.4.2.3.3 Reading comprehension test

As there are no standardised tests available for assessing Arabic speaking children on reading comprehension, a narrative and an expository text was adapted from Jayusy (2012). The internal reliability of this test was calculated by Cronbach's alpha, giving a value of 0.60. It was composed of two texts. The texts are followed by multiple choice questions (one correct answer and three distractors) (see Appendix L). The child is instructed to read the text and circle the correct answer for each question. The reading comprehension test was administered in a group. The raw score for the Arabic reading comprehension test was the number of questions answered correctly out of the total number of questions.

3.4.2.4 English spelling tests

3.4.2.4.1 Real word spelling test

The Single Word Spelling Test (SWST) (Socre and Masterson, 2001) is used to measure an individual's ability to spell real words. This is a published, norm-referenced test. The standardisation sample was 7,952 UK school children (aged 6 years and 3 months to 14 years and 3 months). The reliability of SWST was established based on internal consistency (Kuder-Richardso 20), giving values ranging from 0.94 to 0.97. The re-test reliability was also estimated and the test-retest coefficient was between 0.87 and 0.95. Stimulus words are read aloud three times by the test administrator before the child is asked to write them down. First, each word is read slowly and clearly then it is presented in a sentence context to make the test more relevant for the child. Finally, the word is read aloud again. The SWST was administered in a group. A score of 1 is given for each word written correctly and 0 for an incorrect answer or if the child fails to respond. Raw scores are computed based on the total number of correct items.

3.4.2.4.2 Non-word spelling subtest

The non-word spelling test is a subtest of the Queensland University Inventory of Literacy (QUIL) (Dodd, 1996), a published, norm-referenced test. It was used to assess the children's ability to spell non-words. The norming sample was 706 children (aged 6 years and 3 months to 12 years and 3 months). The internal consistency, i.e. reliability, for the non-word spelling subtest was estimated using Cronbach's alpha, giving a value of 0.86. In this subtest, the child is required to spell a list of non-words of increasing syllable length. Words are read out two times before the child is asked to write them down. The non-word spelling subtest was administered in a group. A score of 1 was given for each word written correctly and 0 for the incorrect answer or if the child failed to respond.

3.4.2.5 Arabic spelling tests

3.4.2.5.1 Real word spelling test

This measure, developed by Taha (2008), assesses spelling of Arabic vowelised words. The test consists of 30 words. Each word is spoken embedded within a short sentence to provide semantic context (see Appendix M). The words are read out to the children three times before they are instructed to write them down. A score of 0 is given for incorrect responses and 1 for correct responses. This task was administered in a group.

3.4.2.5.2 Non-word spelling test

This experimental test assesses a child's ability to write Arabic non-words. It was adapted from Taha (2008). In this test, the child is asked to spell a list of 30 non-words of progressively increasing syllable length (see Appendix N). Words are read out three times before the children are asked to write them down. This task was administered in a group. The total score for this task was the number of correct responses.

3.4.2.6 Control measures

3.4.2.6.1 Receptive vocabulary

The British Picture Vocabulary Scale III (BPVS) (Dunn.L.M. *et al.*, 2009) was used to assess the receptive (understanding) vocabulary of participants. This is a standardised test with a national British norming sample (N = 3278, age range 3–16 years) and is individually administered. In this test the child is instructed to point to one picture from a choice of four (target and three related distractors) after the researcher says the target word. There is a base starting point that is appropriate to the child's age (base set). This test has also a strict cut-off point (ceiling set) which is obtained when eight or more errors in a set of twelve items are made by the child. The raw score is arrived at by subtracting the number of errors made by the child from the base set through to the ceiling set.

The Arabic Picture Vocabulary Test (APVT) (AL-Khammash *et al.*, 1990) is derived from the Peabody Picture Vocabulary Test – Revised (Lloyd M. Dunn and Dunn., 1981). It is a norm-referenced test used to assess children's acquired verbal ability in Arabic (MSA) through their understanding of vocabulary. The norming sample comprised 2,900 Arabic children (aged 5 to 9 years). It contains 150 items, arranged according to increasing difficulty. This test follows an identical structure to the BPVS above. There is a starting point (base set) that is appropriate to the child's age. The point at which the test is stopped (ceiling set) is obtained when six errors in eight consecutive responses are made by the child. It was administered individually. The subtraction of the number of errors made by the child from the base set through to the ceiling set constituted the raw score.

3.4.2.6.2 Working memory

To assess the working memory skills of children, the Automated Working Memory Assessment (AWMA) (Alloway, 2007) was used in this study. The AWMA is a standardised tool and the norming sample comprised 1,269 English speakers in the UK aged between 4 and 22 years. Test-retest reliability coefficients ranged from 0.69 to 0.90. The AWMA is administered on a computer and includes 12 memory tests. Each test begins with a series of practice trials followed

by the test items. In these working memory tasks, the child is required to remember a piece of information and then recall it both accurately and exactly in the same order that it was presented. The scores are calculated automatically by the computer programme.

3.4.2.6.3 Letter name fluency and letter sound fluency tests

The Letter Name Fluency (LNF) test was used to assess the child's ability to produce the names of letters in both English and Arabic. It is an individually administered test. In both the Arabic and English LNF tests, the child is asked to say the names of as many letters presented as they can in one minute. A score of 1 was given for each correct letter named within the one minute time limit. A response was considered incorrect if the child did not correctly say a letter name within three seconds. Raw scores were computed based on the total number of correct items.

The Letter Sound Fluency (LSF) test was performed to measure the child's ability to produce letter sounds in each of the languages examined. It is an individually administered test. In both the Arabic and English LSF tests, the child is required to say the sounds of as many of the letters presented as he can in one minute. A score of 1 was given for each correct sound within the one minute time limit. A response was considered incorrect if the child did not correctly say a sound within three seconds in both the Arabic and the English versions. Raw scores were computed based on the total number of correct items.

3.4.3 Comparison between English and Arabic assessment measures construction

One important issue to consider when interpreting the results of this study is the assessment measures. The English assessment measures that used in this study were norm referenced, whereas all the Arabic assessment measures were experimental except the PA test. This renders the interpretation of the results difficult, especially the cross linguistic comparisons between Arabic and English. This section explains in detail the comparison of English and Arabic assessment measures construction.

The Phonological Assessment Test II (Robertson and Salter, 2007) was used to assess children's PA in English and Arabic version (Ahmad, 2011) of that test was used to measure children's PA in Arabic. The standardised scores were available for these two versions of the test. PA included six subtests that assess various aspects of phonological processing (rhyming, segmentation, isolation, deletion, substitution and blending), as mentioned in detail in section 3.4.2.1. These subtests were selected because they have a positive relationship with success early literacy achievement and the instruction on these tasks has been shown to improve children's PA (Robertson and Salter, 2007).

To assessed children's ability in English real word reading, the green word reading list of the Wide Range Achievement Test (WRAT) was used. This list comprises of 55 words that gradually progress in phonological complexity of syllabic structure. It includes 32 nouns (7 have one syllable; 7 have two syllables; 6 have three syllables; 8 have four syllables; 3 have five syllables and 1 has six syllables), 8 verbs (3 have one syllable, 3 have two syllables and 2 have three syllables), 13 adjectives (3 have one syllable, 2 have two syllables, 3 have three syllables, 3 have four syllables, 1 has five syllables and 1 has 6 syllables) and 2 adverbs (1 has one syllable and 1 has two syllables). While, Arabic reading real word test was non-standardised. It adapted from Taha (2008). It consists of 30 words, increasing length and syllabic complexity. It comprises of 15 nouns (5 have one syllable, 8 have two syllables and 2 have three syllables), 9 verbs (1 has one syllable, 4 have two syllables and 4 have four syllables), 5 adjectives (1 has one syllable and four have two syllables) and 1 adverb that has one syllable.

The non-word reading test that is a subtest of the Queensland Inventory of Literacy (QUIL) (Dodd, 1996) was used to assess the children's performance in English non-word reading. It consisted of 24 non-words that gradually progress in syllable length. While, the list made of 30 vowelised words were adapted from Taha (2008) was used to assess children's non-word reading task in Arabic. These words were gradually progress in syllabic complexity.

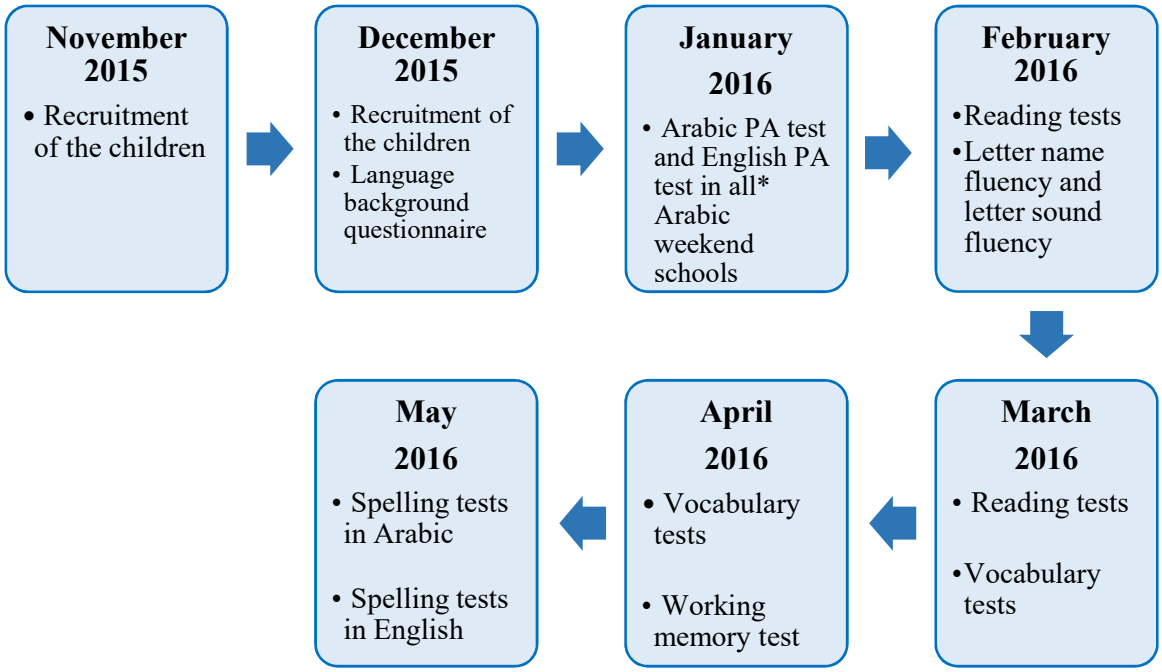
There were considerable differences in how reading comprehension was measured in the two languages, English and Arabic. In English, reading comprehension assessment was part of the York Assessment of Reading for Comprehension Test (YARC) (Snowling *et al.*, 2010) that assesses accuracy, rate and comprehension of oral reading. Children had to read aloud a short passage, then answer some questions about what he/she has read. In Arabic, reading comprehension was assessed using an experimental test which consisted of two passages followed by explicit and implicit multiple-choice questions (one correct answer and three distractors). Children had to read the text and circle the correct answer for each question.

In terms of spelling tasks, English real word spelling was measured using the Single Word Spelling Test (SWST) (Socre and Masterson, 2001). The test is composed of a set of words that are that gradually progress in difficulty and the complex spellings in a test increases across year/ age level. That means the test really measures the children's spelling ability and not an artefact of the test construction. In Arabic, an experimental test was adapted from Taha (2008) was used to assess real vowelised word spelling. It consists of 30 MSA words of progressively increasing syllable length.

The non-word spelling test is a subtest of the Queensland Inventory of Literacy (QUIL) (Dodd, 1996) was used to assess the children's performance in English non-word spelling. It focuses on the strategies that using in assembling orthographic forms. Non-words in this test are arranged in order of progressively increasing syllable length. An experimental test was adapted from Taha (2008) was used to assess non-word spelling in Arabic. It consists of 30 non-words of progressively increasing syllable length. It is important to consider the influence of the transparency of both languages in spelling test. Arabic orthography is characterised by being more transparent orthography than English. In some English words, the child has to make a choice between different options available for spelling and relies not only on PA knowledge, but also having a lot of knowledge of spelling rules for the language.

3.5 Procedures

The data collection process took place over seven months in five Arabic weekend schools (see Figure 3.1).



Three of the Arabic schools are on Saturdays and two of them are on Sundays.

Figure 3.1 Timeline of data collection

3.5.1 Participant selection and information collection

Following recruitment through the Arabic schools, the language background questionnaire was given to parents to complete and return to the researcher. At this stage children who did not meet the inclusion criteria were excluded from the study and their parents informed (N = 2).

3.5.2 Assessment procedure

Assessments took place in the child's Arabic school. Administration of the individual assessments took place in a quiet room or area away from the classroom. The group assessments took place in the children's classrooms and each group consisted of approximately five children. There were two assessment sessions, one for the Arabic language measures and one for the English language measures. The researcher explained to the children the purpose of the research using a specially developed information sheet (see Appendix G). If children refused to take part (N = 3), their withdrawal of consent was noted and respected and their parents were informed. All assessments were administered and scored by the researcher, following the recommended administration procedure for each assessment. A selection of assessments (10% of total) was scored by a second researcher[1] in order to check the reliability and consistency of scoring. During the testing session, children were given breaks as needed. The participants were assigned identification (ID) codes to ensure confidentiality. The record sheet from each assessment was labelled with the participant (ID) and the date of the assessment. These sheets were stored in a secure filing cabinet in an office at Newcastle University. The data were managed in spreadsheets using Microsoft Office Excel. Responses on all oral tasks were recorded on a digital voice recorder to ensure the accuracy of manual scoring. Responses on written tasks were documented in a paper format. The data were manually coded and then computerized to be used for further analysis.

3.5.3 Feedback to parents

The results of all assessments were reported back to parents using a standard format that was developed for this purpose (see Appendix I). It set the results in the context of bilingual language acquisition as an advantage for an individual. For two children whose results gave cause for concern, sources of support were suggested to their parents.

[1] Fathiya ALRahbi (PhD student).

3.6 Data analysis

Several techniques were used in analysing the data. First, linear regression analysis was performed to control extraneous variables. To answer RQ1 concerning the association between PA skills in Arabic (L1) and English (L2), Spearman correlation analysis was used to test the relatedness of PA skills across the tested languages. For RQ2 and RQ4, addressing whether Arabic-English bilingual children present the same level of performance in PA skills and reading tasks and spelling respectively in both languages, non-parametric two related samples tests were performed. For RQ3 and RQ5, concerning whether PA in either of the two languages predicts word reading, reading comprehension and spelling in the other language respectively, multivariate regressions were used. In addition, to determine whether there were significant differences in the means on all tasks in both languages across the three age groups one-way analysis of variance (ANOVA) was used.

3.7 Pilot study

Prior to the actual collection of data, a pilot study was conducted in October 2015. Six bilingual children participated in this study. Two of the children were seven years old, two were eight years old and two were nine years old. These children did not take part in the main study. The children took part in two assessment sessions, one for the Arabic language tasks and one for the English language tasks. The pilot study was carried out in advance to check the acceptability of the assessments to the children and to gain information about time management. Results from the pilot study showed that the tasks were appropriate for the children.

3.8 Ethical implications

Several ethical issues were taken into account prior to data collection in order to ensure that all requirements were met in the study for conducting research ethically. An information letter was provided for parents in both languages (Arabic and English) (see Appendix A and Appendix C), which stated important information about the reason for doing this study, what the child would be asked to do, the child's rights as a research participant and a request for permission for the child to participate in the study. Consent forms were also provided for parents in both languages (Arabic and English) (see Appendix B and Appendix D). A consent letter for head teachers was also provided (see Appendix E and Appendix F). This explained the purpose of this study, what was involved for the school and asked for the head teachers' consent to do the research in their schools. The other ethical consideration related to the research is the participant information sheet that provided clear and brief information on the essential elements of the

study: what the project was about, the nature of involvement and what would happen if the child agreed to take part (see Appendix G).

The right to confidentiality was maintained throughout by identifying each child in the research records using a number (No. 1–80). All data collected will be kept securely at Newcastle University until all beneficial data analysis has been exhausted. Protection from harm was also considered. The participants in this study were in no danger from partaking in the research project. Approval of the ethical procedures in the study was obtained from the Research Ethics Committee of the Faculty of Humanities and Social Sciences, University of Newcastle.

3.9 Summary

This chapter has included a discussion of aspects related to the methodology that was used in this study. Information concerning the study design and the participant sample is provided. The method of data collection is explained in detail. A brief outline of the process of answering the study research questions is provided. A summary of the pilot study and ethical implications are also described. The results of this study are given in the next chapter.

Chapter 4. Results

4.1 Introduction

This chapter addresses the results of each of the research questions in turn, providing detailed analysis of the data. The chapter starts by presenting a detailed description of the demographic characteristics of participants in this study, including information about gender, age at recruitment, age at the start of the study, language environment at home, parents' judgment about the proficiency rating of their child's language ability in both Arabic and English, age of starting to read and educational background of the parents.

4.2 Demographic characteristics of the children

The population considered in this study comprised typically developing Arabic-English bilingual children. They were recruited with fully informed parental consent through five Arabic weekend schools in Newcastle upon Tyne. The regional Arabic spoken in the schools was Iraqi, Libyan, Saudi Arabian, Sudanese and Syrian. However, all schools taught in the medium of MSA and all Arabic assessments were in MSA (see Chapter 3: Methodology). Therefore, the children were not separated by regional dialect, but data were analysed according to other demographic information.

From the population of children attending Arabic weekend schools, 90 children who met the inclusion criteria were sent information about the study. A total of 10 children who fulfilled these criteria did not take part in the study for the following reasons: two children were invited and then it was discovered that English was their third language; five children whose parents returned the signed consent forms declined to participate and for three children the parents did not return the signed consent forms. Data from 80 children who met the inclusion criteria were analysed to address the study questions presented in the following sections.

4.2.1 Gender

There were 42 females (52%) and 38 males (48%) (see Table 4.1).

4.2.2 Age at recruitment

The children were divided into three groups based on their age on the day of assessment: 7, 8 and 9 years old. There were 27 (33.75 %) 7 year olds, aged from 7 years and 4 months to 7 years and 11 months (mean 7 years and 7 months); 27 (33.75%) 8 year olds aged from 8 years and 4 months to 8 yeaers 11 months (mean 8 years and 7 months) and 26 (32.5%) 9 year olds aged from 9 years 4 months to 9 years 11 months (mean 9 years and 7 months) (see Table 4.1).

4.2.3 Age at starting school and number of terms completed in schools

Four (5%) participants started English school at age 4, 43 (53.75%) of them at age 5 and 25 (31.25%) children started their education in English school at age 6. Four (5%) children started English school at age 7 and four (5%) at age 8 (see Table 4.1). Comparatively, none of the children started Arabic school at age 4. Nineteen (23.75%) participants started their education in Arabic school at age 5 and 58 (72.5%) children started their Arabic education when they were at age 6. Two (2.5%) started at 7 years old and one (1.25%) of the children started Arabic school when they wereat age 8 (see Table 4.1).

The number of completed school terms in English and Arabic schools is of importance in relation to exposure to English and MSA and this is detailed in Table 4.1. There are three terms in an English school year, each lasting approximately 13 weeks. The children in this study started school at the beginning of the academic year in September. The number of completed terms is calculated on the basis of three terms per completed school year. Arabic weekend schools in the UK have two terms totalling 39 weeks, starting in September and finishing in May.

In terms of gender, the results of the ANOVA revealed that there were no significant differences according to gender in age at starting Arabic ($F(1, 78) = 0.13$, $p = 0.71$) and English ($F(1, 78) = 0.13$, $p = 0.71$) schools, which mean that gender has no significant effect on age at starting schools. The results of the ANOVA also indicated that there was no significant effect of gender on completed terms in Arabic ($F(1, 78) = 0.48$, $p = 0.49$) and English ($F(1, 78) = 0.34$, $p = 0.55$) schools.

Table 4.1 Age at starting school and terms completed in school

Age	Gender	Age started Arabic school age in years (n) (%)	Number of completed terms in Arabic school	Age started English school age in years (n) (%)	Number of completed terms in English school	Total participant (n)%
7 years	Female (13) (16.25%)	4	0		0	27 (33.75%)
		5	5 (6.25%)	4	8 (10.0%)	6
		6	8 (10.0%)	2	5 (6.25%)	3
		7	0		0	
		8	0		0	
	Male (14) (17.5%)	4	0		0	
		5	4 (5.0%)	4	8 (10.0%)	6
		6	10 (12.5%)	2	4 (5.0%)	3
		7	0		2 (2.5%)	0
		8	0		0	
8 years	Female (13) (16.25%)	4	0		0	27 (33.75%)
		5	3 (3.75%)	6	7 (8.75%)	9
		6	10 (12.5)	4	4 (5.0%)	6
		7	0		1 (1.25%)	3
		8	0		1 (1.25%)	0
	Male (14) (17.5%)	4	0		0	
		5	3 (3.75%)	6	11(13.75%)	9
		6	11 (13.75%)	4	3 (21.4%)	6
		7	0		0	
		8	0		0	
9 years	Female (16) (20%)	4	0		2 (2.5%)	15	26 (32.5%)
		5	4 (5.0%)	8	5 (6.25%)	12
		6	10 (12.5%)	6	7 (8.75%)	9
		7	2 (2.5%)	4	1(1.25%)	6
		8	0		0	3
		9	0		1(1.25%)	0
	Male (10) (12.5%)	4	0		2 (2.5%)	15
		5	0	8	4 (5.0%)	12
		6	9 (11.25%)	6	2 (2.5%)	9
		7	0		0	
		8	1(1.25%)	2	1(1.25%)	3
		9	0		1(1.25%)	0
Totals	80(100%)	80(100%)		80(100%)		80(100%)

One-way ANOVA was used to examine whether the means of the three age groups differed significantly in terms of age at starting school. The outcome of the one-way ANOVA showed that there was no statistically significant difference ($F(2, 77) = 0.51$, $p = 0.60$) between the means of groups in age of starting English school. Descriptive statistics for age of starting English school appear in Table 4.2.

Table 4.2 Descriptive statistics for age of starting English school

					95% Confidence Interval for Mean	
Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**
7	27	5.48	0.64	0.12	5.22	5.73
8	27	5.44	0.75	0.14	5.14	5.74
9	26	5.69	1.34	0.26	5.14	6.23
Total	80	5.53	0.95	0.10	5.32	5.74

The comparison of means for the three age groups for age of starting Arabic school by ANOVA revealed that the groups were not significantly different ($F(2, 77) = 2.83$, $p = 0.06$) in the age of starting Arabic school. Table 4.3 shows the descriptive statistics for age of starting Arabic school.

Table 4.3 Descriptive statistics for age of starting Arabic school

					95% Confidence Interval for Mean	
Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**
7	27	5.66	0.48	0.09	5.47	5.85
8	27	5.77	0.42	0.08	5.61	5.94
9	26	6.00	0.63	0.12	5.74	6.25
Total	80	5.81	0.52	0.05	5.69	5.93

4.2.4 Language spoken at home

Parents were asked to provide information about the languages spoken at home and to estimate how much time children used each language. This information was collected in the expectation that it would reveal information about the relative use of Arabic and English in the home. However, it indicated that parents found this difficult to report accurately. An interesting point to note is the reliability of parents in making subjective judgments about which languages their children speak, not all of which added up to 100% of their time. The diagonal pattern of dark blue shaded cells, in contrast to the white cells, in Table 4.4 clearly shows some parents counted more than 100% of the children's time. Due to the obvious unreliability of these data, they have not been used in any further analysis.

Table 4.4 Parents' report of the languages children speak at home

% Arabic spoken at home \ % English spoken at home	0%	25%	50%	75%	100%
100%	6	5			
75%		19	1	2	4
50%			21	3	
25%			3	14	
0%					2

Parents were also asked about their child's use of Arabic words in English sentences and use of English words in Arabic sentences. Eighteen children (22.5%) did not use Arabic words in English sentences in their daily home language use; 52 (65%) children used Arabic words in English sentences 25% of the time. Four (5%) children used Arabic words in English sentences 50% of the time and 6 (7.5%) children did so 75% of the time. Three (3.8 %) participants did not use English words in Arabic sentences; 45 (56.3%) children used them 25% of the time. Fifteen (18.8%) children used them 50% of the time and 17 (21.3%) did so 75% of the time.

Parents were asked to respond to questions about whether their child watched TV/DVDs in Arabic or English. Sixty-one (76.3%) children watched Arabic TV/DVDs; 19 (23.8%) did not watch TV/DVDs in Arabic. In comparison, 76 (95%) of children watched English TV/DVDs; 4 (5%) did not watch TV/DVDs in English. In this case, 57(71.2%) of children watched TV/DVDs in Arabic and English at the same time. Four (5%) children watched TV/DVDs in Arabic and 19 (23.8%) watched TV/DVDs in English.

The language background questionnaire also included information about the parent's L1 and the dialect or dialects of Arabic they spoke at home. Although recruited from only five Arabic-

speaking countries, the parents identified 12 different dialects as their L1. It is customary for Arabic children to speak their parents' dialect first. Once they start to attend school, they learn to speak, read and write in MSA. The children start school at age 6 in their country of origin. Some of the children started school at home and then came to the UK, while others would only have had Arabic weekend schooling.

4.2.5 Parents' judgment of the children's proficiency rating in language ability

Parents reported their judgment about the proficiency rating of their child's language ability in both Arabic and English. The results of the comparison between the three age groups for parents' judgment about the proficiency rating in Arabic ability showed that all 9-year-old children spoke Arabic; of these 7 (26.9%) were only able to understand and speak simple Arabic, 5 (19.2%) were able to understand and speak more complex Arabic and 14 (53.8%) were able to understand and speak Arabic fluently. Similarly, all of the 8-year-old children could speak Arabic: 8 (29.6%) could understand and speak simple Arabic, 12 (44.4%) could understand and speak more complex Arabic and 7 (25.9%) could understand and speak Arabic fluently. The results for the 7-year-old group showed that although all could speak Arabic, 5 (18.5%) were only beginning to understand and speak Arabic, 10 (37.0%) could understand and speak simple Arabic, 6 (22.2%) could understand and speak more complex Arabic and 6 (22.2%) could understand and speak Arabic fluently (see Table 4.5).

Table 4.5 Parents' judgment of the children's proficiency rating in Arabic ability

Age	Is beginning to understand and speak Arabic N (%)	Can understand and speak simple Arabic N (%)	Can understand and speak more complex Arabic N (%)	Can understand and speak Arabic fluently N (%)
7	5 (18.5%)	10 (37.0%)	6 (22.2%)	6 (22.2%)
8	0 (0.0%)	8 (29.6%)	12 (44.4%)	7 (25.9%)
9	0 (0.0%)	7(26.9%)	5 (19.2%)	14 (53.8%)
Total	5 (6.3%)	25 (31.3%)	23 (28.8%)	27 (33.8%)

The chi-square analysis showed that there is a significant association ($x^2 = 18.48$, DF = 6, p = 0.004) between ability to speak Arabic and age group as rated by the parents. It is clear that a higher proportion of the 9-year-old age group (53.8%) spoke Arabic fluently compared to the 8-year-old (25.9%) and 7-year-old (22.2%) age groups.

The results of parents' judgment concerning the proficiency rating in English ability showed that all 9-year-old children spoke English, with 4 (14.8%) able to understand and speak simple English, 8 (30.8%) able to understand and speak more complex English and 14 (53.8%) able to understand and speak English fluently. Similarly, all of the 8-year-old children could speak English: 2 (7.4%) could understand and speak simple English, 13 (48.1%) could understand and speak more complex English and 12 (44.4%) could understand and speak English fluently. The results for the 7-year-old group indicated that although all could speak English, 8 (29.6%) could understand and speak simple English, 4 (14.8%) could understand and speak more complex English and 12 (44.4%) could understand and speak English fluently (see Table 4.6).

Table 4.6 Parents' judgment of the children's proficiency rating in English ability

Age	Is beginning to understand and speak English N (%)	Can understand and speak simple English N (%)	Can understand and speak more complex English N (%)	Can understand and speak English fluently N (%)
7	3 (11.1%)	8 (29.6%)	4 (14.8%)	12 (44.4%)
8	0 (0.0%)	2 (7.4%)	13(48.1%)	12 (44.4%)
9	0 (0.0%)	4 (14.8%)	8 (30.8%)	14 (53.8%)
Total	3(3.8%)	14 (17.5%)	25 (31.3%)	38(47.5%)

The chi-square analysis showed that there is a statistically significant difference ($x^2 = 14.92$, DF = 6, p = 0.01) between the ability to speak English and age group as reported by parents. It is clear that a higher proportion of the 9-year-old age group (53.8%) spoke English fluently compared to the 8-year-old (44.4%) and 7-year-old (44.4%) age groups.

4.2.6 Age of starting reading

One-way ANOVA was used to examine whether the means of the three age groups differed significantly in terms of age at starting reading. The outcome of the one-way ANOVA showed that there was no significant difference ($F(2, 77) = 0.01$, $p = 0.99$) between the means for the three age groups for age of starting to read in English (see Table 4.7).

Table 4.7 Descriptive statistics for age of starting to read in English

					95% Confidence Interval for Mean	
Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**
7	27	5.40	0.63	0.12	5.15	5.65
8	27	5.44	0.75	0.14	5.14	5.74
9	26	5.42	1.36	0.26	4.87	5.97
Total	80	5.42	0.95	0.10	5.21	5.63

In terms of age of starting to read in Arabic, one-way ANOVA showed that there was no significant difference ($F(2, 77) = 2.83$, $p = 0.06$) between the means for the three age groups of starting to read in Arabic (see Table 4.8).

Table 4.8 Descriptive statistics for age of starting to read in Arabic

					95% Confidence Interval for Mean	
Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**
7	27	5.66	0.48	0.09	5.47	5.85
8	27	5.77	0.42	0.08	5.61	5.94
9	26	6.00	0.63	0.12	5.74	6.25
Total	80	5.81	0.52	0.05	5.69	5.93

4.2.7 Reading at home

Parents also responded to questions about reading practices i.e. whether they read to their children at home and if their children read to them or independently (see Table 4.9).

Table 4.9 Reading at home

Participant Age	Parents reads with child at home		Child reads at home	
	Yes	No	Yes	No
7	23 (85.2%)	4 (14.8%)	27 (100%)	0 (0.0%)
8	19 (70.4%)	8 (29.6%)	25 (92.6%)	2 (7.4%)
9	22 (84.6%)	4 (15.4%)	24 (92.3%)	2 (7.7%)
Total	64 (80.0%)	16 (20.0%)	76 (95.0%)	4 (5.0%)

A chi-square analysis showed there was no significant ($x^2 = 2.36$, DF = 2, p = 0.32) association between parents reading with the child and the child's age group. All children (27, 100%) in the 7-year-old group read at home; 25 (92.6%) of the children aged 8 years old read at home and 2 (7.4%) did not. The result of the 9-year-old group, indicated that 24 (92.3%) read at home and 2 (7.7%) did not (see Table 4.9). A chi-square analysis showed there was no significant ($x^2 = 2.14$, DF = 2, $p = 0.46$) association between whether the child reads at home and their age group.

4.2.8 Parental education

The parents were asked about the most advanced stage of education they had attained. It should be noted that due to the location of the Arabic schools, the majority of child participants had one or both parents in the UK pursuing postgraduate study. This may mean that the large number of parents with undergraduate and postgraduate qualifications does not reflect the typical population of parents of Arabic-English bilingual children in the UK. No comparison data are available. Details of responses to this question appear in Table 4.10.

Table 4.10 Level of parental education

Education Level	Participant Age	Father's Education Level	Mother's Education Level
Postgraduate N (%)	7	20 (74.1%)	11 (40.7%)
	8	19 (70.4%)	12 (44.4%)
	9	19 (73.1%)	10 (38.5%)
	Total (%)	**58 (72.5%)**	**33 (41.3%)**
Undergraduate N (%)	7	7 (25.9%)	13 (48.1%)
	8	6 (22.2%)	11 (40.7%)
	9	5 (19.2%)	12 (46.2%)
	Total (%)	**18 (22.5%)**	**36 (45.0%)**
Further Education Diploma N (%)	7	0 (0.0%)	2 (7.4%)
	8	2 (7.4%)	3 (11.1%)
	9	2 (7.7%)	3 (11.5%)
	Total (%)	**4 (5 %)**	**8 (10 %)**
Secondary School Certificate N (%)	7	0	1 (3.7%)
	8	0	1 (3.7%)
	9	0	1 (3.8%)
	Total (%)	**0**	**3 (3.8%)**

The chi-square analysis did not show any significant association ($x^2 = 2.33$, DF = 4, $p = 0.71$) between the father's educational level and age group. There is also no significant association ($x^2 = 0.57$, DF = 6, $p = 0.99$) between the educational level of mothers and age group.

4.3 Language tests

The first step in data analysis involved controlling the extraneous variables that could affect the participants' performance on the PA tasks in both languages. Hence, as well as the PA tests, the children were tested on four other measures: a) receptive vocabulary, b) letter name fluency, c) letter sound fluency and d) working memory (digit recall, listening recall, listening recall processing, spatial recall and spatial recall processing). In contrast to previous research in this area, this study has attempted to control the effect of these different variables because of all these control tasks are closely associated with PA in both languages.

4.4 Comparison between the children's scores on the language tests

Table 4.11 shows the means, standard deviations, ranges and confidence intervals for each age group in the vocabulary, letter and sound knowledge and working memory tasks administered.

Table 4.11 Descriptive statistics and confidence interval for children's performance in vocabulary, letter and sound knowledge and working memory tasks

Variable	Age	Mean	Std. Deviation	Range	95% Confidence Interval of the Difference	
					Lower	Upper
*Arabic Vocabulary	7	100.33	8.73	76–120	96.88	103.79
	8	100.67	6.85	92–120	97.96	103.38
	9	102.42	3.75	93–110	100.91	103.94
English Vocabulary	7	76.78	7.58	69–103	73.78	79.78
	8	77.26	14.23	69–141	71.63	82.89
	9	71.27	4.22	69–80	69.56	72.97
Arabic Letter Name Knowledge	7	25.07	2.20	21–28	24.20	25.94
	8	25.59	2.45	19–28	24.62	26.56
	9	26.54	2.19	21–28	25.65	27.43
English Letter Name Knowledge	7	25.77	0.71	21–27	24.86	25.81
	8	24.52	2.42	15–26	23.56	25.48
	9	25.77	0.71	23–26	25.48	26.06
Arabic Letter Sound Knowledge	7	25.44	1.90	22–28	24.69	26.20
	8	25.74	1.91	21–28	24.98	26.50
	9	26.35	2.09	21–28	25.50	27.19
English Letter Sound Knowledge	7	25.04	1.34	20–26	24.06	25.28
	8	23.70	2.79	13–27	22.60	24.81
	9	25.04	1.34	21–26	24.50	25.58
Digit Recall	7	111.77	9.13	86–124	108.16	115.39
	8	113.51	11.04	96–137	109.15	117.88
	9	118.81	20.15	90–153	110.67	126.95
Listening Recall	7	129.74	9.04	94–139	126.16	133.32
	8	136.44	8.30	108–139	133.16	139.73
	9	139.96	16.85	94–148	133.15	146.77
Listening Recall Processing	7	129.96	10.69	90–139	125.73	134.19
	8	133.89	12.30	96–143	129.02	138.76
	9	124.27	12.93	94–134	119.05	129.49
Spatial Recall	7	123.11	16.69	91–137	116.51	129.71
	8	121.33	19.02	90–139	113.81	128.86
	9	112.19	18.60	91–137	104.68	119.71
Spatial Recall Processing	7	114.55	14.96	87–134	108.63	120.47
	8	114.63	17.81	95–134	107.58	121.68
	9	113.58	21.46	87–137	104.91	122.25

All scores are standard scores except the letter name and letter sound in both languages, which are raw scores.

The 7-year-old age group's performance scores are higher for Arabic vocabulary (M = 100.33, SD = 8.735) than English (M = 76.78, SD = 7.582). However, their performance in letter name knowledge (Arabic LK: M = 25.07, SD = 2.200; English KL: M = 25.77, SD = 0.710) and letter sound knowledge (Arabic SK: M = 25.44, SD = 1.908; English SK: M = 25.04; SD = 1.341) tasks in both languages are similar. The results for the 8-year-old children showed higher performance scores for Arabic vocabulary (M = 100.67, SD = 6.850) than for English vocabulary (M = 77.26, SD = 14.236), whereas their performance for Arabic letter name knowledge (M = 25.59, SD = 2.454) is similar to that for English letter name knowledge (M = 24.52, SD = 2.424). However, their Arabic letter sound knowledge scores (M = 25.74, SD = 1.913) were slightly higher than those for English letter sound knowledge (M = 23.70, SD = 2.799).

The results for the 9 year olds indicated higher performance in Arabic vocabulary (M = 102.42, SD = 3.754) than in English vocabulary (M = 71, SD = 4.220) and their performance for both Arabic letter name and letter sound knowledge (M = 26.54, SD = 2.195; M = 26.35, SD = 2.097) was slightly higher than in English (M = 25.77, SD = 0.710; M = 25.04, SD = 1.341). As can be seen in Table 4.11, the performance of this age group was higher on every working memory tasks except for listening recall processing and spatial recall.

One-way ANOVA was run to determine whether there were significant differences in the means of the controlled factors in Arabic language and the school terms completed in Arabic school between three age groups. The results indicated that there were no significant differences between the means of the three age groups for all controlled factors in Arabic language and the completed school terms in Arabic school (vocabulary: $F(3,76) = 0.54$, $p = 0.65$; letter name knowledge: $F(3,76) = 2.06$, $p = 0.11$; letter sound knowledge: $F(3,76) = 2.24$, $p = 0.09$; digit recall: $F(3,76) = 0.60$, $p = 0.61$; listening recall processing: $F(3,76) = 2.44$, $p = 0.07$, spatial recall: $F(3,76) = 2.60$, $p = 0.058$; spatial recall processing: $F(3,76) = 1.65$, $p = 0.18$), except for listening recall ($F(3,76) = 4.03$, $p = 0.01$).

In terms of English, the results of the one-way ANOVA indicated that there were no significant differences between the means of the three age groups for all controlled factors in English language and the school terms completed in English school (vocabulary: $F(5,74) = 0.41$, $p = 0.83$; letter name knowledge: $F(5,74) = 1.09$, $p = 0.37$; letter sound knowledge: $F(5,74) = 0.99$, $p = 0.42$; digit recall: $F(5,74) = 0.88$, $p = 0.49$; listening recall processing: $F(5,74) = 0.38$, $p = 0.86$; spatial recall: $F(5,74) = 0.95$, $p = 0.45$; spatial recall processing: $F(5,74) = 0.24$, $p = 0.94$), except for listening recall ($F(5,74) = 3.10$, $p = 0.01$).

The comparison between the three groups for both Arabic and English skills showed that the three age groups were better in Arabic vocabulary than in English and their knowledge of letter and sound in both languages was similar. In terms of working memory tasks, the 9-year-old group performed better than the other two groups in both digital recall and listening recall tasks. The performance of the 7- and 8-year-old groups was similar in all working memory tasks, except the listening recall task in which the 8-year-old group was better than the 7-year-old group (see Table 4.11).

4.4.1 Statistical control of the language tests

Simple linear regression analysis was performed to control statistically the effect of the extraneous variables (vocabulary, letter sound knowledge, letter name knowledge and working memory) because the four assumptions of linear regression (linearity, normality, independence and equality of variance) were met. The results for Arabic showed that the R value is 0.556, indicating a strong positive correlation between Arabic PA and receptive vocabulary, letter and sound knowledge and working memory. It can be concluded that the regression model predicts Arabic PA significantly (p = 0.001) (see Table 4.13).

Table 4.12 Simple linear regression analysis of Arabic and English PA

	R	R^2	Adjusted R^2	F	Sig.
Arabic PA	0.556	0.309	0.23	3.96	0.001
English PA	0.691	0.477	0.41	8.10	0.001

a. Independent variables: sound knowledge, listening recall processing, vocabulary, digit recall, spatial recall, listening recall, spatial recall processing, letter knowledge in both languages.

b. Dependent Variables: Arabic PA and English PA.

The results of the regression analysis for English showed that the R value is 0.691, indicating that the correlation between English PA and these variables is positive and strong. The regression model statistically significantly (p = 0.001) predicts the English PA variable (see Table 4.12).

4.5 Results for Research Question 1: Is there an association between phonological awareness skills in Arabic (L1) and English (L2)?

RQ1 concerned the association between PA in the L1 and L2 and it was hypothesised that Arabic and English PA skills would be strongly associated. Preliminary data screening was run to ensure no violation of the assumptions of normality using the Shapiro–Wilk test. Data screening also included checking plots for nonlinearity and heteroscedasticity. The results revealed that the data were not normally distributed. Therefore, Spearman's correlation was run to determine the relationship between Arabic and English PA skills. The results showed that Arabic PA correlated significantly and positively with English PA across the three age groups (see Table 4.13).It can be concluded that the hypothesis that PA skills are strongly associated in Arabic and English is confirmed.

Table 4.13 Relationship between Arabic and English PA

Age (N)	Spearman's correlation coefficient (r_s)	Sig.
7 (27)	0.618	0.001
8 (27)	0.640	0.00
9 (26)	0.770	0.00

4.6 Results for Research Question 2: What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and reading tasks in both languages?

RQ2 concerned the children's level of performance in PA and reading tasks in Arabic and English and it was hypothesised that children's performance would be better in Arabic (L1) than in English (L2) due to lengthier exposure to Arabic. To address this research question, non-parametric two related samples tests were conducted because the data were shown not to be normally distributed. The Wilcoxon signed-rank test was run to determine if there were differences between these sets of scores. One significant issue to take into account when interpreting the results of this question is the assessment measures (as mentioned in section 3.5). The English assessment measures were norm referenced, whereas all the Arabic assessment measures were experimental except the PA test, which is standardised test. The results are presented in Tables 4.14, 4.15 and 4.16.

Table 4.14 Descriptive statistics for children's performance in PA and reading at age 7

Test	N	Mean	Std. Deviation	Sig.
APA	27	108.87	9.14	0.143
EPA	27	106.63	6.81	
Arabic real word reading	27	63.59	22.15	0.000
English real word reading	27	90.21	10.71	
Arabic non-word reading	27	68.13	24.63	0.000
English non-word reading	27	87.90	13.14	
Arabic reading comprehension	27	60.62	16.64	0.000
English reading comprehension	27	89.62	5.56	

The non-parametric two related samples analysis shows that children's performance at 7 years old on the Arabic PA test (M = 108.87, SD = 9.14**)** was higher than on the English PA test (M = 106. 6, SD = 6. 81) as indicated in Table 4.14. Their performance on all English reading tasks – real word (M = 90.21, SD = 10.71), non-word (M = 87.90, SD = 13.14) and reading comprehension (M = 89.62, SD = 5.56) – was higher than in Arabic – real word (M = 63.59, SD = 22.15), non-word (M = 68.1, SD = 24.63) and reading comprehension (M = 60.6, SD = 16.64). Statistically significant results were found when the Wilcoxon signed-rank test was run for all reading tasks (real word reading: Z = -4.108, $p < 0.01$; non-word reading: Z = -3.836, $p < 0.01$; reading comprehension: Z = -4.518, $p < 0.01$). However, data for PA (Z = -1.466, $p > .001$) yielded non-significant differences.

Table 4.15 Descriptive statistics for children's performance in PA and reading at age 8

Test	N	Mean	Std. Deviation	Sig.
APA	27	109.24	9.72	0.021
EPA	27	105.45	9.32	
Arabic real word reading	27	75.67	18.71	0.000
English real word reading	27	89.65	12.47	
Arabic non-word reading	27	71.87	21.19	0.866
English non-word reading	27	74.37	12.88	
Arabic reading comprehension	27	67.90	16.68	0.000
English reading comprehension	27	86.55	7.28	

The results for the 8-year-old children show that the performance in Arabic PA (APA) skills (M = 105, SD = 9.32) was higher than in English (EPA) (M = 109.24, SD = 9.72), as indicated in Table 4.15. In terms of reading tasks, children's performance in English tasks – real word (M = 89.6, SD = 12.47), non-word (M = 74.3, SD = 12.88) and reading comprehension (M = 86.5, SD = 7.28) – was higher than in Arabic – real word (M = 75.6, SD = 18.71), non-word (M = 71.8, SD = 21.19) and reading comprehension (M = 67.9, SD = 16.6). The results also indicate that the differences between these sets of scores were statistically significant for PA (Z = -2.306, $p < 0.01$), real words (Z = -3.5, $p < 0.01$), reading comprehension (Z = -4.026, $p < 0.01$). The exception was the non-word reading test (Z = -0.168, $p > 0.01$).

Table 4.16 Descriptive statistics for children's performance in PA and reading at age 9

Test	N	Mean	Std. Deviation	Sig.
APA	26	109.79	10.30	0.006
EPA	26	105.78	5.58	
Arabic real word reading	26	82.28	19.77	0.732
English real word reading	26	83.45	14.34	
Arabic non-word reading	26	78.42	23.03	0.264
English non-word reading	26	76.35	11.77	
Arabic reading comprehension	26	70.33	16.15	0.000
English reading comprehension	26	90.90	7.63	

The results for the 9-year-old children indicated that their performance in the Arabic PA test (M = 109.79, SD = 5.58) was higher than in English (M = 105.78, SD = 10.30). However, their performance in English reading comprehension (M = 90.90, SD = 7.63) was higher than in Arabic (M = 70.33, SD = 16.15). Their performance in the Arabic (M = 82.28, SD = 19.77) and English (M = 83.45, SD = 14.34) real word tasks and the Arabic (M = 78.42, SD = 23.03) and English (M = 76.35, SD = 11.77) non-word tasks were very similar. The Wilcoxon signed-rank test indicated that only the PA and reading comprehension scores were significantly different (Z = -2.756, $p < 0.01$ and Z = -4.252, $p < 0.01$ respectively) (Table 4.16). Therefore, the hypothesis that children's performance in Arabic PA would be better than in English is confirmed, while the hypothesis that performance on reading tasks would be higher in Arabic (L1) than English (L2) is rejected.

To determine whether there are significant differences between the means of PA and reading tasks in both languages across the three age groups, one-way ANOVA analysis was used. In

terms of Arabic tasks, the results showed that the groups did not differ significantly for PA ($F(2, 77) = 0.06$, $p = 0.94$), non-word ($F(2, 77) = 1.35$, $p = 0.26$) and reading comprehension ($F(2, 77) = 2.50$, $p = 0.08$). However, there was a statistically significant difference at the $p < 0.05$ level for the scores of the Arabic real word task across the three age groups ($F(2, 77) = 5.81$, $p = 0.005$). Post-hoc comparisons using Tukey HSD test indicated that the mean score for the 9-year-old group (M = 82.28, SD = 19.77) was significantly different ($p = 0.03$) from that for the 7-year-old group (M = 63.59, SD = 22.15). There was, however, no statistically significant difference ($p = 0.46$) in means between the 9- and 8-year-old groups' performance or between the 7- and 8-year-old groups' performance ($p = 0.07$) in the Arabic real word reading task (see Table 4.17).

With regard to the English tasks, the outcome of ANOVA showed that there was no significant difference between the means of the three age groups in English PA ($F(2, 77) = 0.18$, $p = 0.83$) and real word ($F(2, 77) = 2.34$, $p = 0.102$) tasks. There was, however, a statistically significant difference between groups' performance ($F(2, 77) = 9.02$, $p = 0.00$) in the non-word reading task. Tuckey HSD test revealed that the 7-year-old group performed better than the other two groups. There was a significant difference ($p = 0.01$) between the 7-year-old (M = 87.90, SD = 13.14) and 8-year-old (M = 74.37, SD = 12.88) groups' performance, as well as between the 7-year-old (M = 87.90, SD = 13.14) and 9-year-old groups (M = 76.35, SD = 11.77) at $p = 0.04$. No other differences were significant ($p = 0.83$) between the 8- and 9-year-old groups. The comparison between the three groups' performance on the reading comprehension task showed there was no significant difference ($F (2, 77) = 2.81$, $p = 0.066$) between the groups (Table 4.17).

Table 4.17 Comparison of means for performance in the PA and reading tasks across the two languages for the three age groups

	Tasks	F	Sig.
Arabic	**PA**	0.06	0.94
	Real word reading	5.81	0.005
	Non-word reading	1.35	0.264
	Reading comprehension	2.50	0.089
English	**PA**	0.18	0.83
	Real word reading	2.34	0.102
	Non-word reading	9.02	0.00
	Reading comprehension	2.81	0.066

4.7 Results for Research Question 3: Does phonological awareness in either of the two languages of bilingual children predict word reading and reading comprehension in the other languages?

Following on from RQ3, it was hypothesised that PA in one language would correlate with reading in the other language. Multivariate regression was used to test this hypothesis and the results revealed that there was a significant effect of English PA on all Arabic reading tasks (real word: $F(1, 78) = 9.42$, $p < 0.05$; nonword: $F(1, 78) = 10.70$, $p < 0.05$; reading comprehension: $F(1, 78) = 15.65$, $p < 0.05$). The results also showed that there was a significant effect of Arabic PA on all English reading tasks (nonword: $F(1, 78) = 12.00$, $p < 0.05$; reading comprehension: $F(1, 78) = 22.93$, $p < 0.05$), except the real word reading task ($F(1, 78) = 3.91$, $p > 0.05$), the p value has a clear tendency towards significance (see Table 4.18).

Table 4.18 Multivariate regression analysis for PA predicting reading

Predictor variable	Dependent variable	F	Sig.
English PA	Arabic real word reading	9.42	0.003
	Arabic non-word reading	10.70	0.002
	Arabic reading comprehension	15.65	0.000
Arabic PA	English real word reading	3.91	0.052
	English non-word reading	12.00	0.001
	English reading comprehension	22.93	0.000

Therefore, English PA predicts Arabic reading and Arabic PA predicts all English reading tasks except real word reading. Thus, the hypothesis that English PA would predict Arabic reading is accepted, while the hypothesis that Arabic PA would predict English reading is accepted for all reading tasks except the real word task.

4.8 Results for Research Question 4: What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and spelling tasks in both languages?

RQ4 concerned the children's level of performance in PA and spelling tasks in Arabic and English and it was hypothesised that children's performance in PA skills and spelling would be better in Arabic (L1) than in English (L2). Because the data were not normally distributed, a non-parametric two related samples test was conducted to address this question. The Wilcoxon signed-rank test also was run to determine if there were differences between these scores. It is worth considering when interpreting the results of this question, that English measures were norm referenced and the Arabic measures were experimental except the PA test, which is standardised (see section 3.5).

Table 4.19 shows that children's performance at 7 years old on the Arabic PA test (M = 108.87, SD = 9.14) was higher than in English (M = 106.63, SD = 6.81). In terms of spelling tasks, the performance was higher in English – real word (M = 81.63, SD = 12.51), non-word (M = 67.15, SD = 11.25) than in Arabic – real word (M = 63.32, SD = 23.66), non-word (M = 61.07, SD =

23.52). The Wilcoxon signed-rank test indicated that only the differences between the scores for spelling real words (Z = -3.665, $p < 0.01$) were statistically significant.

Table 4.19 Descriptive statistics for children's performance aged 7 in PA and spelling tasks

Test	N	Mean	Std. Deviation	Sig.
APA	27	108.87	9.14	0.143
EPA	27	106.63	6.81	
Arabic real word spelling	27	63.32	23.66	0.000
English real word spelling	27	81.63	12.51	
Arabic non-word spelling	27	61.07	23.52	0.234
English non-word spelling	27	67.15	11.25	

The results for 8-year-old children showed that the performance for Arabic PA was higher than in English, as explained earlier, and their performance in spelling tasks was higher in English – real word (M = 79.99, SD = 11.1), non-word (M = 59.84, SD = 10.76) than in Arabic – real word (M = 64.10, SD = 20.53), non-word (M = 57.52, SD = 21.15). The Wilcoxon signed-rank test revealed statistical differences between the two sets of scores for PA (Z = -2.3, $p < 0.01$) and spelling of real words (Z = -4.15, $p < 0.01$). Spelling of non-word scores (Z = -0.36, $p > 0.01$) were not statistically significant, as illustrated in Table 4.20.

Table 4.20 Descriptive statistics for children's performance aged 8 in PA and spelling tasks

Test	N	Mean	Std. Deviation	Sig.
APA	27	109.24	9.72	0.021
EPA	27	105.45	9.32	
Arabic real word spelling	27	64.100	20.53	0.000
English real word spelling	27	79.99	11.16	
Arabic non-word spelling	27	57.52	21.15	0.719
English non-word spelling	27	59.84	10.76	

Performance in terms of Arabic PA of children aged 9 years old (M = 109.79, SD = 10.30) was higher than in English (M = 107.78, SD = 5.58). Children's performance on both spelling tasks in Arabic – real word (M = 81.68, SD = 10.87) and non-word (M = 71.98, SD = 15.84) – was higher than in English – real word (M = 75.47, SD = 8.29) and non-word (M = 42.64, SD = 13.24). The Wilcoxon signed-rank test determined that there were statistically significant differences between these scores (PA: Z = -2.7, $p < 0.01$; spelling real words: Z = -2.4, $p < 0.01$; spelling non-words: Z = -4.4, $p < 0.01$), as illustrated in Table 4.21.

Table 4.21 Descriptive statistics for children's performance aged 9 in PA and spelling tasks

Test	N	Mean	Std. Deviation	Sig.
APA	26	109.79	10.30	0.006
EPA	26	105.78	5.58	
Arabic real word spelling	26	81.68	10.87	0.014
English real word spelling	26	75.47	8.29	
Arabic non-word spelling	26	71.98	15.84	0.000
English non-word spelling	26	42.64	13.24	

Therefore, the hypothesis that children's performance for PA skills and spelling would be better in Arabic (L1) than in English (L2) is confirmed only for 9-year-old children. In terms of children aged 7 and 8 years old, this hypothesis is confirmed only for PA skills and is rejected for spelling.

The comparison of means for the three age groups' performance in Arabic PA and spelling tasks using one-way ANOVA analysis showed that the groups did not differ significantly on PA tasks ($F(2,77) = 0.06$, $p = 0.94$)(see Table 4.22). However, the groups differed ($F(2, 77) = 7.67$, $p = 0.001$) on the real word spelling task. Tukey post hoc test HSD showed that the 9-year-old children performed better than the other groups. There was a significant difference ($p = 0.002$) between the 9-year-old (M = 81.68, SD = 10.87) and 7-year-old (M = 63.32, SD = 23.66) groups. There was also a significant difference ($p = 0.004$) between the 9-year-old (M = 81.68, SD = 10.87) and 8-year-old (M = 64.10, SD = 20.53) groups. No other differences were significant ($p = 0.98$) between the 7- and 8-year-old groups.

The results of one-way ANOVA for non-word tasks showed a group difference ($F(2, 77) = 3.56$, $p = 0.03$). Post-hoc comparisons using Tukey HSD test indicated that there was a significant difference ($p = 0.03$) between the 9-year-old (M = 71.98, SD = 15.84) and 8-year-

old (M = 57.52, SD = 21.15) groups. There was, however, no significant difference ($p = 0.135$) between the 7-year-old (M = 61.07, SD = 23.52) and 9-year-old (M = 71.98, SD = 15.84) groups. No other differences were significant ($p = 0.8$) between the 7-year-old (M = 61.07, SD = 23.52) and 8-year-old (M = 57.52, SD = 21.15) groups.

In terms of English spelling tasks, ANOVA comparing the three groups' performance on the real word task showed no significant difference ($F(2,77) = 2.28$, $p = 0.108$) between groups (see Table 4.22). However, the groups did differ significantly ($F(2, 77) = 30.10$, $p = 0.00$) on the non-word task. Tukey post hoc test HSD showed that there was a significant difference ($p = 0.00$) between the 7-year-old (M = 67.15, SD = 11.25) and 9-year-old (M = 42.64, SD = 13.24) groups, as well as between ($p = 0.00$) the 8-year-old (M = 59.84, SD = 10.76) and 9-year-old (M = 42.64, SD = 13.24) groups. There was, however, no significant difference ($p = 0.06$) between the 7-year-old and 8-year-old groups. From these results, it is clear that the performance of the 9-year-old group was lower than the other two groups in English spelling tasks.

Table 4.22 Comparison of means for performance on the PA and spelling tasks across the two languages in the three age groups

	Tasks	F	Sig.
Arabic	**PA**	0.06	0.941
	Real word spelling	7.67	0.001
	Non-word spelling	3.56	0.033
English	**PA**	0.18	0.83
	Real word spelling	2.28	0.108
	Non-word spelling	30.10	0.000

4.9 Results for research Question 5: Does phonological awareness in one of the two languages of Arabic (L1) - English (L2) bilingual children predict word spelling in the other languages?

Following on from RQ5, it was hypothesised that PA in one language would correlate with spelling in the other language. To test this hypothesis, multivariate regression was performed and the results indicated that there was a significant effect of English PA on all Arabic spelling tasks – real word ($F(1, 78) = 13.09$, $p < 0.05$) and non-word ($F(1, 78) = 10.51$, $p < 0.05$). Moreover, the results also showed that there was a significant effect of Arabic PA, but only on English real word spelling ($F(1, 78) = 11.97$, $p < 0.05$) (see Table 4.23). Therefore, English PA

predicts both real and non-words in Arabic and Arabic PA predicts only real word spelling in English.

Table 4.23 Multivariate regression analysis for PA predicting spelling

Predictor variable	Dependent variable	F	Sig.
English PA	**Arabic real word spelling**	13.09	0.001
	Arabic non-word spelling	10.51	0.002
Arabic PA	**English real word spelling**	11.97	0.001
	English non -word spelling	2.17	0.145

4.10 Summary

This chapter has examined the assessments and questionnaire results, presenting the data analysed to answer the research questions regarding the comparison between the three age groups of Arabic-English bilingual children in terms of the relationship between PA and literacy. The potential for cross-linguistic transfer between the L1 and L2 has also been examined. The results in this chapter indicate that there is, as expected, a significant correlation between PA in English and in Arabic across the three age groups. In addition, the children's performance in Arabic PA is better than in English. The findings also show that Arabic PA predicts all English reading tasks, except the real word task; moreover, English PA predicts all Arabic reading tasks. A further important finding of this study is that Arabic PA predicts only English real word, not non-word, spelling, while English PA predicts Arabic real and non-word word spelling. The next chapter, therefore, moves on to discuss these findings, as well as highlighting the study implications and limitations and significant directions for further research.

Chapter 5. Discussion

5.1 Introduction

The primary research question of this study concerned how phonological awareness (PA) relates to reading and spelling for typically developing Arabic-English bilingual children growing up in the UK who speak Spoken Arabic Vernacular (SAV) and learn Modern Standard Arabic (MSA) and English at the same time. To address this research question, which guided the study, the performance of three age groups of bilingual children in tasks of phonological awareness, reading (real word, non-word and reading comprehension) and spelling skills (real and non-word) were compared in both Arabic and English. The children were also assessed on four other measures: a) receptive vocabulary b) letter name fluency c) letter sound fluency and d) working memory (digit recall, listening recall, listening recall processing, spatial recall and spatial recall processing). Previous chapters have discussed issues related to the methods used for the study, as well as the results of the language background questionnaire and tasks administered. This part of the thesis is devoted to the discussion of the findings which have emerged from the data.

Four major findings emerged from this study. First, there is a significant correlation between PA in English and in Arabic across the three age groups. Second, the children's performance in Arabic PA is better than in English. Third, Arabic PA predicts all English reading tasks except the real word task and English PA predicts all Arabic reading tasks. Finally, a further important finding of this study is that Arabic PA predicts only English real word, not non-word, spelling, while English PA predicts Arabic real and non-word word spelling.

This study addressed five research questions. The findings associated with each are discussed below and connected to the broader language context. The discussion of RQ2 is integrated with that of RQ4 because they both aimed to investigate the Arabic-English bilingual children's levels of performance in PA skills, reading and spelling in the two languages. This chapter also includes some consideration of the challenges of conducting cross linguistic research and presents the study's practical implications and limitations and indicates future research directions based on the findings of this study.

5.2 Research Question 1: Is there an association between phonological awareness skills in Arabic (L1) and English (L2)?

The first research question asked whether there is an association between phonological awareness skills in Arabic (L1) and English (L2). It was hypothesised that PA skills in Arabic

and English would be strongly associated with each other. As might be expected from the existing literature (Saiegh-Haddad and Geva, 2008; Farran, 2010), the results of the Spearman correlation showed that there is a positive and strong association between Arabic PA and English PA across the three age groups. In other words, Arabic PA and English PA skills are highly correlated.

A possible explanation of this finding might lie in the universality of PA development, particularly in alphabetic languages (Cisero and Royer, 1995; Comeau *et al.*, 1999; Anthony and Francis, 2005; Chiang and Rvachew, 2007; Sun-Alperin and Wang, 2009). Since the theory of developmental progression in PA assumes it is universal across alphabetic languages, naturally Arabic and English will be no exception to this pattern and developmental knowledge of PA in one of these two languages can normally be connected to PA in the other language. That is to say, PA skills in the two languages will facilitate children's developmental progress in both the L1 and L2.

These findings support those of Saiegh-Haddad and Geva (2008) and Farran (2010), who found that PA skills in Arabic and English correlate with each other. However, one fundamental difference between these studies and this research is that they included children who spoke English as an L1 and Arabic as an L2, while this study included only children who spoke Arabic as their L1 and English as their L2. In contrast to the current study, PA in both Saiegh-Haddad and Geva's (2008) and Farran's (2010) studies was only measured in relation to specific skills, with no consideration of the different aspects of PA considered in this study. Elision (deletion), which only measures the children's ability to remove phonological units from the spoken word to produce another word, was used in Saiegh-Haddad and Geva's (2008) work, while elision and blending, which only measures the children's ability to connect a sequence of sounds to form a word, were used in Farran's study (2010). Moreover, in contrast to Jayusy's (2012) study of Arabic, Hebrew and English, this study explored PA in greater depth, indicating that the broad range of PA skills still yields the same outcome.

Furthermore, the findings here in corroborate those found in previous studies on high achieving bilingual children and support the finding that PA skills in the L1 and L2 are associated linguistically with each other (Bruck and Genesee, 1995; Cisero and Royer, 1995; Comeau *et al.*, 1999; Wade-Woolley and Geva, 2000; Al-Sulaihim, 2014). Findings such as these are in agreement with the linguistic interdependence hypothesis (LIH) (Cummins, 1981), which assumes that linguistic knowledge (such as PA skills) can be transferred positively between two languages regardless of their orthographic structure. In conclusion, these results would seem to

suggest that there is a significant cross-linguistic correlation of PA skills between Arabic and English.

5.3 Research Questions 2 and 4: What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and reading tasks in both languages? What is the Arabic (L1) - English (L2) bilingual children's level of performance in PA and spelling tasks in both languages?

RQ2 and RQ4 sought to determine the children's performance in PA skills and reading tasks in both languages and in PA skills and spelling in both languages respectively and it was hypothesised that the children's performance in PA skills, reading and spelling tasks would be better in Arabic (L1) than English (L2). In terms of PA results, PA was assessed in Arabic and English at three linguistic levels (syllables, rhymes and phonemes). Due to the lack of PA measures that are tailored specifically for Arabic-English bilingual children, the Phonological Assessment Test II (Robertson and Salter, 2007) was used to assess children's PA in English and Arabic version (Ahmad, 2011) of that test was used to measure children's PA in Arabic. The standardised scores were available for these two versions of the test. It is worth giving some consideration to how the process of translation and modification of the PA is developed , as explained in section 3.4.2.1, in discussion the results of PA test. The modified and translated Arabic version has equivalent subtests of the English PA test that aim to assess the same range of PA skills.

For cross-sectional analysis of the data, a comparison across the three age groups was conducted. The results showed that the mean performance of the three age groups on Arabic PA tasks was higher than in English. This means that the children performed better on Arabic PA than English PA. Furthermore, the comparison between groups showed clearly that there was no significant difference between the means of the three age groups in either Arabic PA or English PA, indicating comparable performance. This would suggest that children of all age groups in this study were able to perform well on PA tests in their mother tongue and in English. Therefore, the results support the prediction of this study that children's performance in PA skills would be better in Arabic than in English. These findings are consistent with the fact that Arabic and English PA correlate positively and significantly in a range of research studies.

These findings also concur with theoretical and empirical studies among native and non-native language speakers that indicate children develop better metalinguistic skills (PA, orthographic awareness and morphological awareness) in their native language than in any other language acquired later (Droop and Verhoeven, 2003; Bialystok *et al.*, 2005; Bialystok and Crago, 2007).

However, this study extends the evidence by suggesting that Arabic-English bilingual children develop better PA in MSA, which is a different version of Arabic to the dialect the children speak (SAV). This issue is discussed below in the context of the results for both these questions.

Finally, the higher performance of children in Arabic PA skills could be interpreted as being a result of the nature of Arabic and English orthography. Arabic orthography, in contrast to English orthography**,** is shallow, with more letter-sound mapping and that in turn may develop high levels of PA skills in Arabic compared to English.

Comparison of the results for the reading tasks in both languages yielded the following main findings: the results seem to suggest that the children's performance at 7 years on all English reading tasks was much better than their performance in Arabic. A statistically significant difference was also found for this group on the reading comprehension task, but none of the other tasks. Similarly, the performance of the 8 year olds on the reading tasks was also higher in English than in Arabic and there were statistically significant differences for the real word and reading comprehension tasks, but not for the non-word reading task. The findings with regard to the 9-year-old children showed that their performance in real and non-word tasks in both languages was very similar and their performance in the English reading comprehension task was higher than in Arabic. A statistically significant difference was found for this group only on the reading comprehension task. Therefore, the results for performance in the reading tasks were contrary to the proposed hypothesis.

In terms of spelling, analyses that compared the performance of the three groups on the spelling tasks in the two languages also yielded some interesting results. For 7-year-old children, a similar pattern emerged as for the 8-year-old children. The mean performance of the two age groups was significantly higher on the English real word spelling task than the equivalent Arabic task. However, there was no statistical significant difference for these groups on the non-word spelling task. It is surprising that the 9-year-old group performed better on the Arabic spelling tasks than on the English spelling tasks and statistical difference was found only between the scores for real word tasks. As a result, the results for this question only partially support the proposed hypothesis.

It can be concluded that despite these children growing up with an ambient language that is a variant of MSA, they still have a linguistic advantage over English, which was their L2. Arabic was the L1 for all children in this study and they were also exposed to Arabic, i.e. MSA (the officint version of Arabic), in weekend schools, which differs from SAV, the spoken form of Arabic used at home. MSA is taught in schools because it is regarded as the medium for

studying Arabic. This study focuses only on the written form of Arabic (MSA) rather than the spoken forms of Arabic. The bilingual children in the study acquired English as their language of learning at school and it was their L2.

It is important to consider the oral language proficiency of children in both languages, specifically with regard to vocabulary, when interpreting the children's performance. Generally speaking, vocabulary is significantly related to the development of PA and it is essential for literacy achievement in both L1 and L2 (Gillon, 2004). The vocabulary results showed clearly that the performance of the three age groups in Arabic vocabulary was better than in English. The most likely explanation for this result is that Arabic was the L1 for the children in the study.

It would be reasonable to assume that the higher level of performance in PA and vocabulary in Arabic might lead to higher outcomes in Arabic literacy than in English literacy. Contrary to expectations, the results showed that the children's performance in all English reading tasks was better than in Arabic. The performance in the spelling tasks yielded the same pattern, with the exception of the performance of the 9-year-old group, whose performance was better in Arabic than in English.

In general, it could be argued these findings align with the parents' judgment of their children's proficiency in both Arabic and English. The parents reported that most of the children in the 9-year-old group could understand and speak Arabic and English fluently, most children in the 8-year-old group could understand and speak more complex Arabic and they could understand and speak English fluently, while most children in the 7-year-old group could understand and speak simple Arabic and could understand and speak English fluently.

There are many possible explanations for these findings. First, the linguistic distance between the predominant versions of Arabic (SAV and MSA) may have an impact on the children's Arabic reading and spelling outcomes. Children first naturally acquire SAV and typically when they enter school they develop the written version of Arabic (MSA). Abu-Rabia (2000) and Saiegh-Haddad (2005) proposed that the linguistic distance between SAV and MSA may lead to delays in Arabic children's literacy acquisition because there is a lack of a transparent relationship between speech and literacy.

Second, these results could be attributed to the limited hours available for literacy instruction in Arabic weekend schools compared to English schools. In other words, the intensive focus on literacy teaching in English schools because the children spend more time in English school compared to Arabic weekend schools. The nature, quality and intensity of input is a central

aspect of learning a language and hence the high-intensity instruction in English may lead to better English reading and spelling skills. In contrast, the more limited exposure to instruction in written Arabic (MSA) may lead to a delay in Arabic reading and spelling skills.

Moreover, it is possible that these results in literacy skills in both Arabic and English can be accounted for by the minimal exposure to Arabic outside the home for children resident in the UK. The bilingual Arabic-English population resident in the UK tends to use English in the general environment in which they live and as the language of communication with their friends. Another important point that should be mentioned here is that Arabic-English bilingual children have more incidental exposure to written English, for example on TV and computer programs. As a consequence of this change in linguistic environment, children may use their L1 less in their daily lives. This could account for children having greater proficiency in English than in Arabic.

In terms of the performance of the 9-year-old group in spelling tasks, the results showed that their performance was better in Arabic than in English. It is likely that children relied on their deeper knowledge of Arabic PA skills in spelling performance. This is supported by evidence that has emphasised the predictive power of PA for spelling in Arabic (Al Mannai and Everatt, 2005; Elbeheri and Everatt, 2007). Another possible explanation for these findings may be attributed to the Arabic orthography, which has a higher transparency between letters and sounds compared to English orthography.

According to the English National Curriculum, one aspect of English spelling that children should learn is how to understand and use morphological structures to spell new words when they are 9 years old. Indeed, knowledge of morphology is a crucial skill in spelling development in languages with transparent orthography such as English. Consequently, the children rely on their extensive phonic knowledge that they have already acquired in the early stages of spelling acquisition, alongside their knowledge of morphology, to spell unfamiliar or new words. The children in this age group (9 years old) might not have mastered how to reflect morphological information in English spelling. This interpretation aligns with suggestions that children need more time to learn about how morphology is expressed in English spelling (Gentry, 1982; Ehri and Wilce, 1986; Carlisle, 1988).

In conclusion, the children's performance in Arabic PA skills is better than in English. The performance of children in English reading tasks is better than in Arabic. In terms of spelling tasks, the 7- and 8-year-old groups are better in English spelling tasks, while the performance of the 9-year-old group is better in Arabic spelling tasks than in English.

5.4 Research Questions 3: Does phonological awareness in either of the two languages of bilingual children predict word reading and reading comprehension in the other languages?

RQ3 asked whether PA in either of the two languages of bilingual children might predict word and non-word reading and reading comprehension in the other language and it was hypothesised that PA in one language would correlate with reading skills in the other language. The findings from the multivariate regression clearly confirm that English PA predicted all Arabic reading tasks and partially supported, contrary to expectations, the hypothesis that Arabic PA would predict all English reading tasks. Arabic PA only predicted English non-word reading and reading comprehension. This might suggest that PA contributes to reading acquisition in both Arabic and English. It is important to mention here that the analysis carried out to answer this question was correlation. Hence, an association between variables is demonstrated, no causality or direction of influence is suggested.

These findings corroborate those of Saiegh-Haddad and Geva (2008), who found that PA skills in either of the two languages of English-Arabic bilingual children predicted word reading skills in the other language. However, this study extends that of Saiegh-Haddad and Geva (2008) by examining reading comprehension skills in Arabic and English. This study also supports the findings of Farran (2010) in that PA skills predict reading outcomes across Arabic and English. While Farran (2010) found that PA predicted both real word and non-word reading, this study found that PA in both languages contributed significantly to reading outcomes, except that English real word reading was not predicted by Arabic PA. This study, in contrast to Farran (2010), examined the contribution of PA to reading comprehension skills in addition to real word and non-word skills in Arabic and English. Similar findings were obtained in a study by Al-Sulaihim (2014), which adopted a cross-sectional and longitudinal research design. The researcher compared the performance of two groups of children (monolingual Arabic and bilingual Arabic-English) in PA and reading tasks and found PA abilities in Arabic were correlated with reading in English, indicating a positive cross-linguistic transfer effect for the bilingual children.

The studies mentioned previously all support the fact that PA skills are important in developing bilingual children's reading skills in both languages, but none controlled factors that may have an impact on this development. This study has drawn attention to a number of these significant factors, such as receptive vocabulary, letter name knowledge and letter sound knowledge in both languages, as well as working memory. This study also replicates earlier evidence of the

transferability of PA across alphabetically written languages and its paramount role in predicting reading skills, regardless of the transparency of orthography (Comeau *et al.*, 1999; Durgunoglu and Oney, 1999; Goswami and Bryant, 1999; Wade-Woolley and Geva, 2000; Hamilton and Gillon, 2006; Chiang and Rvachew, 2007).

Moreover, the cross-linguistic results provide evidence in favour of the LIH (Cummins, 1981), arguing that certain linguistic skills (including reading) in L1 can positively be transferred to the L2, despite variation in their orthographic depth. Because of the cross-linguistic transfer of skills, it can thus be suggested that bilingualism may present an advantage in terms of PA for Arabic-English bilingual children. Furthermore, the findings related to this question clearly point to the importance of PA in predicting outcomes for reading among bilingual Arabic-English children.

In conclusion, Arabic PA predicted performance on all English reading tasks, except the real word task; moreover, English PA predicted performance on all Arabic reading tasks.

5.5 Research Question 5: Does phonological awareness in one of the two languages of Arabic (L1) - English (L2) bilingual children predict word spelling in the other languages?

The fifth research question investigated whether PA in either of the two languages predicts word and non-word spelling in the other language. It was hypothesised that PA in one language would correlate with spelling in the other language. The findings from multivariate regression indicated important results. Arabic PA predicts only English real word spelling and English PA predicts Arabic real and non-word spelling. Hence, the results only partially support the proposed hypothesis. These findings imply that PA ability is a significant predictor of early spelling development in bilingual children. Correlation analysis was used to analyse data for this question, therefore, the present findings show only a relationship between variables and not a causal relationship among those variables or direction of prediction.

There are two possible explanations for these results. First, explicit phonics instruction and phonemic awareness activities take place with a high level of intensity in English schools. Explicit phonics instruction involves an understanding of the complex associations between the letters and sound patterns. Phonics instruction helps children in both reading (decoding) and spelling (encoding) and each skill reinforces the other (National Reading Panel, 2000). Phonemic awareness activities that aim to promote the ability to manipulate sounds in words are also necessary for reading and spelling. However, both phonemic awareness and phonics instruction are more important for spelling than learning to read (Pearson, 2004; Emmit *et al.*,

2006) because "there is a substantial transfer value from the focus on sound-symbol information in spelling to symbol-sound knowledge in reading" (Pearson, 2004, p. 262). It is thus argued that children may guess the spelling of the word in the tasks. They are also likely to be better at dealing with non-words because there is no correct spelling and they depend on their alphabetic code rather than their vocabulary knowledge and their memory, whereas in real words there is

only one of spelling of word and they might be good in remembering phonic rules or they may depend on their vocabulary knowledge and their memory.

Moreover, it is very likely that the greater amount of literacy instruction in English schools compared to Arabic weekend schools has an effect. Arabic-English bilingual children attend Arabic school one day a week for approximately four hours, whereas they attend English school five days a week for approximately six hours each day. Children therefore have much more English input than the formal version of Arabic (MSA).

These findings further support the LIH (Cummins, 1981), which claims there is significant interaction between L1 and L2. Thus, reading, writing and general academic skills (such as PA) that are successfully acquired in the L1 should automatically be transferred to L2, even if the two languages are different in their orthographic structure. Moreover, these findings also lend support to the contrastive analysis hypothesis (CAH), which argues that positive transfer can occur between L1 and L2 if there is a similarity in certain aspects of the two languages (such as phonetics).

No prior study has been undertaken investigating the relationship between PA and spelling acquisition among Arabic-English bilingual speakers. These results support the findings of other studies of bilingual children from different L1 backgrounds which have indicated that positive or negative linguistic transfer of PA and spelling skills occurs across languages (Figueredo, 2006; Sun-Alperin and Wang, 2009; Xuereb, 2009). More research is needed to replicate this study to generalise the findings in this respect.

The main conclusion that can be derived from these findings is that cross-linguistic transfer of PA occurs from Arabic to English for real word spelling and from English to Arabic for both real and non-word spelling.

5.6 Educational and clinical implications of the study

There are several educational and clinical implications that emerge from the findings of the study and these implications could be useful to educators and speech and language therapists.

First, it is crucial for educators and speech and language therapists who support multicultural and bilingual populations in countries with high levels of immigration, such as the UK, to take into account the language and literacy development of young children who are developing their reading and spelling skills in English as a L2.

Second, no prior study has ever been done on the relationship between PA and literacy acquisition among Arabic-English bilinguals in the UK. Due to the cross-linguistic transfer of PA between these two alphabetic languages, the background information collected regarding bilingual children's PA skills in their first language (L1) could help clinicians and educators facilitate early literacy development in both languages. In addition, educators can also play an important role in understanding their bilingual children's literacy development in English as an L2 if they know the fundamentals of phonology and spelling in Arabic as the children's L1 and support the children in overcoming challenges in English literacy skills. It is therefore not surprising that the native language (Arabic) could act as a bridge in learning to read in the L2 (English).

This study provides evidence concerning the predictive relationship between PA and reading, as well as between PA and spelling among Arabic-English bilingual children. Therefore, another important educational implication that can be drawn from this study is that a clear understanding of the interaction that occurs among the fundamental literacy skills could enable educators and researchers to develop suitable interventions and instructional approaches for children growing up with two languages. It is important they consider certain factors that contribute to literacy development, such as PA and linguistic characteristics, particularly the phoneme-grapheme correspondence in Arabic and English.

The findings yielded by this study also have clinical implications, particularly for speech and language therapists who work with bilingual children. Due to the cross-linguistic transfer of PA between Arabic and English and the highly consistent grapheme to phoneme correspondence in Arabic, intervention in both languages based on techniques focusing on PA tasks (for example games and songs) in the early years may be beneficial in determining children with speech and language difficulties and possibly promoting later reading and spelling skills in both languages.

A further clinical implication is that the findings in combination provide support for the importance of parents and teacher reports of children's ability to use language to determine the linguistic development and proficiency of Arabic-English bilingual children and make

appropriate and accurate recommendations for children who have language delay or children who need extra help and support to improve their literacy skills.

Finally, one of the significant clinical issues that may face speech and language therapists is that many Arabic-English bilingual children who have limited proficiency in English can not complete PA assessments in English. This study indicates that PA skills in Arabic and English are strongly associated and therefore assessing bilingual children's PA in their L1 would be recommended and could be taken as an indication of existing or future English PA skills. In addition, developing assessments that are tailored specifically for Arabic-English bilingual children is important to remedy this situation.

5.7 Challenges of cross linguistic comparison research

It is widely accepted that cross linguistic transfer is an important issue to consider in the field of second language acquisition. Cross-linguistic transfer studies are solidly based on the general notion that there is an interaction between the speaker's L1 and L2. In a general sense, learning of the second or additional language is facilitated if the learner able to make use of previously acquired linguistic knowledge (i.e. L1). Much bilingual research has examined how the developmental interrelationship between the bilingual child's two languages may change the course of their literacy development in their L2. Therefore, it could be correct to say that cross-linguistic transfer plays a key role in supporting the children growing up with two languages in overcoming challenges in their L2 literacy skills. However, there are some fundamental challenges arising from the use of this type of research. This section deals with some of these challenges.

Not surprisingly, cross linguistic comparisons are challenged by the fact that languages are different in their typological properties (i.e. phonology, semantics, syntax and lexicon). Linguistic typology is one of the most influential factors to take into account in the transfer between two languages. As the transfer studies are based mainly upon the systematic comparisons of languages (Oldlin, 1989), there is no doubt that particular characteristics of linguistic systems have influenced what learners consider transferable. As a result, it is commonly assumed that learners carry over more from their first language that is typologically closer to the target language. In other words, if the two languages have features in common, the occurrence of language transfer tends to be more possible.

The lack of equivalent assessment tools across different languages is another serious challenge relating to cross linguistic comparisons. For example, there are a wide range of standardised

assessments are available in English, while in most other languages the comparable standardised tests are not available. More important, it is worth mentioning that if the translation versions of these assessments are available, they do not take into account both the certain linguistic and psycholinguistic parameters of the target languages.

Moreover, one of the cross linguistic comparisons challenge stemmed from the fact that culture plays an interesting role throughout the process of language learning. Allwright *et al.* (1991) argued that learning a new language includes the learning of a new culture. It is especially important to bear in mind that cultural identity is one of the characteristic of bilingualism. Therefore, bilinguals learn two languages as well as they learn about the cultures associated with the languages.

In closing, although there are many problems in cross linguistic studies, the knowledge of L1 and its influence on L2 is one of the interesting issue in language learning.

5.8 Limitations and directions for future research

The limitations of this study offer a number of potential directions for future research. First, the most important limitation lies in the fact that the cross-sectional design provides a snapshot of children's development in PA and literacy skills at one time point and it might not be representative of children's overall PA, reading and spelling performance. Therefore, an empirical longitudinal study based on making comparisons over time for the same cohort could very usefully follow the children's development in these skills. For example, future research could follow these three age groups at three or more points in time and measure their ability in PA, reading and spelling skills.

The second limitation is related to the background language questionnaire. Although the design of the questionnaire was based on existing questionnaires used in similar research, an attempt was made to keep the questionnaire short enough to be acceptable to parents. Consequently, there was insufficient detailed information to draw sound conclusions. In addition, due to the time constraints of a PhD, it was not possible to test the reliability of the questionnaire. It might be informative for researchers to develop a questionnaire that includes more detailed questions and they should test the reliability of the questionnaire in order to obtain complete and accurate information about the language background of the children.

Another limitation concerns the Arabic assessments administrated in this study. Because comparable, valid and reliable standardised measures were not available in Arabic, some experimental tasks that had been developed for other research projects were adopted for use in

the study. Consequently, it might be worthwhile for researchers to consider developing standardised tests in both Arabic reading and spelling. The availability of standardised testing materials would be ideal for the present line of research.

In addition, the educational background of the parents is one of the limitations of this study. Parents' level of education has been identified as the strongest family status variable substantially associated with the child's educational attainment. More specifically, parents with higher levels of education are more likely to enhance their children's language development and academic achievement. In this study, the vast majority of parents had a high educational level, as indicated in the parental education data (see section 4.2.8); indeed, most of the parents were in the UK with the purpose of pursuing doctoral studies. The parents' level of education might contribute to the children's performance (Lesniak *et al.*, 2014) and thus this population is unlikely to be representative of the general population of parents of Arabic-English bilingual children in the UK. This may warrant caution in generalising the findings to other Arabic-English bilingual or L2 children. As a result, it might be fruitful to take into account different parental educational backgrounds in future research.

Finally, this study examined the relationship between PA and literacy in typically developing Arabic-English bilingual children, so further work could undertake in-depth investigation of this relationship in atypical populations, for example children with reading or developmental language difficulties. Such studies would provide information regarding the impact of PA development on literacy skills in atypical bilingual children.

5.9 Summary

The discussion of the study findings has been presented in this chapter. Some challenges of conducting of cross linguistic comparisons were presented. Educational and clinical implications drawn from the findings of the study were discussed. Limitations and directions for future research were also discussed. A summary of the key findings of this study related to each question and hypothesis, together with an account of the recommendations for educational practice and a final reflection of the research process will be presented in the next chapter.

Chapter 6. Conclusion, Recommendations and Reflection

6.1 Introduction

This study aimed to examine the relationship between phonological awareness (PA) and literacy in Arabic-English bilingual children. Referring to the results discussed in Chapter 5, a summary of the key findings of the study is set out in this chapter. Furthermore, recommendations for educational practice will also be considered. This chapter concludes with a reflection on the research process.

6.2 Summary of the key findings

Even though the transferability of PA has been widely investigated in relation to its crucial role in literacy acquisition across different languages, little attention has been paid to the relationship between Arabic and English. Hence, the purpose of this study was to examine the correlation and predictive relationship of PA with literacy skills in Arabic-English bilingual children. More specifically, the study had the following objectives:

1. To examine the relationship between Arabic and English PA.
2. To determine the children's performance in PA and reading in both languages.
3. To determine the children's performance in PA and spelling tasks in both languages.
4. To know whether PA in either of the two languages predicts reading skills in the other language.
5. To know whether PA in either of the two languages predicts spelling skills in the other language.

Taken together, the findings of this study point to the paramount role of PA in promoting children's early literacy. The study confirms previous findings and contributes additional evidence that suggests there is a positive cross-linguistic correlation between PA skills in the two alphabetic languages. In addition, the study supports previous findings in bilingual research which found that the development of PA, as one of the metalinguistic skills, is better in the first language (L1) than in the second language (L2). A further important consequence of this study is that Arabic PA skills predict English non-word and reading comprehension and English PA skills predict Arabic reading skills. This finding supports the fact that PA has an important role in predicting reading cross-linguistically.

This, to my knowledge, is the first study that has investigated the relationship between PA and spelling acquisition among Arabic-English bilingual children and found that PA skills in Arabic

predict only the spelling of English real words and that PA skills in English predict both Arabic real word and non-word spelling. It can therefore be argued that further research should be done to explore these findings in greater depth.

More importantly, with controlling variables that may have an impact on the relationship between PA and the acquisition of literacy skills in bilingual children, this study enhances our understanding of cross-linguistic transfer facilitation. Overall, the study aimed to contribute to the field of research on the influence of language transfer. Evidently, research in this area is on-going and the effect of the target language and any possible additional language continues to interest researchers in second language acquisition.

6.3 Recommendations for educational practice

The findings of this study have a number of important for recommendations educational practice. First, they suggest that there is transferability of PA skills across Arabic and English, which could assist educators, researchers and policymakers in understanding the developmental paths of Arabic-English bilingual children. It is recommended that specialists in the field of education take into account certain factors that contribute to literacy development in both languages (such as PA skills) in designing educational intervention programmes to support and enhance children's reading and spelling performance and demonstrate language-specific learning challenges and patterns.

To promote the transfer of PA skills, it is also recommended that teachers who work with bilingual children should be familiar with the basic linguistic characteristics of their children's L1 to understand their knowledge and development in the L2 learning process, particularly phoneme-grapheme mapping of the language being learned. Therefore, teacher training programmes may be required in this regard. Teachers should also be aware that transference of literacy skills between two languages is an important factor for successful literacy acquisition and supporting children's development in both the L1 and L2.

Classroom materials such as bilingual dictionaries, textbooks and information about the contrasts between Arabic and English should also be available for classroom use as these may help teachers be aware of some problems that children may face.

In addition, to produce better learning outcomes for bilingual children and to optimise cross-linguistic transfer of PA skills and its vital role in the development of literacy skills, more educational training programmes for teachers in multilingual classrooms are needed for them to adopt effective and appropriate pedagogical approaches. Furthermore, special consideration

should be given to assessing the literacy skills of bilingual children in both languages to ensure accurate measurement of their development, highlighting the importance of the transfer of literacy skills across languages.

6.4 Reflection on the process of the research

This section comprises my personal reflection on the learning experience in completing this study. I can say beyond any doubt that my learning experience while completing this thesis was invaluable. I have learned a great deal and I have a deep sensation that what I have learned so far will contribute further to my professional and personal growth.

The main lesson I have learned from the whole research process is to learn how to learn, because I believe that the PhD journey is a learning experience. I have discovered my ability to teach myself any topic and any skill that I need for my study and this ability has changed dramatically and favourably throughout the work of the research, especially because I have been optimistic about developing my own understanding of my project. Indeed, I have found that the more I learn, the more I realise how little I know and how much there is to be known because knowledge is infinite. Consequently, it can be said that what I have learned through the course of conducting this research will be extremely beneficial to my career progression in the near future.

In particular, what I have learned through the social science research training and researcher development programme (HASS) offered by Newcastle University has been a key part of my PhD study. It offered a broad range of modules and advanced skills sessions in a multidisciplinary and international learning environment. It was appropriate to my needs as a researcher in order to complete my project successfully. I have truly enjoyed the experience of this programme and found it extremely interesting. In general, HASS has contributed to the improvement of the fundamental skills necessary in research, providing substantial benefits for me as a developing researcher.

In addition, undertaking this research study has contributed to the improvement of my time management skills. More specifically, I have learned that conducting research is based on a plan that should be implemented according to a specific timetable and it may help to distribute my work into time frames. To accomplish my goals, daily plans were established to do certain task(s). I am certain that time management is among the important criteria for the successful researcher.

One of the best opportunities that my research project offered me was participation in conferences. As a new researcher, attending these conferences was a great opportunity to share my research and to engage with the community of researchers interested in similar subjects in my field. In addition, these conferences were a good opportunity to build my professional network with academics and researchers from different countries and increase my awareness of the cutting-edge research in my field.

As a result of conducting this research, I have found that my level of self-confidence has increased significantly. This was mainly achieved through overcoming challenges in the data collection process. These challenges were related to the process of recruiting children and building a good relationship with people in a confident manner. At first, it seemed to me that the collection of data would be a difficult task; however, it is now clear to me that if I have high confidence in facing and addressing tough tasks, I will do good research work with the help of others. Hence, without doubt, I will greatly benefit from the increased level in confidence in the future, as a researcher and also as a teacher.

I really benefited from working and cooperating with my supervisory team. They offered valuable advice in dealing with the issues that arose in many stages during this research project. I have gained greatly from their comments and suggestions that have helped to shape this thesis and my own thinking in many ways. They taught me how to adopt a critical way of thinking. Their invaluable support, encouragement and excellent cooperation have helped me become an independent researcher.

Overall, the research process in this project has shown me clearly how I have grown up and matured from being a teacher into being a researcher. I am profoundly grateful for having had this research experience.

6.5 Summary

This closing chapter of the current study started with a summary of the key findings and their significance for the field of language transfer. This was followed by a number of important recommendations for educational practice. An overall reflection on the process of the research has also been presented.

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Appendices

Appendix A: Parent Information Sheet in English

School of Education, Communication and
Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

Study Title: The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK
A Research Project by: Sahar Naeem Sabhan
Information for Parents

Your child is being invited to take part in a research study. This letter has important information about the reason for doing this study, what I will ask your child to do, and the way I would like to use information about your child if you choose to allow your child to be in the study. Please, take time to read the following information carefully and discuss it with others if you wish.

What is the purpose of the study?

The aim of the study is to find out if there is a correlation between phonological awareness (the ability to hear, distinguish and manipulate speech sounds) and the reading and spelling skills of Arabic-English bilingual children. Phonological awareness is really important for all children as a necessary skill for speech development, acquisition of vocabulary and reading and spelling. We know a lot about how phonological awareness relates to literacy for monolingual children, but we do not have the same information about Arabic-English speaking bilingual children. The findings of this study will be an important piece of new knowledge about how speaking these two very different languages supports literacy development in both languages. This study is being undertaken by the researcher in completion of her PhD. It will be written up as a PhD thesis and the findings will be submitted for publication in peer reviewed journals.

What will my child be asked to do in this study?

Should you decide to allow your child to take part in this research study, and all your questions have been answered to your satisfaction, you will be asked to sign a consent form. The study consists of a language questionnaire for you to complete and return to the researcher. Then,

your child will have 2 sessions of phonological awareness, language and literacy assessment. Assessment of phonological awareness, vocabulary knowledge, reading and spelling in both Arabic and English will take place over the two sessions. Assessments will take place in your child's Arabic school. Each assessment session will take up to an hour. The assessment sessions will take place during the autumn term. You will be notified in advance of the assessment dates.

What are the possible benefits for my child or others?

You will be given a report outlining the assessment results and what they mean in relation to your child. You might find it helpful to share this report with your child's teacher to help support their language and literacy development. Furthermore, this study is designed to find out more about the relationship between phonological awareness and reading and spelling in both these languages. The results of the study will have significance for all Arabic-English bilingual children learning to read in both languages.

How will you protect the information you collect about my child?

We will ensure that your child's results are confidential. Your child will be identified in the research records by a number, for instance, as (pupil No. 1-80). All data will be kept confidentially in a password protected and a secure server at Newcastle University. Only the supervisors and the researcher can access the data. Data will be stored securely at Newcastle University until all beneficial data analysis has been exhausted.

What are my child's rights as a research participant?

Your child's participation is entirely voluntary. She /he is free to choose not to participate. Should you and your child choose to participate, he/she can withdraw at any time without consequences of any kind. If you and your child decide not to be in this study, this will not affect the relationship you and your child have with your child's school in any way.

Who is conducting the research?

The researcher is Sahar Naeem. She is from Iraq. She has completed her BA in English language from AL-Basrah University and obtained Master degree in methods of teaching English as a foreign language from AL-Mustansriea University. Sahar worked as a lecturer at the Universities of Basrah and Missan and also taught in Baghdad at AL-Nahrain University. At present, she is a PhD student at Newcastle University.

Who can I contact if I have questions or concerns about this study?

If you have questions or concerns during the time of your child's participation in this study, please contact**:**

Sahar Naeem AL-Kaab (researcher)
Email: s.sabhan@ncl.ac.uk
Tel. 01912086000

Dr. Helen Stringer
(supervisor)
Email: helen.stringer@ncl.ac.uk
Tel. 01912085196

Ms Maria Mroz
(supervisor)
Email: m.a.mroz @ncl.ac.uk
Tel.01912086585

Thank you for taking the time to read this letter. We hope you will give permission for your child to take part in this important and exciting study.

Appendix B: Consent Form in English

School of Education, Communication and
Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK
A Research Project by: Sahar Naeem Sabhan
Consent Form for Parents

Name of Child:	**Date of Birth:**
Name of Parent/Guardian:	

Please, indicate that you have read and agree with the statement by putting your initials in the following boxes:

1. I confirm that I have read and understood the information sheet for the above project and have asked any questions I wanted to.	
2. I understand that participation by my child is voluntary and that she/he is free to withdraw at any time, without giving a reason.	
3. I understand that all information collected will be labelled with a number and not my child's name to maintain anonymity and will be stored in a secure place.	
4. I understand that if my child discloses information that indicates he/she may be at risk, it will be followed up through established channels.	

Parent/Legal Guardian Signature……Date……

Researcher: Sahar Naeem Sabhan, Signature……

Please give the form to Sahar Naeem or the school office. You will be given a copy of this consent form to keep.

Appendix C: Parent Information Sheet in Arabic

جامعة نيوكاسل
كلية التربية والتواصل وعلوم اللغة

عنوان الدراسة: "العلاقة بين الوعي الصوتي وإكتساب القراءه والاملاء للاطفال الناطقين باللغة العربية و الإنكليزية في المملكة المتحدة"
الباحثة :سحر نعيم سبهان
(موافقة الوالدين لمشاركة الطفل في دراسة بحثية)

أعزائي أولياء أُمور التلاميذ.....

هذه دعوة لطفلك في المشاركة في دراسة بحثية. تتضمن هذه الرسالة معلومات مهمة عن الغرض من القيام بهذه الدراسة، ماالذي نطلبه من طفلك القيام به، والطريقة التي نرغب في استخدام المعلومات الخاصة بطفلك إذا سمحت له/ لها بالاشتراك في هذه الدراسة. يمكنكم ان تقرؤوا هذه المعلومات بعناية ومناقشتها مع الآخرين إذا رغبتم بذلك.

ما هو الغرض من الدراسة؟

الهدف من هذه الدراسة هو معرفة فيما إذا كان هناك علاقة بين الوعي الصوتي (القدرة على سماع وتمييز أصوات الكلام) ومهارات القراءة والاملاء لدى الاطفال الناطقين باللغتين العربية و الإنجليزية. الوعي الصوتي ذو اهمية كبيرة بالنسبة لجميع الأطفال باعتباره المهارة اللازمة لتطوير الكلام و اكتساب المفردات والقراءة والكتابة. نحن نعرف الكثير حول علاقة الوعي الصوتي باكتساب القراءة والاملاء للاطفال الناطقين بلغة واحدة ، ولكن ليس لدينا معلومات كافية عن هذه العلاقة لدى الأطفال الناطقين باللغتين العربية والانكليزية . النتائج التي ستتوصل إليها هذه الدراسة ستُعطي معلومات جديدة عن دور التحدث بهاتين اللغتين المختلفتين جدا في تطوير القراءة والكتابة في كلا اللغتين. تُعتبر هذه الدراسة من متطلبات الحصول على شهادة الدكتوراه بالنسبة للباحثة. بالاضافة الى ان النتائج ستُقدم للنشر في مجلات علمية.

ماذا سَيُطلب من طفلي القيام به في هذه الدراسة؟

عندما تُقرر السماح لطفلك في المشاركة في هذه الدراسة البحثية ، سوف يطلب منك التوقيع على نموذج الموافقة المرفق. ان هذه الدراسة تتضمن استبيان عن الخلفية اللغوية لطفلك الذي يجب ان يُملئ من قبلك ويعاد الى الباحثة. بعد ذلك ستجرى لطفلك اختبارات في الوعي الصوتي والقراءة والاملاء باللغتين العربية والانكليزية .ستسغرق تللك الاختبارات اكثر من(60) دقيقة. علما ان هذه الاختبارات ستجرى في المدرسة العربية لطفلك.وسوف يتم اعلامكم مقدما بتاريخ تلك الاختبارات دون التاثير على وقت الدرس وذلك من خلال التنسيق مع ادارة المدرسة.

ما هي الفوائد المحتملة لطفلي أو للاخرين؟

سوف يتم تزويدك بتقرير يوضح نتائج التقييم وماذا تعني بالنسبة لطفلك. قد تجد أنه من المفيد ان تقاسم هذا التقرير مع معلم طفلك لغرض المساعدة في تطوير لغته وإكتسابه للقراءة والكتابة .و لقد تم تصميم هذه الدراسة لمعرفة المزيد عن العلاقة بين الوعي الصوتي واكتساب القراءة والاملاء في اللغتين العربية والانكليزية على حد سواء. وستكون نتيجة الدراسة لها أهمية لجميع الأطفال المتحدثين بهاتين اللغتين.

كيف سيتم حماية المعلومات التي تُجمع عن طفلي؟

نحن نضمن أن نتائج طفلك سرية. وسيتم تحديد طفلك في سجلات البحث من خلال اعداد، على سبيل المثال، (تلميذ رقم 1-80). سيتم الاحتفاظ بجميع البيانات بسرية تامة في كلمة السر المحمية وخادم آمن في جامعة نيوكاسل. المشرفين والباحث فقط يمكنهم الوصول إلى هذه البيانات. سيتم تخزين البيانات السرية في جامعة نيوكاسل حتى يتم استنفاذ جميع البيانات المفيدة.

ما هي حقوق طفلي كمشارك في البحث؟

مشاركة طفلك طوعية اي انه حر في اختيار عدم المشاركة ، ويحق له ان ينسحب في أي وقت دون ان يترتب على ذلك اي نوع من العواقب.اما في حالة عدم مشاركة طفلك في هذه الدراسة ، فهذا لن يؤثر على علاقتكم مع المدرسة بأي شكل من الأشكال .

من الذي سوف يجري البحوث؟

الباحثة هي سحر نعيم سبهان. وهي من العراق. لقد أكملت شهادة البكالوريوس في اللغة الإنجليزية من جامعة البصرة. حصلت على درجة الماجستير في أساليب تدريس اللغة الإنجليزية كلغة أجنبية من الجامعة المستنصرية . عملت كتدريسية في جامعتي البصرة وميسان. بالاضافة الى انها عملت في بغداد في جامعة النهرين.اما في الوقت الحاضر فهي طالبة دكتوراه في جامعة نيوكاسل.

من الذي يمكنني الاتصال به إذا كان لدي اي أسئلة أو استفسارات حول هذه الدراسة؟

إذا كان لديك أسئلة أو استفسارات خلال فترة مشاركة طفلك في هذه الدراسة، يرجى الاتصال ب:

سحر نعيم سبهان (الباحثة)
البريد الإلكتروني: s.sabhan@ncl.ac.uk

رقم الهاتف: 01912086000

الدكتورة هيلين سترينجر (المشرف)
البريد الإلكتروني: helen.stringer@ncl.ac.uk
رقم الهاتف:01912086585

ماريا مروز (المشرف)
البريد الإلكتروني :m.a.mroz@ncl.ac.uk
رقم الهاتف: 01912085196

شكراً لقرائَتكم هذه الرسالة، نأَمل أنّ تُعطي الإذن لطفلكَ للمشاركة في هذه الدراسة المهمة والمثيرة

تفضلوا بقبول فائق الاحترام

سحر نعيم (الباحثة)

هيلين سترينجر (المشرف)، ماريا مروز (المشرف)

Appendix D: Consent Form in Arabic

جامعة نيوكاسل
كلية التربية والتواصل وعلوم اللغة

"العلاقة بين الوعي الصوتي وإكتساب القراءه والأملاء للأطفال الناطقين بالعربية والأنكليزية في المملكة المتحدة"

الباحثة: سحر نعيم سبهان

(موافقة أولياء الامور)

اسم التلميذ:	**تاريخ الولادة:**
اسم الوالد/الوصي:	

رجاءا، أشر إلى أنك قد قرأت و وافقت على العبارة بوضع الحروف الأولى من اسمك في المربعات التالية:

1-أوكد إنني قد قرأت وفهمت ورقة المعلومات عن المشروع المذكور أعلاه، ويمكني ان اسأل أي سؤال اذا أردت.

2- أنا علمت أنّ مشاركة طفلي طوعية وهو/هي حر في الانسحاب في أي وقت دون إبداء الأسباب.

3- أنا علمت أن جميع المعلومات التي سيتم جمعها عن طفلي:

- يتم تحديدها كاعداد للحفاظ على عدم الكشف عن هويته.
- يتم خزنها في مكان امن.

4 - أنا علمت أنه في حالة إذا طفلي يكتشف معلومات تشير إلى أنه / أنها قد تكون في خطر سيتم متابعتها عن طريق السبل المعمول بها.

توقيع ولي الأمر/ الوصي ..... التاريخ .....

توقيع الباحثة.....

الرجاء إعطاء هذه الاستمارة الى الباحثة او الى ادارة المدرسة ,علما انك سوف تحصل على نسخة من نموذج الموافقة لغرض الاحتفاظ

Appendix E: School Information Sheet for Head Teacher

School of Education, Communication and
Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

Study Title: The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK
A Research Project by: Sahar Naeem Sabhan
Information for Head Teachers

Dear Head Teachers

My name is Sahar Naeem. I am from Iraq and am studying for a PhD at Newcastle University. I have a BA in English language from AL-Basrah University and obtained a Master degree in methods of teaching English as a foreign language from AL-Mustansriea University. I worked as a lecturer at the Universities of Basrah and Missan and the AL-Nahrain University in Baghdad.

This letter has important information about the reason for doing this study and sets out what will be involved for school. The aim of the study is to find out if there is a correlation between phonological awareness (the ability to hear, distinguish and manipulate speech sounds) and the reading and spelling skills of Arabic-English bilingual children. Phonological awareness is really important for all children as a necessary skill for speech development, acquisition of vocabulary and reading and spelling. We know a lot about how phonological awareness relates to literacy for monolingual children, but we do not have the same information about Arabic-English speaking bilingual children. The findings of this study will be an important piece of new knowledge about how speaking these two very different languages supports literacy development in both languages. This study is being undertaken by the researcher in completion of her PhD. It will be written up as a PhD thesis and the findings will be submitted for publication in peer reviewed journals.

As part of this research we are looking for 80 children, aged between 7 years and 1 month and 9 years and 11 months who speak Arabic as their first language (L1) and English as their second language (L2) to take part in the study. After parents have given consent, the pupils'

participation is entirely voluntary. The pupil is free to choose not to participate and can withdraw at any time without consequences of any kind.

I am asking your consent to do the research in your school. I will take every care to reduce to a minimum disruption to school routine. I would like you to identify a group of pupils that meets my criteria and send a parental consent letters and language questionnaires to those parents I will provide the letters and questionnaires. I would also like to use your school office as a point of return for consent forms and questionnaires.

Each pupil will have two sessions where they are assessed in Arabic and English on phonological awareness, language and literacy. Each assessment session will take up to an hour. I also need permission to complete these assessments during school hours and have access to an appropriate space in which to conduct the assessments. At the end of the study I would appreciate your support to distribute reports to the parents.

Parents will be given a report outlining the assessment results and what they mean in relation to their child. If there are areas of concern we recommend that parents share this report with their child's teacher to help support their language and literacy development.

We will ensure that all results are confidential. Pupils will be identified in the research records by a number, for instance, as (pupil No. 1-80). All data will be anonymised and stored in a password protected and secure server at Newcastle University. Only the supervisors and the researcher can access the data. Data will be stored securely at Newcastle University until all beneficial data analysis has been exhausted.

If you require any further information or have any questions about this study, please do not hesitate to contact me**:**

Sahar Naeem AL-Kaab (researcher),
email:s.sabhan@ncl.ac.uk, tel. 01912086000

OR
My supervisors:

Dr Helen Stringer, email:helen.stringer@ncl.ac.uk, tel. 0191 2085196

Ms Maria Mroz, email: maria.mroz@ncl.ac.uk, tel.0191 2086585

Thank you for taking the time to read this letter

If you give permission for pupils to take part in this important and exciting study, please complete the attached consent form and return it to me at the above address in the envelope provided.

Yours sincerely,
Sahar Naeem
Researcher

Helen Stringer and Maria Mroz (Supervisors)

Appendix F: Consent Form for Head Teacher

School of Education, Communication and Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK
A Research Project by: Sahar Naeem Sabhan
Consent Form for Head Teacher

Please, indicate that you have read and agree with the statement by putting your initials in the following boxes:

	Initials
1. I confirm that I have read and understood the information sheet for the above project and have asked any questions I wanted to.	
2. I understand that my school's participation in this study is entirely voluntary and that the pupil is free to withdraw at any time, without giving a reason.	
I understand that my school's participation in this project will involve:	
3. Assisting the researcher to identify a group of pupils to take part in her study.	
4. Assisting the researcher to send a consent letter to the parent or guardian in order to obtain parental consent for their child to participate in the study.	
5. Assisting the researcher to distribute language questionnaires to parents.	
6. Allow the researcher to use the school office a point of return for consent forms and language questionnaires.	
7. Allowing the researcher the use of a suitable location in which to conduct the assessments.	
8. Allowing the researcher to conduct the assessments during school hours.	
9. Distributing final reports from the researcher to parents.	
10. I understand that all information collected will be anonymised will be stored securely.	
11. I understand that if any pupil discloses information that indicates he/she may be at risk, it will be followed up through established channels.	

Name of school……

Name of head teacher ……...

Signature……Date……

Appendix G: Child Information Sheet

If you want more information, please contact:
Sahar Naeem (researcher)
School of Education, Communication and Language Sciences
King George VI Building, Queen Victoria Road,
Newcastle upon Tyne,
NE1 7RU
Tel.01912086000
Email:s.sabhan@ncl.ac.uk

Dr. Helen Stringer (supervisor)
School of Education, Communication and Language Sciences
King George VI Building, Queen Victoria Road,
Newcastle Upon Tyne,
NE1 7RU
Tel.01912086196
Email:helen.stringer@ncl.ac.uk

Ms Maria Mroz
School of Education, Communication and Language Sciences
King George VI Building, Queen Victoria Road,
Newcastle Upon Tyne,
NE1 7RU
Tel.01912085585
Email:m.a.mroz@ncl.ac.uk

Newcastle University

The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic /English Speaking Children in the UK

Information Sheet for Children

A Research Project By
Sahar Naeem

Supervised by

Dr. Helen Stringer

&

Ms Maria Mroz

This leaflet is about a research project. We are asking if you will help us with it. Before you decide it is important for you to understand all about the research. Sahar will talk through this information sheet with you. You can take it home to read again and talk about to your parent or other adults. Ask us if there is anything that is not clear or if you would like more information (Sahar's phone number is 01912086000).

What is the project about?

This project aims to find out if there is a relationship between how children who speak Arabic and English can hear and play with sounds in words and their reading and spelling in both languages. This would be useful to know to help all Arabic-English Speaking Children when they are learning to read and write.

Do I have to do this?

Your parents have already said that they would like you to take part. They have signed a form to say this. They might have spoken to you about it. But if you really don't want to take part, you don't have to. You don't have to give a reason. No one will tell you off or try to make you stay in the study.

What will happen when I take part?

You will have two assessment sessions of speaking, reading and spelling, one in English and one in Arabic. There is no pass or fail in the assessments but we would like you to do your best and try hard. I will tell your parents how you got on. I will take all of the children's names off the information I collect and I will write about what I have discovered for other people to read.

Thank you for your help

Appendix H: Language Background Questionnaire

School of Education, Communication and
Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK

BY: Sahar Naeem Sabhan

Language Background Questionnaire

Child Information

1. Name of child:…… 2. Date of birth: ……

3. Gender: …… 4. School Year: ……

5. Place of birth: ……

6. If your child was born outside the UK,

6a. How old was your child when he/she started Arabic school? (years/months)

6b. How old was your child when he/she started English school?

(years/months)

---

7. If your child had a nanny, what language other than Arabic and English did the nanny speak? ----------

8. Does your child have any hearing difficulties? (If yes, please give some details)

---

9. Does your child wear glasses or contact lenses? (If yes, please give some details)

---

10. Do you have any concerns about your child's progress in school? (If yes please give some details)

Languages spoken in your home and family

11. Please list all the languages spoken in your home:

Language	**Who speaks it**

12. What dialect or dialects of Arabic do you speak at home?

---

13. How often does your child speak Arabic at home?

a. 0% b. 25% c. 50% d. 75% e. 100%

14. How often does your child speak English at home?

a. 0% b. 25% c. 50% d. 75% e. 100%

15. Please rate your child's current overall language ability in Arabic

1 = is beginning to understand and speak Arabic

2 = can understand and speak simple Arabic

3 = can understand and speak more complex Arabic

4 = can understand and speak Arabic fluently

16. Please rate your child's current overall language ability in English

1 = is beginning to understand and speak English

2 = can understand and speak simple English

3 = can understand and speak more complex English

4 = can understand and speak English fluently

17. How often does your child use Arabic words in English sentences?

a. 0% b. 25% c. 50% d. 75% e. 100%

18. How often does your child use English words in Arabic sentence?

a. 0% b. 25% c. 50% d. 75% e. 100%

19. Does your child watch TV/DVDs etc. in Arabic?

20. Does your child watch TV/DVDs etc. in English?

21. Does your child watch TV/DVDs etc. in other languages? (Please state which languages) ----------

Questions about reading

22. Do you read to your child at home? (Please circle one)

- Yes • No
- If yes, please circle all languages that apply.
- Arabic • English • others (please list)

---

23. Does your child read to you at home? (Please, circle one)

- Yes • No
- If yes, please circle all languages that apply.
- Arabic • English • others (please list)

---

24. How old was your child when he/she first started learning to read in Arabic? ..... (years, months)

25. How old was your child when he/she first started learning to read in English? ..... (years, months)

26. Do you think your child is better at reading in English or Arabic or does he/she read both at the same level?

.....

Parents' Information

Father

27. Father's first language: ……
28. Which main language does father speak at home? .....
29. Highest level of education: ……
30. Currently enrolled in an educational programme? If so, which programme? ……

Mother

31. Mother's first language: ……
32. Which language does mother speak at home? ……
33. Highest level of education: ……
34. Currently enrolled in an educational program? If so, which programme? ……

Thank you for your cooperation
Please return this questionnaire to Sahar Naeem or the school office

Appendix I: Final Report of Findings

School of Education, Communication and
Language Science
Newcastle University
King George VI Building
Queen Victoria Road
NE1 7RU

The Relationship between Phonological Awareness, Reading and Spelling Acquisition of Arabic-English Speaking Children in the UK

A Research Project by

Sahar Naeem Sabhan

Final Report of Findings

Name of child: ……

Date of assessments: ……

It is now recognised that growing up speaking more than one language can be an advantage for children. Although more than half the people in the world are bilingual, our knowledge about how children acquire more than one language is still not complete. This research will contribute to it. The assessments used in the research were all designed for use with children speaking just one language or were translated from English into Arabic because no equivalent test exists. We do not know how bilingual children will perform on them. It is likely to vary depending upon how well they speak each language and where their particular language strengths lie. In most cases we are reporting that your child has fallen within the average range. This means that they perform at a similar level to other children of the same age who only speak one language. If your child performed below the average range it might be due to the interaction of the two languages,

or because they speak one language better than the other, or because they lost concentration during the test, or because they find this task particularly hard or because bilingual children typically score below the average range for monolingual children. It is important that you do not become unduly concerned about any assessments falling in this range. However, if you have any concerns about your child's performance in school we would recommend that you talk to your child's teacher. You can share this report with them if you want to. If you have any questions please contact me on s.sabhan@ncl.ac.uk .

Arabic language assessments

- Phonological awareness (skills related to recognizing and manipulating sounds in spoken words): Your child achieved scores within/below the average range.

- Understanding vocabulary (single word vocabulary pointing to one out of four pictures in response to a spoken word): Your child achieved scores within/below the average range.

- Reading single words: Your child achieved scores within/below the average range.

- Spelling single words: Your child achieved scores within/below the average range.

English language assessments

Phonological awareness (skills related to recognizing and manipulating sounds in spoken words): Your child achieved scores within/below the average range Understanding vocabulary (single word vocabulary, pointing to one out of four pictures in response to a spoken word): Your child achieved scores within/below the average range.

Reading single words: Your child achieved scores within/below the average range.

Spelling single words: Your child achieved scores within/below the average range.

Appendix J: Arabic Real Word Reading Test
Taha (2008)

Name…….. **Birth Date…….**
Date of the Administration…… **School……**

Time: **Total:**

الرقم	الكلمة	صح/ خطأ	الرقم	الكلمة	صح/ خطأ
1	عَصِير		16	نَبْعْ	
2	قارِب		17	عَجُوز	
3	بخَار		18	حَبْسْ	
4	قَرِيب		19	ضَعِيف	
5	فِرَاشِ		20	ضَبَاب	
6	رَ طب		21	إسِتدَارْ	
7	ظلاَ م		22	إسِتـجْمَعْ	
8	كبشَ		23	إسِتـبْسَل	
9	تجَاهَل		24	تـبَدَّل	
10	صَغِير		25	إ نِتـفَخَ	
11	تقَاتَل		26	إسِتـقِلاَل	
12	دُ رج		27	ضَجِيج	
13	هَوَا ء		28	تـدَرَّب	
14	جُرح		29	إ سِتَمْتَعَ	
15	كُرَة		30	إ نِتَقَدْ	

Appendix K: Arabic Non-Word Reading Test

Taha (2008)

Name…….. **Birth Date…….**
Date of the Administration…… **School……**

Time: **Total:**

الرقم	الكلمة	صح/ خطأ	الرقم	الكلمة	صح/ خطأ
1	بَلاَم		16	عَفِرْ	
2	بَزَلْ		17	زَشَلْ	
3	ضَبَاشْ		18	ظَابُوبْ	
4	قَامِشْ		19	بَمِلْ	
5	تَفَاشَلْ		20	إِنْتَضلْ	
6	مِفْهَلْ		21	إِستَضْرَمْ	
7	إِسْتَدْلَفْ		22	تَرَاطَمْ	
8	طَمِيجْ		23	ضَبْفَ	
9	فَيُونْ		24	تَلَمَّشْ	
10	كَابُوزْ		25	بَطْرَمْ	
11	خَفِمْ		26	إِخْتَنَفْ	
12	ثَالُوبْ		27	قَبِيشْ	
13	ضَرِيمْ		28	ظَامِرْ	
14	إِسْتَعفَلْ		29	خَبِيشْ	
15	صَارِشْ		30	غُقَومْ	

Appendix L: Arabic Reading Comprehension Test

Jayusy (2012)

اسم التلميذ: **المدرسة:**
تاريخ الاختبار: **الوقت:30 دقيقة**
الدرجة النهائية:

(القطعة الاولى)

اقرأ النص التالي ثم أجب عن جميعِ الأَسئلة التي تَليه:

الْمَزْحَةُ الَّلطِيفَة

كَانَ يومِي رائِعاً جِداً, فَقَدْ شارَكتُ رَفِيقَاتِي وَمُعلِّمتَنَا الْحَنونَ فِي نُزْهةٍ مُمتعةٍ وسَطَ حَقْلٍ فَسِيح . وَكَانَ فِي طَرَفِ الْحَقْلِ فَلاحٌ عَجوزٌ يَعْمَلُ بِجِدٍّ وحَمَاس , وَقَدْ تَركَ مِعْطَفَه وحذَاءَهُ بِجانِبِ شَجرَةٍ كَبِيرةٍ.

اقْتَرحَتْ صَدِيقَتِي لَيلَى أَنْ نَمزَحَ معَ الْفلاحِ, فَنُخْفِيَ لَهُ مِعْطَفَهُ, وَنَخْتَبِىءَ لِنَعْرفَ وَقْعَ الْمُفَاجأَةِ علَيهِ, وَاقْتَرحتْ عَبِيرُ أَنْ نَمْلأَ حذَاءَهُ عُشبًا وتُرابًا, وَنَرى مُفَاجأَتَهُ مِنْ بَعِيدٍ لَكِنَّ الْمُعَلِّمةَ تَبَسمَتْ كَعادَتِهَا وقَالَتْ: عِنْدِي اقتراحٌ أَفْضَلٌ, نَضعُ فِي فَرْدَتَيْ حذَائِهِ قِطَعًا مِنَ الْنقُودِ, وَنَتَأَملُ مَبْلَغَ دَهشتِهِ وَعجَبِهِ.

نالَ الإقتِرَاحُ مُوَافَقَتَنَا وَقُمنَا بالتنَفِيذِ فَورًا, ثُمَّ عُدنَا إِلَى لَهْوِنَا وَنَحنُ نُتَابِعُ النَّتِيجَة : اقْتَرَبَ الْفَلاحُ مِنْ حذَائِهِ, وبدَأَ يُدخِلُ قَدَمهُ فِي الْحذَاءِ, ولَكِن دَهشَتَهُ كَانَتْ عظِيمَةً حِين سَمعَ رَنِينَ الْنقُودِ, وتَلَفَّتَ حوْلَهُ ثُمَّ انْحَنَى يجمعُها غَير مُصدِّقٍ, وهُو يُردِّدُ: الْحمدُ لَكَ يَا رَبُّ... لَقَدَ كَانَ هَمِّي أَنْ أُؤَمِّنَ طَعامَ عِيالِي, وها قَدْ أَكرَمتَنِي ورزَقْتَنِي. قَالَتِ الْمُعَلِّمَةُ: إِنَّ مِن الَّناسِ مَنْ يُؤْذِي الاخَرِينَ بِمزَاحِهِ مِنْ غيرِ قَصدٍ, وَمزْحتُنَا كَانَتْ لَطِيفَةً وملأَتْ قَلَبَ الْفَلَّاح بِالَّسعادَةِ.

الأسئلة

1.أَحَطْ بِدَائِرةٍ رَقْمَ الإِجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

الرَّاويةُ الَّتِي تَحْكِي هَذهِ الحِكَايَة هِيَّ:
1. تِلْمِيذَةٌ شَارَكَتْ فِيْ الَّنزهَةَ.
2.مُعَلِّمةٌ لَمْ تُشَارِكْ الَّتلميذاتِ فِيْ الَّنُزهَةَ.
3. مُعَلِّمةٌ شارَكَتْ الَّتلْمِيذَات فِيْ الَّنُزهَةَ.
4. تِلْمِيذَةٌ لَمْ تُشَارِكِ فِيْ الَّنُزهَةَ.

2. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

(وَقْعَ الْمُفَاجأَةِ) (سطر 4) المقصود بها إي مُفَاجأَة:
1. إخْتِفْاء المِعْطَفَ.
2. إخْتِبْاء ليلى.
3. مْلأُ الحْذَاء عُشبًا وتُرابًا.
4. إيجْادُ الْنُقُودَ بالحِذَاءِ.

3. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

مَا المُشْتَرَكُ بَينَ مُزْحَةُ عَبْيرٍ وَلَيْلَى؟
1.الْمَزْحَتَانِ لَطِيفَتَانِ.
2. الْمَزْحَتَانِ غَيْرُ لَطِيفَتينِ.
3. الْمَزْحَتَانِ جَعَلَتَا الْفَلاَّحَ سَعِيداً.
4. الْمَزْحَتَانِ نَالَتَا مُوَافَقَةُ الْجَمِيعِ.

4. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

مَزْحَةُ مَنْ نَفَّذَ المُشَارِكُونَ؟
1.مَزْحَةُ إِحْدَى الَّتلمِيذَاتِ.
2. مَزْحَةُ المُعَلْمةُ.
3. مَزْحَةُ عَبْيرٍ.
4. مَزْحَةُ لَيْلَى.

5. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

لِمَاذَا فَرِحَ الْعَجُوزُ بالنقُودِ الَّتي وَجَدْهَا فِيْ حِذائهِ؟
1.لأنَّهُ كَانْ مُتْعَباً مِنَ الْعَمِلِ.
2. لأنَّهُ لا يُحْبُ الْعَمِلِ.
3. لأنَّهُ سَوُفَ يَسْتَطِيعُ شِرَاءَ طِعَاماً لِبِيتْهِ.
4. لأنَّهُ أَصْبَحَ غَنِيَّاً جِدَّاً.

6. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

بِمَاذا تَخْتَلْفُ مَزْحَةُ المُعَلْمةُ عَنْ مَزْحَةُ الأَخَرِينَ فِيْ الَّنَصِ؟
1. مِزَاحُ الأَخَرِينَ غَيْرُ مُؤذٍ.
2. مِزَاحُ الأَخَرِينَ مُؤذٍ.
3. مِزَاحُ المُعَلْمةُ مُؤذٍ.
4. مِزَاحُ المُعَلْمةُ غَيْرُ لَطْيفٍ.

7. أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ: **(دَرَجّةً واحِدةً)**

نَتَعَلَّمُ مِنَ هَذِهِ القصَّةِ:

1.لا تَمْزَحْ أَبداً.
2.الْمِزَاحُ يُؤذِي الأخَرِينَ دَائِماً.
3. أَنْ لاتُؤذِي الأخَرِينَ بِالمِزَاحِ.
4.أَكْثِرْ مِنَ الْمِزَاحِ.

(القطعة الثانية)

اقرأ النصْ التاليّ ثم أجب عنْ جميعِ الأسئلةِ التي تَليه:

صَديقُ الأنْسانُ

(1) الدَّلَافِينُ هي أقْدمُ أصَدِقاَءِ الإنْسانِ في عالمِ الْبحِارِ. وكَانَ البحَّارةُ يتَفاَءلوُنَ برِؤيتَهِا وهِي تتَقاَفَزُ بِجِوارِ سُفنُهِم ويعْتبِرونَ أنَّ رَحلتَهمْ سَوفَ تكَونُ طيَبّةً وَآمِنةَ.

رُغمَ ذَلكِ فإنِنَّاَ نَقتلُ الالاَف منهَا سنَوِيًا. ويعُتتَرُ لحَمهاَ طعَامًا شهِيًا وزيْتهَا مِن الُّزيوُتِ الْجيّدةِ التَّي تَدخلُ فيِ الصِّنَاعاتِ والْادَوِيةِ . ونحَنُ جمِيعًا نأَكْلُ أسَماكَ "التُّونةِ", وبسبب هذهِ الأسماكِ تَقعُ الدَّلَافِينُ فيِ شِباكِ الصَّيأَّدينَ, فهِي تسِيرُ في أسَرابٍ معَ أسَماكِ التُّونةِ, وَعِنْدَمَا يَسعَى الصَّيأَّدُونَ خَلْفَ هذِهِ الْاسْمَاكِ الصَّغيرَةِ تَقعُ الدَّلَافِينُ فيِ الفخَّ.

وَالدَّلَافِينُ لهَا لغَةٌ خَاصَّة, فهِيَ تصُدِرُ أصَواتاً وَتتَصَّلُ بِبعْضهاَ الْبعَضِ مِن خلاَلِ هذه الأْصواتِ. وَيعَتَقدُ الْعُلمَاءُ أنَهَّاَ لَا تصُدِرُ هذهِ الْاصَواتَ إلِّا إذِا كَانَتْ فيِ مَأْزقٍ.

وفيِ هذهِ الْايَاَّمِ نَرى الْكَثيِرَ مِن الدَّلَافِينِ وهِي تقُدِّمُ الْعُروضَ وَالْالعابَ الْبهَلَوَانيةَّ, ولقَدْ تبين أنَهَّ يمُكنُ تدرِيبهُاَ ويمُكنهُا أنَ تَفهمَ الْكَثيِرَ مِن تعَليِماتِ الأنسَانِ. لقَدْ كَانَ الْقدُماءُ يعَتَقِدُونَ أنَهَّا تنْقِذُ الْغَرقىَ من الْبشَرِ. ولكِن مِن الْمُؤَكَّدِ أنَهَّا فيِ عَصرِناَ الْحدِيثِ تضُحِكهمْ وَتسُليهِمْ.

الأسئلة

أحَطْ بِدَائِرةٍ رَقْمَ الإجَابَةِ الصَحِيحَةِ في الأسئلةِ التالية:

1. كانَ البحارَةُ عندما يَرَونَ الدّلافين تتقافزُ في البحرِ: **(دَرَجّةً واحِدةً)**
   1. يَخَافونَ أن تكونَ رحلتهمْ صَعبةً وفاشلةً.
   2.يتفائلونَ بأنذ تكونَ رحلتَهمْ مُوفقة.
   3.يتوقعون بأنّ تكونَ رحلتُهمْ غير مُوفقة.
   4.يأملونَ أنَّ يكونَ صيدهم كثيراً ووافِراً.

2. إحدى فَوائدُ الدَّلافين حسبَ النصّ هي : **(دَرَجّةً واحِدةً)**

1.تقعُ في شباكِ الصيادينَ.
2.تسيرُ مع أسماكِ التونةِ.
3. زَيتُها يَدخُلُ في صناعةِ الأدويةِ.
4.لَهَا لغةٌ خاصَّة بِهَا.

3.نفهمُ منَ الفقرةِ الثانية أنّ الصيادين : **(دَرَجّةً واحِدةً)**

1.يسعون لأصطيادِ اسماكِ التونِة.
2.يسعون لإصطيادِ الدّلافين.
3. لا يسعون لإصطيادِ الأسماكِ.
4.لا يسعون لإصطيادِ اسماكِ التونِة.

4.يعتقدُ العلماءُ إنّ الدلافينَ تُصدرُ أَصواتاً عنْدما: **(دَرَجّةً واحِدةً)**

1.تكونُ في خطرٍ.
2.تكونُ في وضعٍ جيدٍ.
3. تكونُ فوقَ الماءِ.
4.تكونُ تحتَ الماءِ.

5.نفهمُ من الفقرةِ الأخيرةِ إن الدَّلافِين : **(دَرَجّةً واحِدةً)**

1.خَطيرة.
2.غَبية.
3.مُضحكة.
4.ذكية.

6.نتعلمُ من النصّ إن معاملةَ الأنسان للدَّلافين : **(دَرَجّةً واحِدةً)**

1.قد تغيرت عن الماضي.
2.أصبحتْ افضلُ اليوم.
3.لم تتغيرَ عن الماضي.
4.أصبحتْ أسوأُ اليوم.

Appendix M: Arabic Real Word Spelling Test

Taha (2008)

التعليمات للطالب: سوف أملي عليك كلمة وبعدها سوف اقرأ جملة تحتوي على هذه الكلمة ومن ثم سوف اسمعك هذ الكلمة لوحدها اي انك ستسمع الكلمة ثلاث مرات , مرة لوحدها بعد ذلك في جملة ومن ثم لوحدها مرة اخرى.عليك كتابة الكلمة بعد ان تسمعها في المرة الاخيرة(المرة الثالثة):

صَفْ	في مدرستي **صَفْ** كبير	صَفْ
أُخْ	لدي **أَخْ** واخت	أَخ
داري	جاء ضيفٌ الى **داري**	دارْي
فَمِي	أدخلت فرشاة الاسنان الى **فَمْي**	فَمِي
زجاج	الكأس مصنوعة من **زُجْاج**	زُجْاج
زُورْق	في النهر يوجد **زُورْق** جديد	زُورْق
عْاصِف	الشتاء فصل **عْاصِف** وماطر	عْاصِف
عُشْب	هذا **عُشْب** يابس	عُشْب
رِيَاح	في الشتاء توجد **رِيَاح** شديدة	رِيَاح
تَجَّمَّع	**تَجَّمَّع** الاولاد في الساحة	تَجَّمَّع
إستطاع	**إسْتطاعَ** الرياضي ان يربح السباق	إسْتطاعَ

قَلَم هذا **قُلَم** حبر قَلَم

مَصْرِف يسمى البنك في العربية **مَصْرِف** مَصْرِف

لُغزْ هذا **لُغزْ** صعب لُغزْ

مِينَاء **مِينَاء** السفن كبير جدا مِينَاء

إسْتَعمَل في الماضي **إسْتَعمَل** الانسان الزيت لاشعال النار إسْتَعمَل

إستَقْبل **إستَقْبل** الملك ضيوفه إستَقْبل

ضُيُوف جاء **ضُيُوف** ليزورونا ضُيُوف

ظِلّ جلسنا في **ظِلّ** الشجرة ظِلّ

كَلْب **كَلّب** صديقي يعض كَلّب

مُزَارع جدي يعمل **مُزَارع** مُزَارع

إستَسْلَم **إستَسْلَم** الجيش لعدوه إستَسْلَم

إنْتَقَل **إنْتَقَل** الاولاد الى المدرسة الجديدة إنْتَقَل

قَمَر في السماء **قَمَر** ونجوم قَمَر

ضَار التدخين **ضَار** بالصحة ضَار

أطْفَال خرج **أطْفَال** القرية الى المخيم أطْفَال

ظَالِم هذا الحاكم **ظَالِم** لشعبه ظَالِم

حَبْل معي **حَبْل** طويل حَبْل

رَمْل على شاطىء البحر يوجد **رَمْل** رَمْل

مُعَلّم هذا **مُعَلّم** نشيط مُعَلّم

Appendix N: Arabic Non Word Spelling Test

Taha (2008)

التعليمات للطالب: سوف أملي عليك كلمات بدون معنى لم تعرفها مسبقاً. عليك كتابتها فوراً

مَقَفْ مَبْل صَارِب إِستَجَلْع إِستَطْرَغَ غَرَخَ مَفْهُور تَصَابَمَ

إِستَثَاحَ ظَمِيل زَفْر لاضِم رَامِغ إِنَتضَجَ تَبَدَّم

طِشَام تَماكَل ظُرُوش لَشْم ضَمَج قَالِش ضَعِيم عَبْل

غَثْر صَريج إِنْبَسَك إِسْتَضْرَم تَجَطَرَ عَلُوج كَابُوخ