Acquisition of Biliteracy in Children

DOCTORAL THESIS

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CHAPTER 1: INTRODUCTION

Literacy involves reading and writing as ways of making, interpreting, and communicating meaning wherein reading is defined as the ability to obtain meaning from print (Heath, 1980) and writing is the ability to use print to communicate with others either immediately or later unlike spoken language. Reading and writing are more than simply decoding and encoding print: they are ways of constructing and conveying meaning with written language. Becoming literate, is a multifaceted phenomenon that involves more than learning a set of technical skills such as, learning the alphabet, learning how to form letters and spell words, and learning how to decode print that are typically taught in elementary school. Becoming literate also includes mastering specific skills related to written language as well as a complex set of understandings, attitudes, expectations and behaviors (Erickson, 1984). Development of literacy abilities especially academic reading and writing is one of the most complex and important aspects of academic language development in children. This phenomenon may be even more complex in children acquiring biliteracy when there is a need to acquire literacy in languages that follow different structure and writing systems that are so prevalent in the Indian context leading to a more enigmatic picture.

In the recent years, the term 'biliteracy' has gained importance in the fields of bilingual education, bilingual literacy and English as a second language (Francis, 1999). Biliteracy refers to the use of two or more languages in education i.e., as an instructional medium and as a curricular subject (Devaki, 1990). Biliteracy is defined as the mastery of fundamentals of speaking, reading and writing (knowing sound/symbol connections, conventions of print, accessing and conveying meaning through oral or print mode, etc.) in two linguistic systems (Reyes, 2001). The term biliteracy is used to describe children's competencies in two written languages, developed at varying degrees, either simultaneously or successively (Dworin, 2003)

Development of literacy skills depends on certain types of language skills. In preschoolers, language skills most apt to develop literacy are those related to print and oral skills that support emergent literacy (namely, letter-sound correspondence, rhyming, using language to talk about language, and contact with print). In order to understand the different processes of literacy development, a clearer understanding of models of literacy development is essential. Durgunoglu and Öney (2000) proposed a model which they derived from all the other available models of reading and writing models (Adams, 1990; Gough & Tunmer, 1986; Juel, Griffith, & Gough, 1986; Lomax & McGee, 1987; Tunmer, Herriman & Nesdale, 1988; Tunmer & Nesdale, 1985). Figure 1.1 shows a model of literacy development proposed by Durgunoglu and Öney (1999).

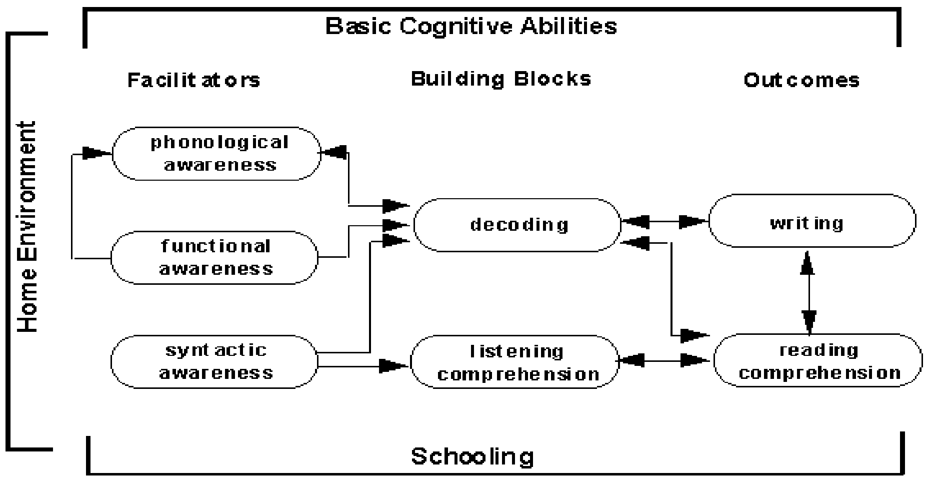

Figure 1.1: A Model for Literacy Development
(*Source*: Durgunoglu and Öney, 1999)

In the above model, Durgunoglu and Öney (1999) discussed three major components of the model as facilitators, building blocks and outcomes to literacy development. The model also emphasizes the role of basic cognitive abilities, home environment and schooling as factors contributing to literacy development. Phonological awareness (refers to a child's awareness of phonological units such as words, syllables, onset-rimes and phonemes), functional awareness (refers to child's developing notions about the functions and conventions of written language) and syntactic awareness (refers to the child's ability to reflect upon the internal grammatical structure of the sentences) are termed as facilitators of decoding and listening comprehension skills. Clay (1979) stated that through the interaction of these facilitators with written language, children develop the concepts about print. Listening comprehension and decoding were considered the building blocks of literacy acquisition. Listening comprehension depends on understanding the semantic and syntactic aspects of spoken language (Durgunoglu & Öney, 2000). Unlike, listening comprehension, reading comprehension depends on information that is extracted from print using orthographic decoding skills.

Listening comprehension and decoding, respectively, were found to be the two tasks reflecting the operation of reading and writing, even in different cultural contexts (Gough & Tunmer, 1986). To read and write fluently, a child needs to understand the spoken language and understand how this spoken language is represented in written form (Juel, Griffith, & Gough, 1986; Perfetti, 1985). The contexts like home environment, schooling and cognitive abilities of the child also play a role in the interaction factors affecting literacy development (Chaney, 1992, 1994, 1998; Dickinson & Snow, 1987; Hart & Risley, 1995; Heath, 1983; Teale, 1986). Through their experiences with both oral and written language, children become familiar with the characteristics of their language and develop an understanding of the functions of literacy (Cunnigham & Stanovich, 1998; Maclean, Bryant, & Bradley, 1987).

Apart from the above skills, yet another skill found to be a strong predictor to literacy acquisition is rapid naming. Rapid automatized naming (RAN) refers to the ability to rapidly name colors, numbers, letters, or objects as quickly as possible. Rapid naming ability has been linked with phonological processing ability—namely, the ability to retrieve phonological codes from long-term memory (Wagner & Torgesen, 1987). Poor rapid naming ability is also identified as a crucial factor to predict reading failures (Hynd & Cohen, 1983; Lombardino, Riccio, Hynd, & Pinheiro, 1997). The term RAN is viewed by investigators as either rapid verbal naming, verbal fluency for letter, phonological, and/or semantic units. The most common verbal fluency tasks used in research are letter fluency, phonological fluency and semantic fluency. While, studies report naming speed differences in different languages with different script structures (Patel, Snowling & de Jong, 2004), Cohen, Morgan, Vaughn, Riccio and Hall (1999) had earlier reported that rapid verbal naming improves significantly between 6 and 12 years of age, thus indicating a developmental trend in verbal fluency.

Literacy acquisition in children is reported to follow a sequence of three stages: logographic, alphabetic and orthographic phases of development. Frith (1985) proposed that children go though the logographic stage of reading while acquiring literacy in English language, while others (Karanth & Prakash, 1996; Wimmer & Goswami, 1994) believed that phonologically transparent orthographies such as German, Spanish or Hindi do not depend on logographic reading. Orthographic sensitivity is a crucial factor in reading and the nature of orthography, its transparency and form of representation is also found to influence the pattern of reading development (Frost, Katz & Bentin, 1987; Karanth, 2002, 2003, 2006; Patel, 2004; Posner & Kar, personal communication; Seymour, Aro, & Erskine, 2003).

Researchers who studied literacy in Indian languages opine that transparent orthography may demand different strategies for Indian languages as the basic unit in most of the Indian languages is a syllable and not a phoneme (Anurag, Kar & Srinivasan, personal communication; Karanth, 1998; Prakash & Rekha, 1992;). Phonological awareness is found to be crucial for reading alphabetic scripts. However, it is not considered to be crucial to reading acquisition in transparent writing systems like Hindi or Kannada (Karanth, 1998). On the other hand, akshara (refers to a basic written unit in Indian script which is a combination of vowel and consonant) awareness is considered a good criterion for identification of good and poor readers in the Indian children (Padakannaya & Mohanty, 2004). Therefore, the model and/or stages proposed for acquisition of literacy in alphabetic languages may not hold true for non-alphabetic languages such as those in India.

Apart from the above skills, another important factor that is discussed in literature relevant to biliteracy in children is processing mechanisms in different orthographies. There are studies in the recent decade that report on the influence of nature of orthography, its transparency and form of representation on the pattern of reading development in biliterate children (Durgunoglu & Öney, 2000; Veii, 2006; Veii & Everatt, 2005; Ziegler & Goswami, 2005). Many hypotheses and assumptions are put forth by researchers on reading and its relation to the processing of different writing systems existing in the world. Geva and colleagues (Gholamain & Geva, 1999: Geva & Siegel, 2000) proposed that the main theoretical positions to understand processing mechanisms in bilingual literacy, can be reduced to two competing perspectives as the *script dependent hypothesis* (Snowling, 2000) and *central processing hypothesis* (Geva, Wade-Wooley & Shany, 1997; Geva & Wang, 2001). The script dependent hypothesis posits that reading acquisition varies across languages. Under this general viewpoint are those theories that propose that reading development should vary with the depth of transparency of a particular orthography (Bialystok, 2002; Prema, 1998; 2000; Shanbal & Prema, 2007b; Wang, Koda & Perfetti, 2003; Veii and Everatt, 2005). Researchers also found similar differences in biliterate children with reading difficulty, who showed deficits in one language and not in the other (Everatt, Smythe, Ocampo & Gyarmathy, 2004; Everatt, Smythe, Ocampo & Veii, 2002; Smythe, Everatt, Gyarmathy, Ho & Groerger, 2003; Karanth, 1992; Miller-Guron & Lundberg, 2000; Wydell & Butterworth, 1999).

The central processing hypothesis, on the other hand, assumes a universal approach to literacy acquisition. It proposes that reading development is not contingent upon the type and the nature of the orthography. Rather, common underlying linguistic and cognitive processes such as working memory, verbal ability, naming and phonological skills influence the development of reading across all languages. Geva (2000) and Gholamain and Geva (1999) found basic reading skills in one language correlated positively and significantly with their reading skills in another language. Such evidence for differential development and commonality of predictors led Geva and Siegel (2000) to conclude that the central processing and script dependant viewpoints are complementary to each other rather than being contradictory. Script dependent and central processing hypothesis explain either script specificity or universality to literacy in children who are biliterate. Though, there is no general consensus on this issue, it may be understood that a few skills of literacy are script dependent and a few others may be universal across languages. Understanding these processing mechanisms in Indian context would be more interesting as children who are biliterate learn literacy mainly in two different contexts of writing systems like Kannada (the semi-syllabic or transparent system) and English (the alphabetic or the opaque system).

A review of existing research on literacy and biliteracy suggests that the components necessary and that may be crucial for acquisition of biliteracy may be different depending on the nature of scripts. Yet, they may grouped under 1) Listening skills, 2) Phonological awareness skills, 3) Rapid verbal naming skills, 4) Reading skills and 5) Written language skills for the convenience of investigation of biliteracy acquisition.

Biliteracy in the Indian context

English as a prestige language and the language of first choice continues to serve as the medium of instruction in elite schools (Sixth All India Education Survey, 1999). All large cities and many smaller cities have private, English-language middle schools and high schools. Such an educational policy schools in India is inevitable due to the globalization and other related factors. An Indian child's first language is generally one of the Indian languages and the second language could be English learnt in a formal context of school unless the child is exposed to other languages at home or in the neighborhood or any other Indian language that is acquired once the child starts school at four years of age. Further imposition of a Trilingual Educational Policy has forced children to learn languages with different script structures. While the script of Indian languages follow the alphasyllabary system, that of English is alphabetic in nature. Therefore, the scripts are distinct in nature since the basic unit of the script of Indian language is the syllable and not phoneme unlike that of an alphabetic script (Padakannaya & Mohanty, 2004). Given the distinct nature of the two scripts that the Indian children need to acquire early in their school years, it would be interesting to study how the differences in orthography between an Indian language like Kannada (with semi-syllabic script) and English (with alphabetic script) influence acquisition of biliteracy in children learning to read and write both the languages.

In the recent years, acquisition of literacy in Indian children has received much attention by researchers and educationists. But, a realistic estimate of the prevalence of literacy failures in school children is yet to be made. Majority of literacy failures in school children may be due to factors such as language and cultural factors (Prema, Shanbal & Khurana, 2010) but need not necessarily be the disability in the real sense. Of late, the number of children with literacy failures who avail consultation from Speech-Language Pathologists is increasing possibly due to the most prevalent language and cultural diversity in India. Among those who report, not everybody manifests typical literacy failures with disability. There are many children who are behind/slow in reading and writing due to factors not directly related to literacy. Majority of these children are from monolingual community, a few others from bi/multilingual community learning to become biliterate. Hence, there is a need to understand acquisition of biliteracy in children particularly in order to tease out the various factors that influence acquisition of biliteracy. This would further help in understanding the specific factors that lead to literacy failures or to reading or learning disability in biliterate children.

Research questions and aims of the study

1. Is there a developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII?

- The primary objective was to study the developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII.

2. Is there a need to develop an assessment battery for Biliterate Children?

- In order to achieve the primary objective of the study, the secondary objective of the study taken up was to develop a tool to assess biliterate children (ABC).

3. Do the existing models of literacy acquisition hold good for biliterate children?

- The data obtained on ABC tool would be examined for patterns of responses in order to compare with the existing models of literacy acquisition. Hence, the tertiary objective of the study was to derive a model of literacy acquisition in biliterate children, which will contribute to the existing models for biliteracy development.

4. If a differential pattern of literacy acquisition exists in biliterate children, what is its relevance to biliterate children with learning disability (CLD)?

- An extended objective of the study was to examine a small group of clinical population (children with learning disability-CLD) in order to check for the relevance of ABC tool for clinical purposes.

CHAPTER 2: REVIEW OF LITERATURE

Literacy is traditionally defined as the ability to read and write. Literacy is considered a process of psychological and linguistic elements of reading and writing that a child develops with the help of meaning. It often begins early, long before children encounter any formal school instruction in reading and writing. Literacy is central to academic achievement and life-long learning. Literacy involves reading and writing as ways of making, interpreting, and communicating meaning wherein reading is defined as the ability to obtain meaning from print (Heath, 1980) and writing as the ability to use print to communicate with others. According to these definitions, reading and writing are more than simply decoding and encoding print; they are ways of constructing and conveying meaning with written language. Becoming literate, is a multifaceted phenomenon that involves more than learning a set of technical skills such as, learning the alphabet, learning how to form letters and spell words, and learning how to decode print that are typically taught in elementary school. Becoming literate includes mastering specific skills related to written language as well as a ‘complex set of understandings, attitudes, expectations and behaviors’ (Erickson, 1984). An individual can be literate in one language or in more than one language. When an individual gains the mastery of the fundamentals of speaking, reading and writing (knowing sound/symbol connections, conventions of print, accessing and conveying meaning through oral or print mode) in two linguistic systems, he/she is considered to be a biliterate (Reyes, 2001).

The term biliteracy[1] is used to describe children's competencies in two written language, developed at varying degrees, either simultaneously or successively (Dworin, 2003). Specifically, Dworin recommends that use of both the languages should be encouraged and the languages should have comparable status in the classroom (Dworin, 2003). In the recent years, the term "biliteracy" has gained importance in the fields of bilingual education, bilingual literacy and English as a second language (Francis, 1999). Since one learns to read once and subsequently has access to the same text processing and general discourse proficiencies associated with literacy when reading or writing in a second language, there is a strong reason to combine the concepts of "bilingualism" and "literacy" to refer to a unique or peculiar set of language skills in biliterate children.

2.1 Language and Literacy

The word '*language'* is often used to refer to several kinds of human activity. It primarily focuses on the oral and written medium used to communicate with one another. The term is used especially to refer to human language and to distinguish between language and other forms of communication. A general definition characterizes language as *a system of arbitrary vocal symbols by means of which members of a society interact with one another*. There are primarily four language skills- listening, speaking, reading and writing. Often it is believed that an individual begins with the listening skill before speaking skill and begin with the reading skill before writing skill. A few researchers divide the language skills into

[1] ***Operational definition of 'biliteracy' adapted for the present study:***

'Biliteracy' or 'bilingual literacy' refers to *sequential acquisition* of languages to learn literacy skills at home and in schools. Here, the first acquired language i.e. L1 is the native language of the child and the language the child acquires after that at school is considered second language or L2. In the context of the present study, Kannada becomes L1 and English becomes L2.

two broad groups- receptive and expressive skills. Listening and reading are considered receptive skills, while speaking and writing are considered expressive skills. Thus, by definition ‘language’ also, comprises of ‘reading and writing skills’ which are the components of ‘literacy skills’.

Language acquisition is defined as a less deliberate, subconscious process of mastering a language, and is often associated with the manner in which children acquire their native or first language. First language is also referred to as L1 in the 1iterature. L2 is the second language. While, children acquire language, they are unaware of the grammatical rules. In order to acquire language, the learner needs a source of natural communication. The context of communication and not the grammatical structure of a given language is crucial for acquisition of language. On the other hand, language learning is largely a mastery of the four language skills, in terms of the phonetic, phonological, morphological (word), syntactic and semantic aspects of the target language. In language learning, learners have conscious knowledge of the new language and can talk about that knowledge. Research has shown, however, that knowing the rules of grammar does not necessarily result in good speaking or writing. It also covers the communicative appropriateness of the structures used, in addition to a mastery of related linguistic information.

2.2 Bilingualism and Second language

Bilingualism refers to the knowledge and use of two languages and an ability to make a meaningful utterance in another language (Harding, Ruth & Riley, 1986). If a speaker is fluent in two languages, then he is said to be a *bilingual*. The commonly held image of a bilingual person is of someone brought up in a culture where he/she is exposed to two languages from birth. Weinrich (1953) proposed three types of bilingualism depending on the way in which the two languages are learned.

a) A *compound* bilingual learns two languages in the same environment so that he/she acquires one notion with two verbal expressions.

b) A *coordinate* bilingual acquires the two languages in different contexts (e.g., home and school), and therefore, the words of the two languages belong to two separate and independent systems.

c) In a *sub-ordinate* bilingual, one language dominates the other.

Bialystok and Hakuta (1994) made a distinction between *simultaneous* (L1 and L2 learned about the same time), *early sequential* (L1 learned first and L2 relatively early in childhood) and *late* (from adolescence onwards) bilingualism. Early sequential bilinguals form the largest group worldwide and the number is increasing. By convention, the language learned first is called *L1* and the language learned second is called *L2*. Sometimes L1 and L2 are learnt simultaneously. The term second language[2] is often used to mean a language that is learned after the first or native language is relatively established. The term is not applicable in the case of a child learning two languages simultaneously, in a bilingual setting. This term is also used to refer to learning a foreign language. Learning a new language in a

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[2] ***Second language (L2) v/s English as a second language (ESL)***

Learning to read in a second language can mean different things in different situations and settings. For instance, the situation of a bilingual child learning to read English as a second language (ESL)is qualitatively different from that of an adult ESL learner learning to read English for literacy purposes (Pang & Kamil, 2004). In the literature, we encounter different terms for describing children who are developing literacy in more than one language, for example: "bilingual students," "English language learners (ELL)," "language minority students," "English-as-a-second-language students," "second-language learners," "limited-English-proficient students," and "limited-English-speaking (LES) students".

foreign language context (studying English as a second language in Japan) as well as learning a new language in the host environment (learning French as a second language in France) is covered by this term. This term may refer to languages learnt after the first language. However, in the changing global scenario, it is plausible that the language learnt first turn out to be the secondary language of use in later life and therefore a rigid definition of terminology is not advisable.

The age of acquisition of L1 and L2 is also debated for long. Lenneberg (1967) proposed that learning a first language, starts around the first year of life and ends at puberty when the brain maturation reaches the adult level. Snow and Hoefnagel-Hohle (1978), Bialystok and Hakuta (1999), Flege (1999) have argued against the critical period in a second language, supporting the fact that adults acquire native-like fluency only if the optimum context (one similar to that for children) is provided to them to learn a second language. The counter argument for the critical period hypothesis is further supported by the linguistic interdependence hypothesis proposed by Cummins (1979, 1999). It states that the skills developed in the first language transfer to the second language. He distinguished between basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP) and theorized that while children may acquire native-like BICS by two years, they take time 5–10 years to catch up academically in English (Collier, 1987; Cummins, 1999). Cummins (1999) also theorized that the transfer of skills occurs only after a certain linguistic competence in the second language is attained which he termed as ‘threshold hypotheses’.

To summarize, language acquisition in a bilingual is a process of mastering of two or more languages by children. Some children acquire two or more languages simultaneously in the same environment and later on learn other languages in different environments such as in schools. Research in the past few decades have suggested the influence of L1 on L2 and vice versa for spoken language skills. A few researchers talk about influence of L2 to be more on L1 when L2 is introduced intensively. However, various other researchers argue that influence of L2 can lead to cognitive disadvantage in the child's literacy skills in L1. A few other researchers attribute this cognitive disadvantage to the acquisition of second language that has writing systems different from that of the first language.

2.3 Writing systems, orthographies, and scripts

A *grapheme* refers to the letter or combination of letters that represent a phoneme. Writing systems reflect design principles and not appearances of letters. The *script* is nothing but the visual forms of writing — the basic unit size for the mapping of graphic units to language units. Written language systems or scripts around the world can be grouped in the following way:

a) *Alphabetic scripts*: The written language most familiar to speakers of English and other European languages are alphabetic scripts. In alphabetic scripts, the basic unit represented by a grapheme is essentially a phoneme. In languages such as English, this relation can be one-to-many in both directions. A phoneme can be realized by different graphemes and a grapheme can be realized by many different phonemes. The nature of this correspondence can vary. In transparent languages such as Serbo-Croatian, Italian, Indian language like Hindi and Kannada, majority of graphemes show one-to-one grapheme-to-phoneme correspondence (GPC). Some languages lie between these extremes. In French, correspondences between graphemes and phonemes are quite regular, but a phoneme may have different graphemic realizations (e.g. the grapheme “o”, “au”, “eau”, “aux”, and “eaux” all represent the same sounds).

b) *Consonantal scripts:* In consonantal scripts such as Hebrew and Arabic, not all sounds are represented, as vowels are not written down.

c) *Syllabic scripts*: In *syllabic* scripts (such as Cherokee and the Japanese script Kana, Indian scripts like Hindi and Kannada), the written units represent syllables.

d) *Logographic scripts*: Some languages do not represent any sounds. In logographic *language* (sometimes also called *ideographic languages*) such as Chinese and t*he Japanese script* Kanji, each symbol is equivalent to a morpheme.

Orthography is a writing system designed for a specific language. Thus, while referring to written English, it is understood that it is not a distinct writing system but it has a distinctive orthography, differing from Italian, Korean and other orthographies within the alphabetic writing system. Within the alphabetic writing system, orthographies vary in the transparency of mappings between letters and phonemes; While, Italian and Finnish are very transparent, English is relatively nontransparent and Danish lies in-between the two.

The writing system that a language uses is found to affect children’s acquisition of literacy because each system is based on a different set of symbolic relations and requires different cognitive skills (Coulmas, 1989). These relations place different demands on children’s analysis of spoken language and their recording of the language in print. The task of learning to read in each of these writing systems is the effect of bilingualism on learning to read in each of these systems. This depends on the type of writing system employed in the target language (Bialystok, Luk & Kuwan, 2005). Further, understanding these systems with different symbolic relations will need different processing mechanisms in order to acquire literacy in those languages.

2.3.1 Theoretical framework

Reading and writing involves various processing mechanisms in children. There are many hypotheses and assumptions put forth by researchers on reading and its relation to the processing of different writing systems existing in the world. In order to understand the processing mechanisms of different aspects of literacy in bilingual children, Geva and Wang (2001) have reviewed the evidence for underlying universal principles which facilitate children's use of processing strategies in second language and bilingual literacy learning. In the L2, the rapid and automatized processing of orthographic-phonological correspondences sustains skillful decoding and comprehension (Birch, 2002), just as it does in L1 reading (Adams, 1990; Perfetti, 1994). Bernhardt (2005), Grabe and Stoller (2002) and Stanovich (2000) surveyed and found that L2 readers' phonological representation of words during decoding need not be native-like or complete for the purpose of processing for meaning. If word decoding continues to be effortful and laborious for beginning and intermediate L2 learners, it will be further difficult for higher order, sentence-level processing meaning (Saiegh-Haddad & Elinor, 2003).

Geva, Wade-Wooley and Shany (1997) assumed that the cognitive processes that underlie first language reading development also apply to the development of an individual's second language. Not all researchers are in consensus with such a common cognitive process for learning all the languages in the world. This may be true because languages differ in terms of the regularity between written symbols (letters/graphemes) and sounds/phoneme i.e., the transparency of orthography is different for different languages. Therefore, an individual may require specific cognitive processes for learning such scripts. Snowling (2000) assumed that children may present different levels of difficulty for reading, especially when they are acquiring literacy skills in different languages. Therefore, he believed that component processes utilized during the acquisition of literacy in different languages cannot be assumed to be the same, and theories that make this assumption require empirical evidence. In general, Geva and colleagues (Geva & Siegel, 2000; Gholamain & Geva, 1999) proposed that the main theoretical positions can be reduced to two competing perspectives as the *script dependent hypothesis* and *central processing hypothesis.*

a) The Script Dependent Hypothesis

The script dependent hypothesis posits that reading acquisition varies across languages. Under this general viewpoint are those theories that propose that reading development should vary with the transparency of a particular orthography. Accurate word recognition skills are assumed to develop more slowly in less transparent orthographies than they do in more transparent orthographies. Transparent orthographies permit a simple direct one-to-one correspondence between letters and sounds of words. Less transparent orthographies, however, use more complex relationships between letters and sounds. These differences in letter-sound correspondence rules have led to variations in the prevalence and patterns of reading difficulties from one language to another, as well as to differences in the development of reading processes and skills between languages. It is believed that, less transparent the orthography more complicated the process of phonetic encoding, the slower the acquisition of literacy and ultimately, the more prevalent and severe the reading problems. Liow (1999) reported that decoding strategies varied among Chinese-English bilinguals/ biscriptals, depending on which language/ script was used for initial literacy instruction. Wang, Koda and Perfetti (2003), in a study of Korean and Chinese English-language learners, showed how differences in students' L1 orthography (alphabetic and morpho-syllabic, in this case) impact on L2 decoding strategies. In this regard, examples of "strategy transfer" (Liow, 1999) point to language specific, script-dependent factors that deserve further investigation (Bialystok, 2002).

Emerging research evidence in support of the script dependent hypothesis shows that the complexity of orthography alters the rate of literacy acquisition in a transparent and a less transparent orthography. Veii and Everatt (2005) attempted to study reading by children in two different languages with different scripts, Hebrew and English. English was the more dominant language and Hebrew, the less dominant language in these children. They found that reading accuracy and the type of reading errors varied across the languages. Their study also revealed that improvements in reading accuracy were faster in Hebrew, the less dominant second language, than in English. The authors attributed this phenomenon to the fact that voweled Hebrew is relatively transparent and therefore easier to decode than English. They also found that age, predicted accurate word recognition in English more than it did in Hebrew. Again they attributed this to the transparency of Hebrew for higher reading accuracy in young children. This they explained with the script dependent viewpoint by arguing that accurate word reading in Hebrew reaches good levels of performance early in learning, whereas English requires more learning and greater experience, leading to a larger relationship with age. This means the older the child, the greater their experience, the more is their ability to perform on measures of English word recognition. These data, therefore, were consistent with faster rates of acquisition being associated with more transparent orthographies (Hebrew in this case) as predicted by the script dependent hypothesis.

Leker and Brian (1999) described a patient with an acquired reading difficulty in Hebrew who showed no difficulties when reading in English, and Wydell and Butterworth (1999) reported the single case of a child who presented evidence of dyslexia in his first language (English) but not in the second language (Japanese). In a larger scale study, Kline and Lee (1972) assessed a group of Canadian children who were learning to acquire literacy in both English and Chinese. These data identified children who presented problems with learning Chinese but not English, and others who had difficulties with English but not Chinese. Similarly, Miller-Guron and Lundberg (2000) identified Swedish children who were demonstrating deficits with literacy skills in their native language, but who showed evidence of succeeding, relative to their peers, with literacy in English. The results of their study suggested that the children presented evidence of problems with developing ‘advanced’ phonological skills, such as phoneme awareness and manipulation skills that are necessary for the successful acquisition of Swedish literacy. The researchers also attributed that the children could have used alternative strategies, such as whole word approaches, when reading in English.

Everatt, Smythe, Ocampo and Veii (2002) also report bilingual children presenting evidence of single word reading difficulties in a language with a less transparent orthography (English) without comparable deficits in another language with a much more transparent orthography (the Fillipino language of Tagalog). There is ample research conducted which argue for different processes distinguishing good and poor readers from differing languages/scripts backgrounds

(Everatt, Smythe, Ocampo & Gyarmathy, 2004; Karanth, 1992; Smythe, Everatt, Gyarmathy, Ho & Groerger, 2003). Karanth (1992) described two biliterate children with reading disability. Both were multilinguals learning to read and write three different scripts, one an alphabetic script English and the other two the semi syllabic scripts Kannada and Hindi. She found more spelling and writing errors in English than in Kannada or Hindi. Therefore she concluded that in developmental biliterate dyslexics, differential patterns may be seen in two or more scripts, depending upon the strategy that is demanded by the nature of scripts. Everatt et al., (2004) found that process which predicts literacy skills for one language may not be able to predict the same in another language. They found that phonological awareness processes could distinguish Grade 3 children with good versus poor English literacy skills more than the same processes that distinguished children with good versus poor Hungarian literacy skills.

Francis (1997, 2000), Francis and Navarrete Gomez (2000) found that children who were bilingual readers and writers were applying phonological and orthographic processing skills learned through the medium of the official academic language (Spanish) to an indigenous proficient language (Nahuatl). They attributed this to the high levels of proficiency in each language and the close relation between alphabetic systems of the two languages which facilitated access to these processing skills. A separate assessment of children's metaphonological awareness related to their knowledge of each language (Francis, 1998) provided indices that correlated positively within literacy skills in each language, measured separately. The pattern of results was found consistent with the findings from L2 readers, some aspects or sub-components that form part of skilled, automatized decoding, applied to the lower-level processes, learnt earlier and were available for application to decoding tasks in another language. This principle was found to be acceptable in those cases in which the orthographies in question are of the same type (e.g. alphabetic, Roman) (Francis, 1998).

Hence, there is research evidence to argue that reading acquisition varies across languages with different writing systems or scripts. However, another group of researchers do not believe in script dependency for acquisition of literacy in children and believe in universality in reading.

b) The Central processing hypothesis

The central processing hypothesis, assumes a *universal approach to literacy acquisition.* It proposes that reading development is not contingent upon the type and the nature of the orthography. Rather, common underlying linguistic and cognitive processes (such as working memory, verbal ability, naming and phonological skills) influence the development of reading across all languages. Therefore, children deficient in such processes are more at risk for developing reading difficulties than those with good skills in these areas.

Various sources have evidences in support of the central processing hypothesis. Geva (2000) cited clinical case studies by Wiss (1987), Obler (1989) where bilingual children with reading disability (Geva, 2000) presented difficulties in both their first and second languages. The findings of these case studies suggested that despite the differences in orthographies, bilinguals who presented decoding difficulties in their native language also had decoding difficulties in their second language. Furthermore, Stevenson, Stigler, Lucker, Hsu and Kitamura (1982) showed that reading skills and reading difficulties differed between children learning an alphabetic script and those learning logographic symbols. They opined that individual differences in underlying cognitive factors provided a basis to understand children's reading development in either of these different types of orthography. These findings argue against views on the acquisition of reading skills across languages varying in their use of logographic vs. alphabetic symbols, and also questions the claim that phonological process is irrelevant to reading a more logographic orthography (Leong, Cheng & Mulcahy, 1987; Perfetti & Zhang, 1991; Seidenberg, Waters, Barnes & Tanenhaus, 1984).

Gholamain and Geva (1999) assessed the role of orthographic and cognitive factors in the development of basic reading skills in Persian (a relatively transparent orthography) and English (a less transparent orthography). They found basic reading skills in Persian-speaking Canadian children correlated positively and significantly with their reading skills in English. That is, they found that children who did well on English reading measures and English cognitive skills were more likely to perform better in Persian. In particular, the results provided evidence for the role of verbal working memory and rapid automatized naming in predicting reading development in both English and Persian despite the orthographic differences between the two languages. Thus, individual and developmental differences in underlying cognitive factors significantly predicted basic reading development in the two orthographies. These findings provide evidence for the central processing hypothesis.

However, Gholamain and Geva (1999) also presented evidence in support of the script dependent hypothesis. Their results showed that despite limited exposure to Persian, once children acquired knowledge of the Persian alphabet, their accuracy to decode Persian words increased considerably, such that it started to resemble their ability to decode English words. Furthermore, they believed that once children acquired grapheme-phoneme correspondence rules of the Persian language, they could read unfamiliar Persian words differing in length nearly as accurately as familiar Persian words. Such evidence for differential development and commonality of predictors led Geva and Siegel (2000) to conclude that the central processing and script dependent viewpoints are complementary rather than contradictory. The two theories are combined to formulate a cross-linguistic theory of reading development in bilingual children. Higher order discourse organizing structures are freely accessible to both L1 and L2 because at this level they are not language specific. However, it might not be the same when phonological and syntactic systems are considered (Pearson, 2002). Even within these, skilled phonological processing in the L1 predicted skilled decoding in the L2, while measures of performance related to L1 syntax have not provided any such evidences (Pearson, 2002; Siegel, 2002).

In bilingual literacy, not all language related competencies, processing mechanisms, and other necessary kinds of knowledge structure are accessed and shared in the same way between the L1 and L2. Cummins (2000) found evidence in favor of common underlying processors that facilitate decoding in beginning L2 readers with the development of linguistic subsystems including phonological knowledge. This can be considered as an evidence for *central and language independent nature.* Another strong candidate for reading ability that depends largely on central and language-independent knowledge structures is text/discourse organizing. In reading comprehension, the integration of other components determines its effect on L2 phonological processing. Some of these components are more or less independent (from L1 and L2) while others are found to be more highly language dependent (Cummins, 2000).

2.4 Acquisition of literacy and biliteracy skills

It is clear that attaining high levels of literacy in a second-language is possible. But, it is less clear, however, how initial exposure to literacy in a second-language affects the subsequent development of literacy skills in that language. The National Research Council's report, Preventing Reading Difficulties (Snow, Burns, & Griffin, 1998), highlight the lack of and need for straightforward, data-based answers to questions about bilingual literacy development. Their report also accepted that there is no clear information on who benefits from bilingual programs, whether literacy instruction in a second-language affects the growth of literacy in that language, and the cognitive processes in bilingual literacy.

In an attempt to study bilingual literacy development systematically, Durgunoglu & Öney (1999)), Öney & Durgunoglu (1997) proposed a general framework of literacy development. They have used this general framework in their previous studies with children, as well as in developing and evaluating an adult literacy program (Durgunoglu, Öney, & Kuscul, 1995). According to Durgunoglu and Öney (1999) and Öney and Durgunoglu (1997), acquisition of literacy skills is dependent on certain types of language skills. They believed that in preschoolers, language skills most apt to develop literacy are those related to print and oral language skills that support emergent literacy namely, letter-sound correspondence, rhyming, using language to talk about language, and contact with print. Moreover, there are also some language skills associated with written language that need to be developed at this stage in order to support reading and writing at a later stage. They opined that in order to understand the different processes of literacy development, a clearer understanding of models of literacy development is essential.

Models are found to help understand the development of literacy skills in relation to different factors responsible for literacy development. The models help us to look for and analyze the factors responsible for difficulties in learning literacy skills. One such model was framed by Durgunoglu and Öney (2000), which is derived from all the other available models of reading and writing (Adams, 1990; Gough & Tunmer, 1986; Juel, Griffith, & Gough, 1986; Lomax & McGee, 1987; Tunmer, Herriman & Nesdale, 1988; Tunmer & Nesdale, 1985). Figure 2.1 shows a model for literacy development (Durgunoglu & Öney, 2000) derived and summed from the above studies.

Because most of the previous studies were found to be correlational in nature, the arrows in Figure 2.1 are intended to indicate relationships rather than cause and effect.

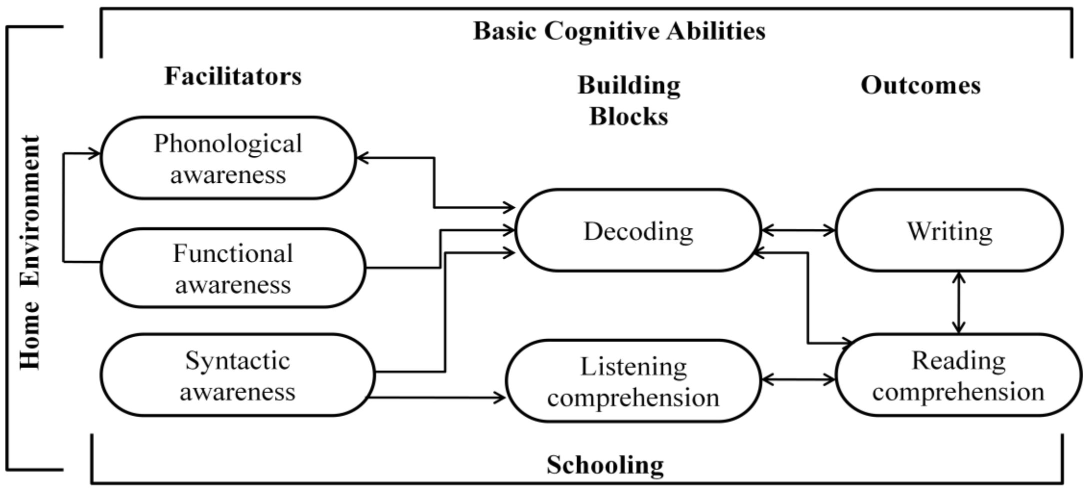

Figure 2.1: A Model for Literacy Development

(*Source:* Cited in Durgunoglu & Öney, 2000)

The three major components of this model- outcomes comprising of reading and writing skills, building blocks comprising of decoding and listening comprehension and facilitators comprising of phonological awareness, functional awareness and syntactic awareness and their inter-relationships coupled with basic cognitive abilities, home environment and schooling.

a) *Outcomes: Reading and Writing:* The final outcomes in the model were reading and writing fluently and effectively. In addition to understanding a text, responding to it and learning from it, are considered as some other hallmarks of good reading. Likewise, writing proficiency includes not only the mechanics of writing, but also expressing thoughts coherently and appropriately using the relevant genre organization. To read and write fluently, a child needs to understand the spoken language and understand how this spoken language is represented in the written form (Juel, Griffith, & Gough, 1986; Perfetti, 1985). Listening comprehension and decoding, respectively, are found to be the two tasks reflecting the operation of reading and writing, even in different cultural contexts (Gough & Tunmer, 1986).

b) *Building Blocks: Listening Comprehension and Decoding:* Listening comprehension and decoding are considered as the building blocks of literacy acquisition. The common denominator in listening and reading is the comprehension of the language. Although listening skills are usually well-developed much before children start school with exposure to spoken language, skills required for reading comprehension are not limited to understanding the semantic and syntactic aspects of spoken language (Durgunoglu & Öney, 2000). Gee (1999) calls the ability to comprehend decontextualized language as 'school-based forms of literate language' that is essential for acquisition of literacy is developed in the school context. Yet another dimension of listening comprehension reported important for bilingual children is vocabulary and background knowledge. Vocabulary knowledge grows through a child's experiences with oral and written language, and is affected by cognitive variables such as memory and categorization (Gathercole & Baddeley, 1989). Background knowledge is also related to experiences with language and culture, especially in the family and through schooling.

In reading, unlike listening, phonological information is extracted from print, using orthographic decoding skills. Quick and effortless recognition of words is found to be an integral component of fluent reading, and unskilled decoding is regularly associated with poor comprehension. When the individual words of a text are read inaccurately or too slowly, comprehension is found to suffer because integrative processes are disturbed (Shankweiler, 1989; Stanovich, 1986). Likewise, it is found that when spelling is laborious, it interferes with the quality of writing (Berninger et al., 1998). In addition, spelling performance can be used to understand a child's knowledge of linguistic structures, especially how orthography represents phonology (Moats, 1995; Treiman, 1993).

c) *Facilitators: Metalinguistic skills:* Before a child can progress to the analytic stage and begin to systematically use the correspondences between graphemes and phonemes, several developments need to occur. The child needs to understand the use of written language, be familiar with the symbols used in the written language, be aware of certain characteristics of spoken language, and understand the systematic relationship between the components of spoken language and written language. These insights are grouped under the metalinguistic skills of phonological awareness, functional awareness, and syntactic awareness. They are considered the facilitators of decoding and listening comprehension skills, as well as mutual facilitators.

Phonological awareness: Before children can understand how orthography represents spoken language, they need to be aware of the relevant units in spoken language. This insight includes a child's awareness of phonological units such as words, syllables, onset-rimes and phonemes. Evidence from a variety of sources suggests that phonological awareness is highly correlated with word recognition and spelling (Goswami & Bryant, 1990).

Syntactic awareness: This metalinguistic insight refers to the child's ability to reflect upon the internal grammatical structure of the sentences. Even though unable to articulate a relevant rule, a child may still be aware of the systematicities in a language. Syntactic awareness can affect decoding and listening comprehension in several different ways (Tunmer, 1990). It enables readers to monitor ongoing comprehension and notice when a word does not fit the ongoing representation of the text. It also influences reading by enhancing or verifying the incomplete visual and phonological information that an inexperienced reader has extracted when reading an unfamiliar word in a text. Currently, there is some controversy about how much syntactic awareness contributes to the decoding process, especially after phonological awareness is taken into consideration (Bowey & Patel, 1988).

Functional awareness: This metalinguistic insight includes children's developing notions about the functions and conventions of written language. Through interactions with written language, children develop the concepts about print (Clay, 1979). This awareness also includes an understanding of when and why print is used and the symbols of the language community (e.g.

alphabet). Research has shown that functional awareness, knowing about the functions of print, is related to letter discrimination ability and phonological awareness (Lomax & McGee, 1987). In sum, functional awareness seemed to affect the building blocks, as well as some of the other facilitators.

Contexts of Development- Home Environment, Schooling, and Basic Cognitive Processes: The overall cognitive ability of the child is also found to play a role in this interaction. These three factors are included in the model as the contexts of literacy development. Thus, the constructs of the model in Figure 1 are enclosed within these contexts of development. As several researchers have discussed, home experiences play an important role in developing language skills, and through them, literacy skills (Chaney, 1992, 1994; Dickinson & Snow, 1987; Hart & Risley, 1995; Heath, 1983; Teale, 1986). Through their experiences with both oral and written language, children become familiar with the characteristics of their language and develop an understanding of the functions of literacy. Home literacy practices contribute to the development of metalinguistic insights, or what we call the facilitators in the model. Cunnigham and Stanovich (1998) reported that knowledge of book titles (indicating print exposure at home or in school) was a good predictor of subsequent reading achievement.

The model of literacy development proposed by Durgunoglu & Öney (2000) suggests that the essential components of literacy development as building blocks and facilitators may be grouped as:

1) Listening skills

2) Phonological awareness skills

3) Reading skills and

4) Written language skills.

The above components are considered as crucial components for literacy acquisition. However, there are sub-skills within these components, which are mutually related to each other and contribute for literacy development in children. These components are explained in the following sections. Durgunoglu and Öney (2000) attempted to study the development of literacy skills in children learning literacy through two languages.

The above model is adopted to explain the concept of "biliteracy in children" and its development in biliterate children within the framework of a host of skills and sub-skills of literacy. A review of sub-skills of literacy is warranted at this stage to understand the differential influence and the inter-relationships among the skills in each of the languages. Very few studies are reported on acquisition of literacy skills in biliterate children. The following literature review attempts to describe reports of a few investigators on the pattern of acquisition in biliterate children learning to read and write different languages with differential script structures.

2.4.1 Listening skills

(a) Auditory discrimination

Auditory discrimination skills can be defined as the ability to identify and distinguish between different sounds. The development of auditory discrimination skills is a step-by-step process. As children grow, they develop ability to discriminate speech sounds. Kramer, Schell and Rubison (1983) believed that typical English-speaking children have considerable knowledge available for analyzing language when they enter school: several thousand words in their vocabularies, some exposure to rhymes and alliterations, practice in writing their own names and “reading” environmental print, and other sources of information about language. Whereas, children who are non English speakers may have problems in listening attributed to their limited English proficiency. For example, for Spanish-speaking children from Latin America, there are eight English phonemes absent from Latin American Spanish (for example, the English short vowels as in “pit,” “pet,” “puf” have no counterparts in Spanish). Also, between 46 and 53 consonant clusters in English appear in the initial position of the word and more than 36 consonant clusters appear in the final position, while Spanish is limited to 12 consonant clusters that can occur both in the initial word and syllable position. In addition, Spanish has no final consonant clusters such as “ld” and “sk” (Kramer, Schell & Rubison, 1983). These differences in languages may have an influence on their listening skills to either of the languages under study.

Two studies have indicated that children can be taught to hear sounds that do not appear in their first language. Kramer, Schell and Rubison (1983) investigated the effectiveness of a four-week auditory discrimination training program in English for Spanish-speaking children with regard to four contrasting pairs of sounds taught and fourteen other sound pairs not taught. The subjects were 15 Mexican American students in first, second, and third grades from two urban public schools in Kansas. All the subjects had reading levels above the primer level but not above the first grade level. The program focused on 36 word pairs that contrasted English sounds difficult for Spanish-speaking children to distinguish. During testing, subjects were asked to identify whether minimally contrasting word pairs sounded the same or different, e.g., sheet-cheat. Training lasted 30 minutes a day, 4 days a week, for 4 weeks. The teacher showed pictures of characters with particular sounds in their names (i.e., Chile Choo for ch). The results of the study on auditory discrimination posttest showed that experimental subjects performed significantly better than controls on total score, sounds taught, and sounds not taught. The findings demonstrated a positive effect of a brief ear-training program for the development of overall auditory discrimination. They also found that there was also a transfer effect to sounds that were not taught to these children.

(b) Listening comprehension skills

Apart from auditory discrimination, yet another important skill to listening is the listening comprehension skill. Listening comprehension refers to the process by which words, sentences, and discourses are interpreted (Gough & Tunmer, 1986). The common denominator in listening and reading is the comprehension of language. The skills of listening and reading are described as decoding functions, whereas speaking and writing are encoding functions in the communicative process. Listening differs from just hearing, which is a physiological process that does not involve interpretation of the information. Although listening skills are generally well developed when children start school, skills required for reading comprehension are not limited to understanding the semantic and syntactic aspects of spoken language. The ability to comprehend decontextualized language was referred to as the school-based forms of literate language which is essential for literacy acquisition in children (Gee, 1999). It is a basic skill that can be improved through teaching and practice. Listening comprehension of an average child begins to develop around 12 months of age and continues to grow. Listening comprehension continues to grow during the elementary years. Thus, a typical 3rd-grader can comprehend more complex oral stories, expositions, etc., than a typical 1st-grader. If comprehension problems in children with reading disability were only because of word decoding problems, then they would be expected to show deficits in reading comprehension, but not listening comprehension. However, it is now clear that many children with reading disability have comprehension problems not just when they are reading but also when they are listening (Betjemann, Keenan, Fazendeiro & Olson, 2002; Betjemann, Keenan & Olson, 2003; Catts et al., 2003; Conners & Olson, 1990; Keenan, Betjemann & Fazendeiro, 2002; Mann, Liberman & Shankweiler, 1980; Mann, Shankweiler & Smith, 1984; Nation, Clarke, Marshall & Durand, 2004). Some have suggested that these deficits in listening comprehension may be because of task demands on phonological working memory, and thus caused directly by phonological deficits (Crain & Shankweiler, 1990; Shankweiler & Crain, 1986; Shankweiler, Smith & Mann, 1984; Spring & French, 1990). However, even when they controlled for phonological working memory, some deficits in listening comprehension remained. In sum, the evidence clearly suggests that while decoding deficits may contribute to reading comprehension difficulties, particularly in the early grades, comprehension difficulties may have additional causes. Comprehension difficulties can occur without decoding problems, as in children with comprehension deficit, and comprehension difficulties can occur for children with reading disability even when no word decoding is involved. Independence in the contributions of word decoding and comprehension skill to reading comprehension was recognized by Hoover and Gough (1990) in their ‘simple model’ of reading. According to the simple model, reading comprehension is the product of a child’s skill in decoding and his/her skill in listening comprehension.

Enhancement of listening skills is relatively less focused in literacy training in comparison to the skills of speaking, reading and writing. In India, most schools do not consider it as important to include listening comprehension as a formal component of English Language Teaching (ELT) in the syllabus (Belasco, 1971). It is known that no language learning can take place without listening comprehension and it is included in majority of models on literacy acquisition. It is generally believed that listening would develop automatically in the course of learning other skills and therefore, tends to get neglected. There is enough evidence from studies on second language learning to show that listening comprehension does not develop automatically alongside production. Few children were found to often misinterpret instructions and fail to comprehend the information because of poor listening. In view of the above study, it can be speculated that listening comprehension is of particular significance in learning English by children in India. The larger number of different varieties of English that exist in India, for e.g., Tamil-English, Bengali-English, Punjabi-English, etc., become mutually incomprehensible, even if partially, if learners are not trained to listen to the sounds of standard Indian English (Sadanand & Sahgal, 1988).

Existing literature suggests that listening comprehension skills do not find a primary focus in majority of the studies on biliterate groups. Drawing evidences from learners of English as second language, it is vital to incorporate this component along with decoding skills in reading assessment battery for biliterate children.

2.4.2 Decoding skills

Decoding and listening comprehension are considered as two important components of reading skill (Gough & Tunmer, 1986). Reading skill in academic learning encompasses the decoding skill and reading comprehension skills. Decoding refers to word recognition processes that transform print to words (Gough & Tunmer, 1986). In reading alphabetic scripts, unlike listening, phonological information has to be extracted from print, using orthographic decoding skills. Quick and effortless recognition of words is an integral component of fluent reading, and unskilled decoding is found to be associated with poor comprehension (Shankweiler, 1989; Stanovich, 1986). Likewise, when spelling is laborious, it interferes with the quality of writing (Berninger et al., 1998). In addition, spelling performance can be used to understand a child's knowledge of linguistic structures, especially how orthography represents phonology (Moats, 1995; Treiman, 1993) if the target language has opaque orthography. In transparent orthography, children can learn letters (letters are fused symbols of consonant and vowel as in /ka/ ‘ಕ’ in Kannada /k/+/a/). Letters do not demand for analysis of phoneme-grapheme correspondence (P-G-C), whereas, spellings in opaque orthographies place demands on a child’s P-G-C abilities. Öney and Durgunoglu (1997) assessed first-grade Turkish children for letter recognition, word and pseudoword recognition and listening comprehension skills in the beginning of the school year. Results suggested that the phonologically transparent orthography in Turkish facilitated the earlier development of word recognition skills. Öney, Peter and Katz (1997) studied children in 2nd and 5th grade. These children learnt to read and write in Turkish and English as Second Language (ESL). Durgunoglu and Öney (1999) also studied these two languages and found that Turkish children performed better on decoding (including word and pseudo-word recognition and spelling tasks) tasks in Turkish compared to English (ESL) and that the 5th grade children performed better compared to 2nd grade children on all the decoding tasks. When there was no difference in the children's word recognition performance, only listening comprehension ability distinguished children on the basis of different levels of reading comprehension. The results suggest that assessment of only decoding skill is not adequate, but listening comprehension should also be incorporated in the assessment process.

Karanth and Prakash (1996) opined that a transparent orthography facilitates comprehension, as decoding is less demanding, for example they reviewed and found that reading comprehension of an Italian child was higher than that of English. But Posner and Kar (personal communication) believed that this cannot be generalized to Indian context as Indian children have more aksharas to learn and they need to master the akshara principle. Karanth (2006) believed that a reader of an Indian script does not learn the vowel component and consonant component separately and then combine them to form a syllable. Rather, the child first learns the basic syllabary with primary forms of vowels and consonants and then the entire syllabary containing all possible CV combinations is taught by rote. Padakannaya and Mohanty (2004) found akshara awareness to be a good criterion for identification of good and poor readers. Posner and Kar (personal communication) explained that writing systems which are alphabetic in nature with a small set of graphemes often have a high proportion of irregular words as compared to alphasyllabaries which have more number of graphemes with close correspondence to the phonemes. They believed that script specific components are involved in literacy acquisition.

2.4.3 Metalinguistic Awareness

Metalinguistic awareness refers to the ability to reflect on the structure and properties of language. Learning a second language involves a conscious and deliberate effort, which is said to promote a level of linguistic awareness in a bilingual that is qualitatively different from that of a monolingual (Garcia, Jimenez,

& Pearson, 1998; Vygotsky, 1962). One of the most robust findings on bilingual children is found to be related to their enhanced metalinguistic awareness. This awareness is demonstrated in various ways, such as sensitivity to word shapes and word length, onset-rime awareness, and knowledge of sentence grammaticality. In a number of studies, it was found that bilingual children consistently outperformed monolingual children on tasks measuring metalinguistic awareness (Bialystok, 1997, 2001). This is attributed in bilingual children as a heightened awareness of the symbolic nature of language encoded in text, and they seem to be able to transfer this knowledge from one language to another (Bialystok, 1997). Bialystok's (2001) analysis of the research on monolingual and bilingual differences in metalinguistic ability suggested that bilingual children excel in the control of attention when presented with misleading information, but tasks that place demands for analysis are not solved better by either monolinguals or bilinguals (Bialystok, 2001).

The meta-linguistic skills necessary for learning to read and write can be grouped as *phonological awareness skill, syllabic awareness skill, syntactic awareness skill* and *functional awareness skill* (Durgunoglu & Öney, 1999).

2.4.3.1 Phonological Awareness

While, metalinguistic awareness refers to the ability to reflect on the structure and properties of language, phonological awareness is a form of metalinguistic awareness that refers to the ability to carry out mental operations on speech (Morais, 1991; Tunmer & Herriman, 1984; Tunmer & Rohl, 1991). Treiman and Zukowski (1991) stated that phonological awareness does not constitute a homogeneous entity, but rather is expressed as awareness of different linguistic units. However, there are different views on the use of the term 'phonological awareness'.

Tunmer and Rohl (1991) used the term to refer exclusively to phonemic awareness, while Mann (1991) and Morais, Alegría and Content (1987) include syllabic awareness in addition to the above. On the other hand, Treiman (1991) interprets phonological awareness to mean awareness of any phonological unit, be it syllables, onsets, rhymes or phonemes. Phonological awareness is a general term that refers to sensitivity to different sound components within speech, while phonemic awareness facilitates manipulation of individual phonemes in the speech stream. For example, a child learning to read and write an alphabetic script needs to understand that the continuous stream of spoken speech could be broken up into sounds, which are then related to letters or strings of letters (the alphabetic principle). Stanovich (2000) suggested separating 'phonological sensitivity' from 'phonological awareness'. He opined that *'phonological sensitivity'* refers to a continuum from a shallow sensitivity of large phonological units (syllable) to *'phonological awareness'* which refers to a deep sensitivity of smaller phonological units (Stanovich, 2000).

According to Ziegler and Goswami (2005), phonological awareness, is also referred to as *phonological sensitivity*, comprising the ability to recognize, identify, or manipulate any phonological unit within a word, be it phoneme, rime, or syllable. Ziegler and Goswami (2005) tried to explain the *psycholinguistic grain size theory* (see Figure 2.2) with special emphasis on the development and use of different grain sizes across visual and auditory domains and across languages.

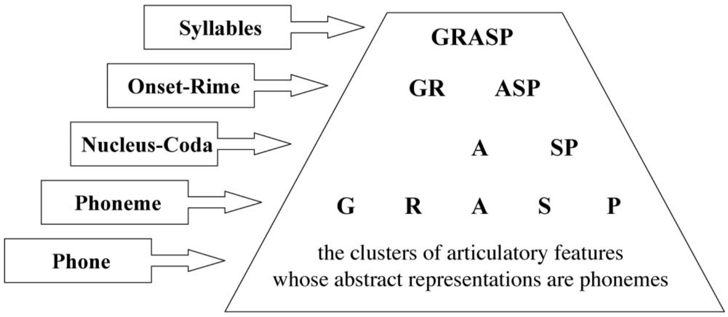

Figure 2.2: A schematic depiction of different psycholinguistic grain sizes.
(Source: *Ziegler & Goswami, 2005*)

The emergence of phonological awareness is best described along a continuum from shallow sensitivity of large phonological units to a deep awareness of small phonological units (Stanovich, 1992). Anthony, Lonigan, Driscoll, Phillips and Burgesset (2003) used a large group of children in the age range of 2–6 years to investigate the order of acquisition of phonological sensitivity skills at various grain sizes while holding constant the type of operation that was performed (e.g., blending, deletion). Their findings revealed that children's progression of sensitivity to linguistic units followed the hierarchical model of word structure shown in Figure 2.2. That is, children generally mastered word-level skills before they mastered syllable-level skills, syllable-level skills before onset–rime skills, and onset–rime-level skills before phoneme-level skills, controlling for task complexity.

For languages such as English and Spanish, the ability to manipulate individual sound units is expected to occur at the lexical and sub-lexical level. Children who have phonological awareness skills are able to segment words into syllables, onset-rime units, and phonemes. Many studies comparing the levels of syllables and phonemes demonstrated that syllabic awareness precedes phonemic awareness (Cossu, Shankweiler, Liberman, Ratz & Tola, 1988; Liberman & Shankweiler, 1977; Liberman, Shankweiler, Fischer & Carter, 1974; Rosner & Simon, 1971; Treiman & Zukowski, 1991). The findings suggested the existence of developmental progression from syllable awareness to intrasyllabic units awareness (onset-rhyme), and finally, to phonemic awareness. Phonemic awareness refers to the ability to segment speech into individual phonemes and to blend phonemes to form syllables or words. In English, the mapping of speech to written language occurs at the level of phonemes. Phonological awareness can be grouped into different types:

- S*yllabic awareness:* Awareness of the syllabic structure of words, for example, in English, '*Cat'* has one syllable, '*hap-py'* two, and '*but-ter-fly'* three syllables.
- *Phonemic awareness:* Awareness of phonemes, or the constituent sounds of a word, for example, '*seat'* has three sounds /s-i:-t/.
- *Awareness of intrasyllabic units:* It is proposed that syllables have an internal structure of onset and rime, for example, '*seat'* would split into /s-it/, with /s/ as the onset, and /it/ as the rime (the rime can further be split into nucleus, usually the vowel, /i/ and the coda, /t / in the given example). Awareness of onsets can be assessed through alliteration (same onset), playing on the first sound(s) of a word (e.g., *seat*, *sat*, *sun*), while awareness of rime is demonstrated by ability to recognize and produce rimes (rime, e.g., *seat*, *meet*, *beat*, *feet*).

Phonemic awareness is a key component of many tests of general phonological awareness skills. Phonemic awareness is considered to be one of the best predictors of learning to read and spell as reported by studies on monolingual children (National Reading Panel, 2000). Studies have shown strong correlations between phonemic awareness skills and word recognition. Juel, Griffith and Gough (1986) reported that phonemic awareness is a stronger predictor of reading achievement, than traditional measures of reading readiness. However, the importance of phonological and phonemic awareness in L2 reading is less well established. Durgunoglu, Nagy, and Hancin-Bhatt (1993) investigated the factors influencing the word identification performance of Spanish-speaking beginning readers. They found that phonological awareness in Spanish significantly correlated not only with the number of common English words read but was also highly correlated with performance on two transfer tests, English-like pseudoword reading and English decoding.

Mastering phonological awareness skill was found to help children master both phonics and reading (Calfee & Norman, 1998; Chard & Dickson, 1999). Goswami and Bryant (1990) suggested that phonological awareness is highly correlated with word recognition and spelling. More specifically it refers to the ability to store, access, retrieve, and manipulate phonological representations. Studies that explore the links between different levels of phonological awareness and literacy acquisition are widely carried out on preschool and young school-aged children (Bradley & Bryant, 1983; Cataldo & Ellis, 1988). Öney and Durgunoglu (1997) assessed first-grade Turkish children on phonological awareness and syntactic awareness skills in the beginning of the school year. They found that phonological awareness contributed to word recognition in the early stages of reading, as with English.

Studies on other bilingual populations with different native and second languages—for example, Turkish and Dutch (Verhoeven, 1994), English and French (Comeau, Cormier, Grandmaison, & Lacroix, 1999)— showed a significant relationship between phonological awareness in one language and word recognition or word reading skills in another. This even was true for students learning English whose first language had a nonalphabetic orthography such as Cantonese (Gottardo, Yan, Siegel, & Wade-Woolley, 2001). The research on phonological awareness suggests that, for L2 students who are already literate, reading instruction, would build on their existing phonological knowledge, and is not delayed until they are highly proficient in L2. Reading instruction in L2 would seek advantage of a child's knowledge of L1 literacy, when it exists, because phonological knowledge appears to transfer across languages . They opined that the degree of transfer is likely to be variable, depending on factors such as individual differences, as well as the amount of overlap in the linguistic and orthographic systems of the bilingual child's two languages.

Studies across different languages indicate that despite differences in the phonological structure of the languages being learned, preschoolers typically demonstrate good phonological awareness of syllables, onsets, and rimes in most languages. Syllable awareness is present by about age 3 to 4 years, and onset–rime awareness is present by about age 4 to 5. Phoneme awareness develops once children are taught to read and write, irrespective of the age at which reading and writing is taught (Goswami & Bryant, 1990). Some findings of studies in different languages are summarized by Ziegler and Goswami (2005) in Table 2.1 below.

Studies on phonological awareness in English and other languages in separate groups of children (Cossu et al, 1988; Caravolas & Bruck, 1993; Borzone de Manrique & Signorini, 1994) have shown that phonological awareness in a particular language is linked to the sound system of that language. Stuart-Smith & Martin (1999) studied phonological awareness in English and Punjabi in Birmingham, United Kingdom. They were of the notion that a child following bilingual literacy should be assessed in each of their languages to study the effect of one language on the other. Hence, they devised a phonological assessment tool comprising tasks of phonemic awareness and syllabic awareness in English and Punjabi. They administered the test on Punjabi-English bilingual children in the age range of 6-7 years of age. They found that a few tasks like the phonemic segmentation are language specific and this was reflected when children did not perform well in Punjabi. They opined that certain tasks like the phonemic segmentation commonly used for English cannot be usefully assessed in Punjabi.

Table 2.1: *Data (% Correct) From Syllable and Phoneme Counting Tasks in Kindergarten and First-Grade Children across Different Languages (Cited in Ziegler & Goswami, 2005)*

Language	Study	Kindergarten		First grade	
		Syllable	Phoneme	Syllable	Phoneme
Turkish	Durgunoglu & Öney (1999)	94	67	98	94
Italian	Cossu, Shankweiler, Liberman,Katz, & Tola (1988)	80	27	100	90
Greek	Harris & Giannouli (1999)	85	0	100	100
French	Demont & Gombert (1996)	69	2	77	61
English	Liberman, Shankweiler, Fischer, & Carter (1974)	48	17	90	70

Meta-linguistic awareness and literacy development in monolingual English-speaking children has been widely investigated over the decades. There is now an increasing interest to explore metalingusitic awareness in languages other than English. For example, Mann (1986) studied in Japanese language; Cossu et al, (1988) in Italian; Caravolas and Bruck (1993) in Czech; Borzone de Manrique and Signorini (1994) in Spanish; Huang and Hanley (1994) in Chinese: Mandarin & Cantonese. There are a few Indian studies available to date on metalinguistic skills and reading development in Indian children. Prema (1998) studied meta-phonological skills such as rhyming, syllable and phoneme related skills in Kannada speaking children. Similar studies are conducted on monolingual children speaking Tamil (Akila, 2000), Malayalam (Seetha, 2002; Ponnumani, 2003) and Kannada (Namrata, 2003). The reports revealed the importance of metalinguistic skills for reading acquisition in Indian children. Studies related to literacy acquisition in India are conducted mostly on monolingual children, however, very few studies are documented that explore the interaction of skills between the languages in biliterate children.

There is a general consensus that successful early readers develop an awareness of phonology, syntax, and functional uses of language. Current theories maintain that to read and write fluently, a child needs to understand the spoken language and understand how this spoken language is represented in written form. The child also needs to understand how and why written language is used and has to be familiar with the symbols used in the written language, to be aware of certain characteristics of spoken language, and to understand the systematic relationship between the components of spoken language and the concepts of written language. Such awareness is highly correlated with word recognition and spelling. Listening comprehension and decoding encompass some of the basic cognitive processes required in reading and writing. While, decoding and listening comprehension (e.g., monitoring on-going comprehension, enhancing or verifying incomplete visual and phonological information) are reported to be influenced by 'syntactic awareness', (i.e., word order and grammar), syntactic awareness is also said to play a role in the prediction of spelling performance. Functional awareness of print, i.e., written conventions of language, is related to the ability to discriminate letters and phonological awareness. Knowledge of onset and rime facilitates both decoding of words in reading and learning to spell and write words correctly (Durgunoglu & Öney, 2000).

Studies on literacy with respect to orthographic system in a given language report that the unique structure of orthography of different languages greatly impact the relationship between the orthography, phonology, morphology and meaning in the processing of print (Durgunoglu & Öney, 2000). For example, Turkish literacy skills appear to develop as they do in English. However as a result of different orthographies and phonologies, a few reading skills develop at different rates in the two languages. This is also true for German, Czech, and Italian monolingual speakers (Durgunoglu & Öney, 2000). They found that phonological awareness in Turkish only contributes to word recognition in the early stages of reading as it does in English. As word recognition skills become highly developed, only listening comprehension can differentiate between readers at different levels of reading comprehension (Öney, Peter, & Katz, 1997). Access to two languages and the possibility of contrasting those languages are insights that can facilitate understanding of literacy development (Durgunoglu & Öney, 2000).

2.4.3.2 Functional awareness/ written language awareness/ Print awareness

Expressive language is of two types- spoken and written. There is a notion that man acquired ability to use the spoken form of language before he learned to read and write (Diringer, 1962). Writing is clearly a system of human inter communication by means of conventional visible marks Gelb (1963). The study of written language has lagged well behind other literacy components such as listening, speaking, and reading, particularly with respect to the investigation of its development, behavioral expression, and neuro-cognitive underpinnings. Written language is more integrated and syntactically complex than spoken language. Writing competence is based on successful orchestration of many abilities, including those needed for lower level transcription skills as well as those essential for higher level composing abilities. Among those who model writing process, there is unanimous agreement that it is a complex process compared to speaking as it requires a high level of abstraction, elaboration, conscious reflection and self regulation (Bereiter & Scardanalia, 1987; Gombert, 1992; Graham & Harris, 1994). Written language awareness or orthographic awareness refers to the awareness of graphic representation in a language (Bialystok, 1997).

Print-related factors such as, understanding the functions and conventions of print, as well as understanding how print represents the spoken language (e.g., the alphabet and its mappings to the spoken language), are found to be specific to written language. Studies have shown that decoding (both word recognition and spelling) and functional awareness skills depend on print-related factors of a language. This meta-linguistic skill includes children's developing notions about the functions and conventions of written language. Through interactions with written language, children develop concepts about print (Clay, 1979). This awareness also includes an understanding of when and why print is used and the symbols of the language (e.g. alphabet). Print awareness and its functions are related to letter discrimination ability and phonological awareness (Lomax & McGee, 1987). Existing research suggests that structural characteristics of different writing systems influence the relationships between orthography, phonology, morphology and meaning in processing written language.

2.4.5 Rapid verbal naming skills

Apart from awareness to the phonological constituents of speech sounds or the characteristics of a writing system, the speed with which an individual performs on a phonological task serves as a measure of one's phonological processing abilities. Such a skill termed as Rapid verbal naming skill, generally measured through naming speed indicates phonological processing ability. Rapid verbal naming refers to the ability to rapidly name a small number of items as quickly as possible. Rapid naming ability is linked with phonological processing ability—namely, the ability to retrieve phonological codes from long-term memory (Wagner & Torgesen, 1987). Rapid verbal naming is otherwise also referred to as verbal fluency (Cohen, Morgan, Vaughn, Riccio & Hall, 1999). The most common verbal fluency tasks used in research are letter fluency, phonological fluency and semantic fluency. The term rapid naming is viewed by investigators as either rapid verbal naming, verbal fluency for letter, phonological, and/or semantic units and rapid automatized naming (RAN).

RAN tasks are found to be the most popular methods for assessing naming speed in children. It is considered and proved to be one of the best predictors of reading in children. In this view, naming speed uses the visual, auditory, and motor processes used in reading but in a less complex fashion. Developmentally it is found that naming through the RAN task is more crucial and a better predictor of reading in younger children than older children (McBride-Chang & Manis, 1996; Torgesen et al., 1997). Hence, in the present study rapid naming task is studied as assessing rapid verbal naming[3] (RVN) using a phonological fluency task in order to further assess phonological processing skill in children. A few researchers have found that

[3] Operational definition of rapid verbal naming (RVN): In the present study, RVN refers to the ability to rapidly name a small number of items (like naming as many words as possible with the phoneme /k/) as quickly as possible in a specified time with a given phoneme.

verbal fluency increases with age and approaches adult level by 10 years (Regard, Strauss, & Knapp, 1982) whereas others (Welsh, Pennington & Groisser, 1991) have reported that children as old as 12 years were significantly less fluent than the adult group suggesting that verbal fluency as measured by phonological fluency continues to develop into adolescence. Cohen et al,, (1999) have found that rapid verbal naming improves significantly between 6 and 12 years of age, thus indicating a developmental trend.

Naming speed differences across scripts have proved to be a crucial factor in predicting the reading ability of children learning to read and write in more than one language. Patel, Snowling and de Jong (2004) attempted to study orthographic and phonemic differences in two different languages with different script structures, English (following alphabetic script) and Dutch (following non-alphabetic script). They predicted reading ability of children in the age range of 7-11 years in these two languages through the rapid automatized naming (RAN) tasks. RAN task was tested separately for children with Dutch as the mother tongue and in children with English as the mother tongue. Reaction time measurements were done and they found that English reading children had a better rapid naming response time when compared to Dutch reading children. Research shows that rapid naming skill could be different in languages with different script structures.

Traditionally, rapid naming is interpreted as a phonological processing ability-namely, the ability to retrieve phonological codes from long-term memory (Wagner & Torgesen, 1987). According to this view, the deficit in rapid naming skills exhibited by dyslexic children and adults is just another manifestation of these individuals' well-known phonological difficulties. In contrast, Wolf and Bowers (1999) suggested that processing in rapid naming leads to a specific source of reading ability or disability, that is, a source that is independent of phonological processing. Their findings on rapid naming, as measured by continuous naming of familiar visual stimuli explains unique variation to reading and spelling ability, that is, variation that cannot be accounted for by differences in phoneme awareness.

There are reports to suggest that the effect of rapid naming skills may be limited to the beginning phases of alphabetic literacy acquisition. Torgesen et al., (1997) investigated the relative contribution of rapid naming and phoneme awareness to later reading ability in three developmental periods: from kindergarten to second grade, from first to third grade, and from second to fourth grade. They found that rapid naming skills contributed independent variation to word reading ability only in the first two developmental periods. McBride-Chang and Manis (1996) supported the view that rapid naming skills can differentiate poor v/s good readers or children at risk for reading difficulties (Ackerman & Dykman, 1993; Cornwall, 1992; Felton & Brown, 1990; Meyer, Wood, Hart, & Felton, 1998; Scarborough, 1998). There is evidence that among poor readers (Scarborough, 1998) and children at high-risk of developing reading difficulties (Felton & Brown, 1990), rapid naming is a better predictor of later reading ability than phoneme awareness.

Debate on the effect of rapid naming skills being limited to the beginning phases of alphabetic literacy acquisition is argued with the support of two theories. While Ehri (1992) argues that the ability to learn to read by phonological recoding plays a major role in learning about orthographic patterns at both the word and subword levels, Torgesen et al., (1997) found that rapid naming skills contributed independent variation to word reading ability in kindergarten to second grade and first to third grade developmental periods.

Wimmer (1993) and Wimmer, Maryinger, and Landerl (1998, 2000), study on dyslexic children shows different influences of rapid naming and phoneme awareness in more consistent orthographies. Dyslexic children exhibited severe naming speed deficit but little phonological recoding difficulties. Research with reference to rapid naming of familiar visual symbols indicates the ability to learn about the orthography of words through learning to code arbitrary symbol–name associations. According to Bowers and Wolf (1993), slow visual recognition of letters may jeopardize the formation of inter-letter associations at both the subword and word levels.

2.4.6 Reading skills

Reading is a complex cognitive process. It involves the co-ordination of a series of functions which include visual functions such as orthographic (word form) analyses and verbal or language functions such as phonological, semantic and syntactic coding in addition to other cognitive functions like memory, attention and motor skills. Various models are proposed to study reading and reading development in children. A few models are quoted in the following sections in order to understand development of reading in children.

i) Marsh, Friedman, Welch and Desberg (1981) proposed a model with four stages of development of reading in children (see Figure 2.3).

Stage 1: Linguistic Guessing

Children are able to read words if they are always presented in the same way. For example the first words that a child can read are often names of shops or brand names. The child cannot guess at words out of context but if given a context the child's guess will be based on syntactic and semantic information rather than any visual information from the target.

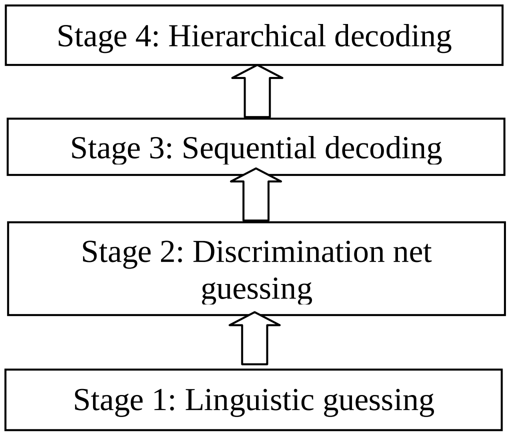

Figure 2.3: Schematic representation of Marsh et al., (1981) model

Stage 2: Discrimination net guessing

The child uses graphemic cues to recognise words but only to the extent that is necessary to differentiate all the words in the sight vocabulary. Reading errors are semantically, syntactically and graphemically based.

Stage 3: Sequential Decoding

The child begins to use grapheme phoneme correspondences. The child decodes words grapheme by grapheme from the left to the right. The child can still only cope with one-to-one correspondences and reading errors reflect this.

Stage 4: Hierarchical Decoding

Decoding is no longer grapheme by grapheme. Children can use analogies and conditional rules (such as ‘magic’).

ii) Frith’s Model (Frith, 1985)

Frith modified Marsh’s model in order to make more apparent the links with models of skilled reading. In Frith’s model new strategies are used in addition to older strategies rather than replacing them (see Figure 2.4).

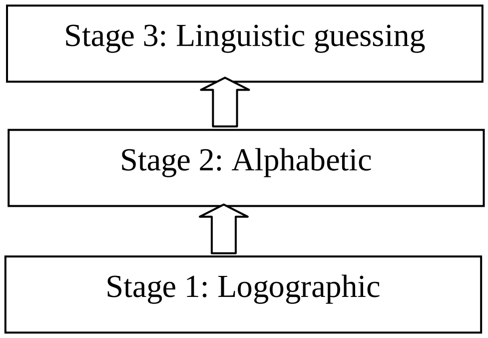

Figure 2.4: Schematic representation of Frith's (1985) model

Stage 1: Logographic

The child recognises words using salient graphic cues. The child cannot read novel or non-words.

Stage 2: Alphabetic

The child uses individual grapheme to phoneme correspondences. Later the child can use conditional rules.

Stage 3: Orthographic

The child recognises strings of letters and accesses pronunciations without decoding these strings. This is very much like analogy theory except the strings that the child uses are whole morphemes rather than onsets and rimes.

A number of researchers (Chall, 1979; Ehri, 1993, 1994) have developed stage models of reading development. There is a general acceptance among empirical researchers that the sequence of development of the word identification system moves from logographic to alphabetic to orthographic. In the first stage, the beginning reader learns to recognize a visual pattern by its shape (a letter landscape). The shape is recognized holistically, and significant alterations to the letter structure may be made without altering the child's response (e.g., Pepsi signs changed to Zepsi without beginning readers noticing any change). At this stage, the child has not learned to analyze the written word structure. The movement to the alphabetic stage is probably driven by the gradual awareness of speech segmentation which the child induces or is taught (Adams, 1990). This phoneme awareness may more readily be invoked in children whose earlier experiences have included a focus on the structure of the spoken word, albeit in larger units such as rhymes, syllables, onset and rimes. Some children do not develop this awareness unaided (Chall, 1989) and without assistance may remain at this early stage, reliant on memory of the letter landscapes or contextual guessing strategies (Spear-Swerling & Sternberg, 1994). Share and Stanovich (1995) believed that such readers find it difficult as the demands of a rapidly increasing visual vocabulary increase in middle to upper primary school.

In the alphabetic stage, simple letter pattern-to-sound conversion provides a means of decoding unknown words. Initially only partial letter-sound cues (Spear-Swerling & Sternberg, 1994) are employed until the insight to alphabets arrive (Byrne, 1991). This strategy becomes reliable, at least with regular words, and continues to provide some clues for irregular words (Goulandris & Snowling, 1995). In irregular words, it is vowels that are found to provide the quality of irregularity, but consonants remain regular for the most part, and it is the consonants that are most important in word recognition (Share & Stanovich, 1995). Hence this phonological recoding strategy enables cues for decoding a high proportion of words along the regular-irregular continuum.

Share (1995) opined that the alphabetic period is crucial and he opined that each successful decoding encounters with an unfamiliar word which provides an opportunity to acquire orthographic information specific to a word. And this becomes the foundation of skilled word recognition and spelling (Share & Stanovich, 1995). This gradual “lexicalization” occurs through repeated opportunities to use letter-sound correspondences for decoding. Share (1995) found that the strategy is used with less frequency as the range of familiar word patterns increases, through a self-teaching mechanism. The phonological recoding strategy is found to be useful for decoding unfamiliar words, and provides the opportunities for the formation of orthographic representations in reading.

2.4.6.1 Reading words

Research on word reading has distinguished several ways to read words (Ehri, 1991, 1994). Ehri (1994) found that decoding words which were never read before, involved transforming graphemes into phonemes and then blending the phonemes to form words with recognizable meanings. Letters might be individual letters, or digraphs such as TH, SH, or OI, or phonograms such as ER, IGHT, OW, or spellings of common rimes (the vowel and consonants that follow a beginning consonant in a word) such as -AP, -OT, -ICK. A second way to read words is by analogy to new words. Ehri (1992) reported that for individual words to be represented in memory, beginning readers are thought to form connections between graphemes and phonemes in the word. These connections bond spellings to their pronunciations in memory. Another way is prediction in which readers use context clues, their linguistic and background knowledge, and memory for the text to anticipate or guess the identities of unknown words. Text reading is found to be the easiest when readers have learned to read most of the words by sight because little attention or effort is required to process the words and this enables readers to attend to meaning.

Grabe (1991) found that the difficulty children face is when they have already read in their first language and some graphemes represent different sounds in the second language as between English and Spanish. For example, the /b/ in

English can be pronounced as either a /v/ or /b/ in Spanish, and the "i" in English as in the word "it" is pronounced in Spanish like the vowel in "eat." Children whose first language has a different orthography than English (e.g., Russian or Arabic speakers) are found to face an additional challenge. Rayner and Pollatsek (1989) have found that direction-of-reading, punctuation, and spacing differences between languages do not appear to cause difficulty. More than these aspects, they found that readers use context clues, their linguistic and background knowledge, and memory for the text to identify unknown words. Thus, they found that English speakers making initial attempts at reading, read words they know and sentences they could understand. They were found to use context and probabilities effectively, and could correct themselves efficiently. Rayner and Pollatsek (1989) speculated that Non-English speakers do not have this basis for knowing if they are reading correctly because the crucial meaning making process is affected by a lack of language knowledge.

Apart from reading the word or the text, it is important to read text quickly, accurately, and with proper expression which is nothing but the reading fluency. Thurlow and van den Broek (1997) believe that fluency extends beyond word recognition and may help the comprehension processes as well. Fluency requires the rapid use of punctuation, and the determination of where to place emphasis or where to pause to make sense of a text. Thus, fluency affects reading comprehension in the absence of utilizing cognitive resources for interpretation, but it is also implicated in the process of comprehension, as it necessarily includes preliminary steps for interpreting the text (Thurlow & van den Broek, 1997).

2.4.6.2 Reading comprehension

Efficient word recognition is associated with improved comprehension. Comprehension is the ability to interpret and understand the decoded words. The ability to comprehend what one reads is based on experience. According to the National Reading Panel (2000), an important development in theories of reading comprehension arose in the 1970s. Durkin (1993) believed that reading comprehension is passive, receptive process, but is more an intentional thinking during which meaning is constructed through interactions with text and reader. According to this view a reader reads a text to understand the text, construct memory representations that are understood, and to put this understanding to use (National Reading Panel, 2000). In doing this, the reader draws on background knowledge or knowledge of the world. The development of reading comprehension is not only critical to good literacy skills, but also to all academic learning. Reading comprehension is not a passive process, but it requires readers to think about the text they read. Reading comprehension is multifaceted and requires the synchrony of a number of reading related processes in order to derive meaning from text. To succeed at reading, a child is expected to identify or read printed words and to understand the story or text composed of those words. Both identifying words and understanding text are critical to reading success to Beimiller (2003).

Relationship between word decoding, fluency and reading comprehension is explored by Curtis (1980). She found that while word decoding and reading comprehension are very highly correlated in beginning readers, this correlation declines in the later grades, although it remains significant. This decline in the correlation may in part reflect the fact that some children make adequate early progress in word decoding during beginning reading instruction, but then fail in reading comprehension when the primary focus shifts from ‘learning to read’ to ‘reading to learn’ around the fourth grade (Catts, Hogan & Adolf, 2005; Leach, Scarborough & Riscorla, 2003; Scarborough, 2005). The existence of children who do not have problems in development of word reading accuracy and fluency but have problems in reading comprehension was noted by Oakhill (1994) and Yuill and Oakhill (1991). A number of studies in recent years have shown that these children appear to have deficits in all of the component skills of comprehension except word decoding (Cain, Oakhill & Bryant, 2000; Catts, Hogan & Fey, 2003; Nation, 2005; Oakhill, Cain & Bryant, 2003). These deficits demonstrate that reading comprehension deficits are not just byproducts of phonological and orthographic processing deficits, but may be an offshoot of deficits in decoding and comprehension skills (Perfetti, Landi & Oakhill, 2005; Scarborough, 2005).

Apart from these, Rayner and Pollatsek (1989) found that language structure may also play a role in comprehension. It is speculated that skilled readers may be using syntactic information unconsciously to make the reading process more efficient, for example by fixating on high-information items in the text. Bernhardt (1987) believed that because high information items differ from language to language, this practice can lead to inefficient fixation patterns when reading in a second language, perhaps disrupting the fluency that facilitates comprehension. Grabe (1991) also found evidence that language structure plays a role in reading in a second language. He has found that word-order variation, relative clause formation, complex noun phrases, and other complex structural differences among languages can mislead the ESL reader, especially in the early stages. Researchers (Garcia, 1991; Jiménez et al., 1995, 1996) have documented that bilingual children generally know less about topics in second language texts. Garcia (1991) reported that

Spanish-speaking Latino and monolingual Anglo (non-Latino White) children in fifth and sixth grades who were in the United States of America and in the same English-speaking classrooms for two years, differed in their background knowledge for standardized reading text passages. Latino students were found to know less about specific topics. When the differences in prior knowledge were controlled, the two groups were not found to differ significantly in reading test performance. Research has also found that comprehension is enhanced in both young and adult readers when what they read had culturally familiar content (Rigg, 1986; Steffenson & Anderson, 1979).

A series of studies find that the best entry into literacy is through the use of a child's native language (Clay, 1993; Snow, Burns, & Griffin, 1998). This is consistent with the research which was reported earlier noting the importance of establishing the sound-letter relationships and beginning to relate the structures of oral language to print, as well as oral comprehension to reading comprehension. Very young children in initial reading are found to use knowledge of these skills in their primary language (L1). Literacy in a child's home language provides knowledge, concepts and skills that transfer to reading in a second language (L2), e.g., English (Carter & Chatfield, 1986; Collier & Thomas, 1992; Cummins, 1989; Escamilla, 1987; Modiano, 1968; Rodríguez, 1988;). This is supported by research showing that proficiency in L1 literacy skills is highly correlated with the development of literacy skills in L2 (Collier & Thomas, 1992; Krashen & Biber, 1987; Leshere-Madrid & García, 1985; Ramírez, Yuen, & Ramey, 1991).

Researchers (Dochy, Segers, & Buehl, 1999; García, 1991; Stahl & Jacobson, 1986; Tobias, 1994) opined that reading comprehension among bilingual children increases as their familiarity with the topic increases. Durgunoglu & Öney

(2000) believed that in novice bilinguals, lexical links between two languages are stronger than conceptual links, making it easier to access lexical links. This implies that, in the early stages of literacy development in a second language, one may rely upon the first language to maximize conceptual development. In support of this, they found that word recognition in a second language develops faster when the concepts are first developed in the primary language.

2.4.7 Written language skills

Writing task is complex in nature. This requires the simultaneous use of semantic, syntactic, and graphophonic information within the framework of linguistic and non-linguistic factors such as graphomotor co-ordination. In a normal child the processes required for writing develop in an orderly pattern. By the time a child is approximately 6 years of age, he/she is ready to write with the development of skills for visual and auditory discrimination and visuo-motor integration. Hayes and Flower (1980, 1987) identified three stages of writing: *Planning stage* where the goals are set, ideas are generated and information is retrieved from long-term memory and then organized into a plan to write; the *Translation stage,* where the written language is produced from the representation in memory. The plan has to be turned into sentences; the *Reviewing stage*, where the writer reads and edits what is written. In the early primary grades text generation and writing quality are most constrained by a child's handwriting fluency (Berninger & Swanson, 1994). Because children who have not yet mastered handwriting must direct attention to letter formation, they do not generate much text. By the intermediate grades, when handwriting is automatised for most children, its constraint on text generation is minimized and written texts become longer with improvement in quality (Berninger & Swanson, 1994; Shanbal, 2003; Yeshoda, 1994).

Most of the studies of written language in children have compared various dimensions of writing in typical and atypical language learners and have concluded that children with language based disabilities exhibit reduced *written productivity* as measured by total number of words, total number of utterances or total number of ideas (Barenbaum, Newcomer & Nodine, 1987; Houck and Billingsley, 1989; Laughton & Morris, 1989; Puranik, Lambardino & Altmann, 2007; Scott and Windsor, 2000). Similarly children with language based disabilities have also shown difficulties in *writing complexity* as measured by average length of T-units, number of different words, and percentage of complex sentences(Fey, Catts, Proctor-Williams, Tombling & Zhang, 2004; Gillam & Johnston, 1992; Houck & Billingsley, 1989; Mackei & Dockrell, 2004; Morris & Crump, 1982; Puranik et al., 2007; Scott & Windsor, 2000), and *accuracy* as measured by number of spelling or mechanical errors and number of syntax errors (Altmann, Lombardino & Puranik, 2008; Mcarthur & Graham, 1987; Nelson & Van Meter, 2003; Puranik et al., 2007).

Further Berninger and her colleagues (Berninger, 1999; Berninger & Hooper, 1993; Berninger et al., 1992) have expanded this model to children. They proposed that translating process in children includes two subcomponents: text generation and transcription. These subcomponents are together called microstructural elements of writing (Scott, 2005). Text generation refers to the process by which the writer translates his or her planned ideas into meaningful chunks of sentences, phrases and words. Transcription refers to the actual mechanics of converting sentences, phrases and words into written symbols and includes spelling, handwriting, and punctuation. Berninger (2000) found that in elementary school children, translation constrains the planning and revising components of writing. Hunt (1965, 1970) and Loban (1976) collected developmental data on writing to understand the level of syntactic complexity in school age children from Grades 3 to 12. They provided the basic techniques for measurement of writing skills in children and their procedure helped in studying the discourse contexts like school compositions (Scott, 1988).

Although several researchers have used a variety of procedures to collect written language samples, interpretation and applicability of these procedures are limited as they do not explain the different tasks used in different situations to understand the progression of these skills in children (Scott, 1994; Scott & Windsor, 2000). There is no consensus in literature regarding the best way to collect a written language sample (Hudson, Lane & Mercer, 2005). Puranik, Lombarino and Altmann (2008) used a story retelling task to measure the microstructural elements of written language. The written language sample was collected from children in Grades 3 to 6. They included 9 measures, total number of words , total number of ideas expressed, number of T-units , mean length of T-unit, number of clauses, clause density, percentage of grammatical T-units, percentage of spelling errors, and writing conventions. Their analysis revealed that the above measures can be classified as *productivity*, *complexity* and *accuracy.* Their analysis suggested that there was a developmental trend observed in measures of productivity like total number of words and ideas. However, there was no trend reported for complexity and mixed results were observed for accuracy.

The study of written language and of its relationship to spoken language is crucial to any discussion on biliteracy (Francis, 1999). Research reports on language and literacy rejected the early versions which argue against the idea that writing is not language but its transcription. Studies on literacy in L1 and L2 emphasize on the importance of higher order processes associated with language structures. Francis (1999) found that written expression appeared to reflect into higher order processes for two reasons. First, metalinguistic awareness would play a greater role in composing tasks (Cummins, 1990). Second, widespread lexical borrowing (say from Spanish in Nahuatl writing) is a cue to examine the manipulation of language patterns that are peculiar to bilinguals, a phenomenon unique to biliteracy. Francis (1999) studied written language skills of 45 bilingual children who spoke Spanish and Nahuatl in the second, fourth and sixth grades in the local elementary school of Central Mexico. He reported that when writing Nahuatl, the children in the upper grades showed a tendency to avoid borrowing nouns and verbs from Spanish. The tendency to substitute Nahuatl vocabulary for Spanish content word borrowings in the fourth and sixth graders' Nahuatl written production is consistent with earlier findings (Francis, 1997) from the language dominance assessments. The opposite trend under the category of discourse connectors (prepositions, conjunction and adverbs) reflected the need on the part of the fourth and the sixth graders to resort to this linguistic device and to construct their more sophisticated narratives.

2.5 Literacy skills in Non-alphabetic scripts

All writing systems represent spoken language, but differences in the mappings between orthography, phonology and semantics give rise to three main types of scripts: alphabetic, syllabic, and morpho-syllabic. The scripts that are used for major European languages are all alphabetic, but there are small differences in their transparency (Goswami, Ziegler, Dalton & Schneider, 2001; Wimmer & Hummer, 1990). Ziegler and Goswami (2005) proposed the psycholingusitic grain size theory which suggests that differences in reading accuracy across languages reflect fundamental differences in the phonology of the languages and the reading strategies that are developed in response to orthography of that particular language. This is explained for more orthographically consistent alphabetic languages like

Greek, German, Spanish or Italian in comparison to less orthographically consistent alphabet language such as English. The orthographically consistent languages may rely more on grapheme-phoneme recoding strategies because grapheme-phoneme correspondences are relatively consistent, whereas in English, children cannot use smaller grain sizes as easily because inconsistency is found to be much higher for smaller grapheme units than for larger units (Treiman et al., 1995). As a result, for English, they need to use a variety of strategies supplementing grapheme-phoneme conversion strategies which can aid them in reading. Ziegler and Goswami (2005) believed that languages vary in the consistency with which phonology is represented in their orthography. According to them this can result in developmental differences in the grain size of lexical representations and accompanying differences in development of reading strategies in children across orthographies. Various researchers (Elbro & Pallesen, 2002; Perfetti, 1992; Wydell & Butterworth, 1999) discussed on the phonological system which is already structured prior to reading, and therefore the quality and grain size of phonological representations play a major role in reading acquisition prior to reading itself. Ziegler & Gosawmi (2005) opined that in the beginning of reading acquisition children face with three major problems-availability, consistency, and granularity of spelling-to-sound mappings (Figure 2.5).

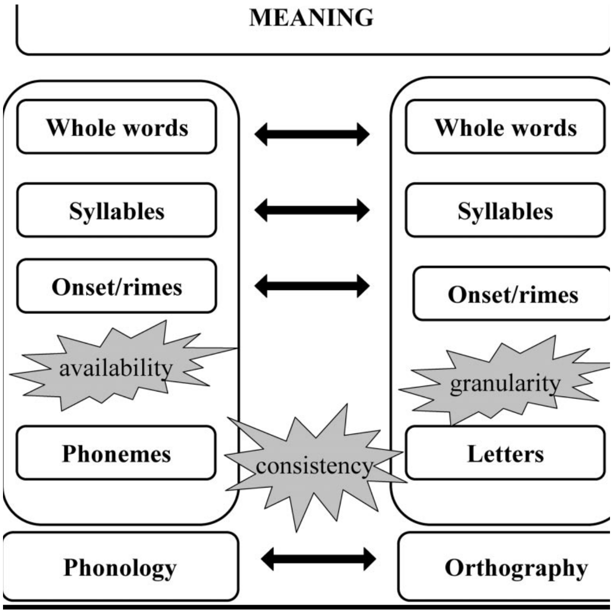

Figure 2.5: Schematic depiction of the three main problems of reading acquisition: availability, consistency, and granularity
(*Source:* Cited by Ziegler & Gosawmi, 2005)

Accordingly they defined each of these different levels of difficulty that can affect reading development. When there is difficulty at the *availability level*, all the phonological units are consciously inaccessible prior to reading. Consequently, connecting orthographic units to phonological units that are not available require cognitive development. Difficulty at the *consistency level* reflects that some orthographic units may have multiple pronunciations and that some phonological units may have multiple spellings (Glushko, 1979; Seidenberg & McClelland, 1989; Ziegler, Stone, & Jacobs, 1997). Both types of inconsistencies are assumed to slow reading development. Ziegler and Gosawmi (2005) opined that degree of inconsistency varies both between languages and for different types of orthographic units and are to lead to differences in reading development across languages. Finally, difficulty at the *granularity level* reflects that there are many more orthographic units to learn when access to the phonological system is based on bigger grain sizes as opposed to smaller grain sizes. That is, there are more words than there are syllables, more syllables than there are rimes, more rimes than there are graphemes, and more graphemes than there are letters.

The differences in scripts and association to various grain sizes have been reported in literature (Goswami, 1988, 1999; Hulme, Hatcher, Nation, Brown, Adams & Stuart, 2002). For example, in languages such as Japanese and Korean, the same words can be represented by more than one type of script (Shafiullah & Monsell, 1999; Vaid & Park, 1997). The scripts for many Indian languages are alphabet-syllabary hybrids (Prakash, Rekha, Nigam & Karanth, 1993, on Kannada; Vaid & Gupta, 2002, on Devanagari*)*. On the contrary, English, which follows alphabetic script, has shown a strong link between phonological awareness and literacy acquisition which is widely documented (Ehri, 1997; Goswami & Bryant, 1990; Rayner, Foorman, Perfetti, Pesetsky & Seidenberg, 2001; Wagner & Torgesen, 1987).

Orthographic complexity, differences in teaching methods and task demands may contribute to complexity in explaining the processing for English language. There is less agreement about whether beginners in English start with whole words followed by phonemes (Frith, 1985) or intermediate subsyllabic units such as onsets and rimes (Treiman & Zukowski, 1996). Multiple level models have been found to explain sub-lexical processing by skilled readers (Grainger & Jacobs, 1996; Shallice & Warrington, 1980; Taft, 1994). It may be that children learning to read and write English establish orthographic representations at several different levels, i.e., phoneme, onset-rime, syllable, morpheme, though not necessarily in that order. Treiman and Cassar (1996) found that even Grade 1 readers of English are less likely to omit the '*n'* when spelling bi-morphemic words such as 'tuned' than they are in mono-morphemic words such as 'brand'. This suggests that beginner spellers can sometimes use rudimentary knowledge of morphological relationships to support their spelling of final consonant clusters.

Development of phonological awareness in oral/aural language was found to be similar for children growing up in different linguistic settings and begins with syllables (Gombert, 1996; Goswami & Bryant, 1990; Mann, 1986). Whether progression is from the grapheme–phoneme level to the multi-graphemic level, i.e., *small to large units* (Ehri, 1997; Hulme et al., 2002) or vice-versa (i.e., large to small units, Goswami, 2002) is still being explored. But, the phoneme-syllable progression and /or the syllable-phoneme progression are found to be different for different languages and are not universal for all languages. This difference is also reported to be true across scripts (Goswami, 1999).

A study by Padakannaya, Rekha, Vaid and Joshi (2002) found that in children acquiring literacy in Kannada (a semi-syllabic Indo-Dravidian script) the optimal unit for beginners is the syllable, although only more proficient readers/spellers were found to manipulate phonemes. Cardoso-Martins (2001) who studied Brazilian children learning to read Portuguese, found that that children do not begin at the grapheme–phoneme level unless explicitly instructed in phonemic awareness. The results of both cross-linguistic studies are in consensus with Treiman's (1993) work on emergent spelling in English. Treiman showed that young children (six- and seven-year-olds) attempt to represent the phonological forms they perceive in speech when they first learn to write (Treiman, 1997; Treiman, Goswami, Tincoff & Leevers, 1997; Treiman & Tincoff, 1997). Padakannaya et al., (2002) showed that the more proficient the children are better is their ability to segment at the phoneme and syllable level in semi-syllabic Kannada. Developmental changes in skill transfer across languages in bilinguals are less known and need to be explored further.

2.6 Children with Learning Difficulties

Research has shown that most children learning to read ESL or EAL, show relatively little difficulty in developing skills in sounding words out and reading them aloud. Failure to do so after normal teaching is exceptional and, in a child learning may indicate literacy learning difficulties that are not just a result of speaking a different language at home (this presupposes adequate instruction). Cline and Shamsi (2000) reviewed literacy learning difficulties among children learning EAL. They found that children learning EAL showed greater difficulty than the monolingual learners in terms of vocabulary, syntactical knowledge, and cultural reference in the texts used by schools. Thus, their accuracy in reading words aloud was found to be superior to their ability to understand what they are reading, and their relative deficit compared to L1 readers was found to be greater in comprehension than in accuracy.

Obler (1989) enumerated some of the factors responsible for difference in the performance of literacy skills in bilingual biliterate children with dyslexia. These factors include,

- Orthographic structure of language (Chinese & Finish have different orthographic structure).
- Characteristics of the orthographic structures of languages (like direction of reading, idiographic vs. phonologic scripts).
- Factors in the course of acquisition of a second language like age of learning.
- Manner of learning the second language (oral or written).

- Order of acquisition of two different scripts (for example, Chinese first and then Finish).
- Use of the scripts in different situation.

Karanth (1992), as reviewed in the earlier sections, described two biliterate children with reading disability. Both were multilinguals learning to read and write three different scripts, one is an alphabetic script English and the other two were semi syllabic scripts Kannada and Hindi. She found more spelling and writing errors in English than Kannada or Hindi. Therefore she concluded that in developmental biliterate dyslexics, differential patterns may be seen in two or more scripts, depending upon strategies adopted for different scripts.

A situation where a child may fail to develop literacy in one language but not in another is known as *differential dyslexia* (Smythe & Everatt, 2002). Smythe (2002) attributed literacy difficulties to different underlying cognitive and linguistic causes and that cognitive and linguistic deficits that impact upon one language may not necessarily have the same effect in another language. Veii (2006) opined that, depending on the magnitude of the cognitive and linguistic demands of a language, a bilingual child is likely to present with symptoms of literacy difficulties in the language with more stringent cognitive and linguistic demands rather than in both languages. Findings from studies (Everatt, Smythe, Ocampo, & Veii, 2002; Ocampo, 2002; Veii, 2003) that investigated literacy difficulties in bilingual children appeared to point to the possibility that literacy difficulties may be language-specific. However, individuals presenting with differential literacy difficulties are found to be rare (Everatt, Smythe, Ocampo & Veii, 2002) and further studies are needed before conclusive evidence is found to confirm the existence, or the lack of, a differential diagnosis. Other studies examining differential dyslexia have provided some evidence for this phenomenon. Leker & Brian (1999) as described earlier reported of a patient who had an acquired reading difficulty in Hebrew but not in English. Wydell & Butterworth (1999) reported a single case of a child who showed evidence of dyslexia in English (L1) but not in Japanese (L2). Kline & Lee (1972) assessed children who were acquiring literacy in English and Chinese and found that the majority of the children had no problems with reading and writing in both the languages, some had trouble with English but not with Chinese while others had trouble with Chinese and not with English. Miller-Guron & Lundberg (1997) identified Swedish children who presented with dyslexia-like deficits in their Swedish (L1) but presented no such deficits in English (L2).

This evidence may be consistent with the script dependent hypothesis of Geva and Siegel (2000) i.e., literacy difficulties will vary from one language to another given the differences in the orthographic depth of the languages. However, a different interpretation of these findings may be reflecting different manifestations of literacy difficulties (dyslexia) across different orthographies; that is, literacy difficulties can occur in different languages or in two languages at the same time as a result of the same deficient cognitive-linguistic processing skills that may occur in both the languages. How these literacy difficulties manifest themselves, however, is considered a function of the orthographic depth of a given language (Veii, 2006; Veii & Everatt, 2005). Veii (2006) studied five Namibian bilingual school children with evidence of poor literacy skills in Grades 3 and 4. They studied their literacy development in Herero and English. These children showed deficiencies in the key areas associated with the development of literacy and literacy difficulties, namely, phonological awareness, verbal short-term memory, rapid naming, and repetition.

The above findings provided evidence for the central processing hypothesis that literacy difficulties are a function of deficient underlying cognitive and linguistic processing skills. However, the findings of two children also indicated acceptance to the script-dependent hypothesis. It was found that when these two children presented with L1 and L2 literacy difficulties at Time 1, by Time 2 only L2 literacy difficulties still persisted, confirming the view that literacy development in less transparent orthographies is slower besides being longer are more severe in nature. Herero which is a transparent, regular, or shallow orthography placed less demands on the cognitive and linguistic processing systems of a child in the process of developing literacy. In contrast, however, less transparent, deep, or irregular orthographies such as English placed much greater demands on a child's cognitive and linguistic processing systems. A situation where a child is developing literacy in two or more languages differing in orthographic depth may result in an uneven development of literacy in each or one of the languages. A child inherently at risk for literacy difficulties developing literacy in an irregular orthography may be at an even much greater disadvantage and, may as a result, be delayed in developing appropriate literacy skills, perhaps more so in the less transparent orthography (Veii, 2006; Veii & Everatt, 2005). Similar findings are expected in children with dyslexia, in the Indian context who learn two different scripts owing to the education policy[4].

[4] According to the Three Language Formula (TLF; Secondary Education Commission,1953; Central Advisory Board of Education & Conference of Chief Ministers (1967), children should be educated in three languages- first, second, and third languages. The forms of bilingual education in India are (a) use of mother tongue or first language as a medium of instruction & other languages as subjects, and (b) use of second language as (MI) and other languages as subjects.

2.7 Biliteracy in the Indian Context

The process of acquisition of literacy becomes complicated when there is a need to acquire languages following different writing systems. Later it is said that they originate from Brahmi. There are many languages which are spoken, written and read in India, but all the four different orthographic families of modern India—Indo-Aryan, Dravidian, Astro-Asiatic (Munda, Santali), and Tibeto-Burman have a common source in Brahmi and therefore share the same salient features. An Indian child's first language could be one of the Indo-Aryan languages like Hindi, Marathi, Gujarati or Punjabi or Dravidian languages like Kannada, Tamil, Telugu, Malayalam etc., which form the two major groups and the second language introduced in school is most often English. English as a second language is acquired once children start going to school with considerable skill in their first language. Bi/tri/multilingualism is a socio-cultural condition and cannot be ignored in India. Cross-linguistic studies suggest that reading skill develops at a different pace in different orthographies (Karanth, 2003). Less is known about how first language or mother tongue interacts with second language acquisition. Much needs to be learned concerning social factors such as number of languages spoken by the child, relative fluency in all the languages spoken, literacy level of parents, and the extent of preschool exposure to literacy (Karanth, 2001).

Apart from the above, the nature of orthography, its transparency and form of representation can influence the pattern of reading development. English follows an alphabetic and opaque script whereas languages with transparent orthographies like Italian, Spanish, German and Indian languages are considered as alphasyllabaries which depend heavily on grapheme-phoneme correspondence. Most of the research and theory building in reading has focused on alphabetic scripts and these theories do not fully apply the process of reading acquisition in languages with transparent orthographies. One difference between writing systems related to reading acquisition is that spelling to sound consistency varies across orthographies (Frost, Katz & Bentin, 1987). In some orthographies, one letter or letter cluster can have multiple pronunciations (e.g. English, Danish), whereas in others it is always pronounced the same way (e.g. Hindi, Greek, Italian, Spanish). Similarly, in some orthographies, a phoneme can have multiple spellings (e.g. English, French, Hebrew), whereas in others it is almost always spelled the same way (e.g. Hindi, Italian). It has been demonstrated that grapheme-phoneme recoding skills take longer to develop in less transparent orthographies like English taking about two years of reading experience as compared to more transparent orthographies like Spanish, Greek, Finnish for which word and nonword reading is acquitted in the middle of first grade (Seymor, Aro, & Erskine, 2003).

Indian scripts, derived from Brahmi, fall in between syllabic and alphabetic writing systems. The alphasyllabaries of India share some characteristics of alphabetic scripts yet are distinct since the basic unit of the script is the syllable and not phoneme. The basic written unit in Indian script is akshara that consists of one of three possibilities- an independent vowel, a consonant symbol with inherent or attached diacritic vowel and two or three consonants plus a vowel (Padakannaya & Mohanty, 2004). The transparency of akshara makes decoding simpler but the spatial configuration of akshara makes it time consuming to master.

A transparent orthography is believed to facilitate comprehension, as decoding is less demanding, for example reading comprehension of an Italian child is higher than that of English. But this cannot be generalized to Indian context as Indian children have more aksharas to learn and they need to master the akshara principle. Akshara awareness has been a good criterion for identification of good and poor readers. Writing systems which are alphabetic in nature with a small set of graphemes often have a high proportion of irregular words as compared to alphasyllabaries which have more number of graphemes with close correspondence to the phonemes. Script specific components are therefore, involved in literacy acquisition.

Literacy acquisition in children is studied in a sequence of three stages: logographic, alphabetic and orthographic phases of development. Frith (1985) proposed that children go though the logographic stage of reading while acquiring literacy in English language, while others (Wimmer & Goswami, 1994; Karanth & Prakash, 1996) believed that phonologically transparent orthographies such as German, Spanish or Hindi do not depend on logographic reading. Orthographic sensitivity is a crucial factor in fluent reading and it does not seem to achieve below a certain age or extent of exposure to the language (Posner & Kar, personal communication). Also, there may be a difference between the processes of reading acquisition in transparent orthographies including Indian scripts as opposed to opaque languages like English. Children are observed to make more spelling errors on vowels than consonants in English. But in transparent scripts such as Italian and German, more spelling errors are committed on consonants than vowels. Generalizing Italian and German findings to Indian context is not appropriate because studies in India show that children commit more mistakes on vowel part of the akshara in Indian orthographies like Gujarati (Patel, 2004).

Another significant finding is that phonological awareness that is crucial for reading alphabetic scripts is neither crucial nor necessary for successful reading acquisition in transparent writing systems. In a study on Indian population with monoliterates, nonliterates and biliterates (Hindi and English or Kannada and English) on tasks like rhyme recognition, syllable deletion, and phoneme deletion it was observed that only biliterates performed well on phoneme awareness tasks, others performed well on syllable deletion and rhyme recognition tasks (Karanth, 1998; Prakash & Rekha, 1992). In one of the studies (Anurag, Kar & Srinivasan, personal communication) it was found that poor readers (first grade children) outperformed good readers on syllable awareness tasks in Hindi and English whereas poor readers performed very poor on phoneme deletion and reversal tasks in English language. It was also reported that performance on phoneme tasks in English was better than on phoneme tasks in Hindi. These findings suggest that the reader while learning English and an Indian script may incorporate different psycholinguistic processes. Transparent orthographies may demand different strategies when, as in Hindi, the basic unit is a syllable and not a phoneme. In another study on bi/multilingual adults it was observed that differences in phonological awareness relates to whether a particular language being tested is one L1, L2 or L3.

Considering the differences in script features, Karanth (2006) opined on teaching of reading based on script specific methods. The teaching methods followed for alphabetic scripts as opposed to transparent orthographies could be different. Models derived from studies of English have proposed phonics and the method of teaching how to read and this may not be appropriate for transparent orthographies, as it would mean teaching aksharas like alphabets. A reader of an Indian script does not learn the vowel component and consonant component separately and then combine them to form a syllable. Rather, the child first learns the basic syllabary with primary forms of vowels and consonants and then the entire syllabary containing all possible CV combinations is taught by rote (Karanth, 2006). These aspects are specific to literacy acquisition in Indian context as far as Indian scripts are concerned. An Indian reader also acquires alphabetic script of English language from the time the child enters school at 4 years of age. English being alphabetic may require a different method of teaching reading. Moreover, one must also consider the fact that the child has the vocabulary and mental lexicon for his/her first language. Differences between languages in multilingual persons could be specifically related to the script of the respective languages (Chengappa et al., 2004). In case of biliteracy i.e., literacy acquisition in first and second language, the child is put in a situation of cross linguistic switching which would involve inhibition, conflict resolution between competing languages when it comes to speaking, reading or comprehension.

Bilingual education or biliteracy refers to the use of two or more languages in education i.e., as an instructional medium and as a curricular subject (Devaki, 1988). According to the information reported by Chaturvedi and Singh (1981), the multilingual nature of India is evident from the fact that they recorded over 200 languages, out of which 15 languages were scheduled as national languages, 58 included in the school curriculum and 47 used as media of instructions in schools. India has preserved such a sort of diversity through various means, one of them being through the system of education in schools. This is by implementing the three-language formula (TLF) through commissions like the Secondary Education Commission (1953), Central Advisory Board of Education & Conference of Chief Ministers (1967). According to TLF, children should be educated in three languages- first, second, and third languages. There are three forms of bilingual education in India namely (a) use of mother tongue or first language as a medium of instruction

& other languages as subjects, (b) use of second language as (MI) and other languages as subjects and (c) use of two languages as medium of instruction (MI). In such an educational system children with different language backgrounds who are monolingual initially enroll to the schools. Due to the prevailing educational policy in India these children have to learn to read and write in at least three languages in school in majority of states of India. These children are required to become bilinguals or multilinguals and biliterates or multiliterates in due course of their learning at school (Prema, Shanbal & Khurana, 2010).

In the 1981 census, 202,400 persons (0.3 percent of the population) gave English as their first language. Less than 1 percent gave English as their second language while 14 percent were reported as bilingual in two of India's many languages. However, the census did not allow for recording more than one second language and is suspected of having significantly underrepresented bilingualism and multilingualism. There are estimates of about 3 percent (some 27 million people) for the number of literates in English. The 1981 census reported 13.3 percent of the population as bilingual (Devaki, 1990).

English as a prestige language and the language of first choice continues to serve as the medium of instruction in elite schools. All large cities and many smaller cities have private, English-language middle schools and high schools. Imposition of such policy on schools in India is inevitable due to the globalization and other related factors. Bilingual education in multilingual India is of two types. In the first type, the mother tongue is used as a medium of instruction and other languages are taught as subjects, the second type, a second language (like English) is used as medium of instruction. However, the impact of these policies on children developing literacy skills and the influence of two or more languages need to be studied extensively in order to derive a consensus on teaching biliterate children in India. Literacy skills in biliterates in India with diverse script structures are less investigated. Hence, there is a need to study the above and orient the educational policy makers in India towards framing policies for biliterate children. In the recent years, acquisition of literacy in Indian children has received much attention by researchers and educationists. But, a realistic estimate of the prevalence of literacy failures in school children is yet to be made. The estimate suffers from intrinsic factors such as lack of proper definition, failure to incorporate factors that contribute to literacy failures. Influence of language and cultural factors appear to be totally ignored in these surveys.

Of late, the number of children with literacy failures who avail consultation from Speech-Language Pathologist is increasing possibly due to the most prevalent language and cultural diversity in India. Among those who report, not everybody manifests typical literacy failures with disability. There are many children who are backward/slow in reading due to factors not directly related to literacy. Majority of these children happen to be from monolingual community, a few others from bi/multilingual community learning to become biliterate. Given the peculiar situation that exists in our country, it becomes mandatory to develop a tool to assess biliterate children in order to understand the typical characteristics of children with literacy failure and those with learning disability[5].

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[5] The World Federation of Neurology definition- Learning disability is difficulty in learning to read and later by erratic spelling and lack of facility in manipulating written as opposed to spoken words. The condition is cognitive in essence and usually genetically determined. It is not due to intellectual inadequacy, or to lack of socio-cultural opportunity, or to emotional factors, or to any known structural brain defect. It probably represents a specific maturational defect, which tends to lessen as child gets older and is capable of considerable improvement, especially when appropriate remedial help is afforded at the earliest opportunity (Cited from Critchley, 1978).

2.8.1 Need for the study

Majority of research on reading pertains to the reading of monolingual speakers of English. However, this body of research has provided an initiation to understand second language (L2) acquisition in children. Research (National Reading Panel [NRP], 2000; Rand Reading Study Group, 2002; Snow, Burns, & Griffin, 1998) has shown that there is a high degree of convergence on the fundamental components in early stages of reading in L1, such as alphabetics (phonemic awareness and phonics), fluency, vocabulary, and comprehension. These components are found to be relevant to the study of L2 reading but vary due to the differences of a second language learner's knowledge of two languages. Studies report that there is the complexity of learning to read when the learner is not natively proficient in the language. It is reported that since the language of written texts maps onto oral language, L2 learners need to develop some proficiency in the target language (Alderson, 1984). These children need to become aware of the implicit knowledge and norms associated with literate language use as in the native speakers of a language. Also, reports suggest that the L2 learner may have an advantage of accessing knowledge and skills unavailable to the monolingual speaker, including enhanced metalinguistic awareness, code-switching, translation, and, if L1 and L2 are linguistically related languages, knowledge of cognates, etc. Third, for learners who are already literate, some skills are found to transfer to reading in the second language. Finally, other factors like socio-cultural and sociopolitical factors have often been found to play a mediating role in the education of L2 learners and their reading development.

The rationale for the present study followed that of previous work (example Geva & Siegel, 2000; Gholamain & Geva, 1999) who proposed specific predictions based on the script dependent and central processing hypotheses. The script dependent viewpoint argues for faster rates of literacy acquisition with a more transparent orthography. Faster rates of literacy development with a transparent orthography may be particularly evident when grapheme-phoneme decoding is assessed. Script dependent hypothesis also suggests that if the scripts of languages vary in the depth of orthography, reading ability/disability in one language need not be accompanied by similar levels of ability/ disability in another language. It is reported that a child with good reading skills who uses a more transparent orthography need not show the same level of ability with a less transparent script. This may be particularly the case when decoding ability is assessed. Research has shown that individuals with English language literacy disabilities (dyslexia) show evidence of deficits in applying symbol to sound conversion strategies when reading, a deficit that may be related to poor phonological skills but which may be less common in languages with a more transparent orthography (Rack, Snowling & Olson, 1992; Siegel, 1993; Snowling, 2000; Stanovich, 1988).

Keeping in mind the inherent nature of languages and scripts and their influence on acquisition of literacy, it becomes even more essential to study biliteracy acquisition in the Indian context. Children in India follow an education system in which when the mother tongue (such as Kannada) is used as a medium of instruction and other languages are taught as subjects or second language such as English) is used as medium of instruction with the mother tongue (say Kannada) is only taught as a subject. As mentioned earlier, imposition of such a bilingual education policy on schools in India has brought in constraints on the choice of languages in education although it is widely accepted that globalization is possible through the English language. In turn, teaching English as a second language has become a serious issue for schools in India in order to help children think effectively and operate globally in their future in different endeavors in their lives. However, the impact of these policies on children developing literacy skills and the influence of two or more languages need to be studied extensively in order to derive a consensus on teaching biliterate children in India. Literacy skills in biliterates in India learning to be literate in two or three languages that have diverse script structures are less investigated. Hence, there is a need to study the above and orient the educational policy makers in India towards framing policies for biliterate children.

There are reports in the Western literature on the use of two or more languages in schools for the purpose of education. These languages include Spanish, Hebrew, Hispanic, Turkish, Chinese, etc. As seen in the literature such studies are extensively done in nations like the United States of America, where a huge number of immigrants from different parts of the world are found to encounter wide range of problems with respect to learning English. Similarly as mentioned earlier, India is a nation with a history of cultural and linguistic diversity. Hence, biliteracy or multiliteracy in schools is an accepted scenario in the present Indian context as in a few other countries of the world and here, children are exposed not to one language but to two or more languages for literacy skills. Literature suggests that there is a possibility of differential development of literacy in different languages. A child may perform well in some of the literacy skills in one particular language and perform poorly in few others in the other languages. There are reports on differential development of literacy in a few languages like Spanish, Turkish and Hebrew, which follow the syllabic system in script in contrast to English, which is alphabetic.

However, such studies are limited in the Indian context and there is a need to study and understand the pattern of biliteracy acquisition in Indian children.

In the recent years, acquisition of literacy in Indian children has received much attention by researchers and educationists. But, a realistic estimate of the prevalence of literacy failures in school children is yet to be made. Majority of literacy failures in school children may be due to factors such as language and cultural factors (Prema, Shanbal & Khurana, 2010) but may not be the disability in the real sense. Of late, the number of children with literacy failures who avail consultation from Speech-Language Pathologists is increasing possibly due to the most prevalent language and cultural diversity in India. Among those who report, not everybody manifests typical literacy failures with disability. There are many children who are behind/slow in reading and writing due to factors not directly related to literacy. Majority of these children happen to be from monolingual community, a few others from bi/multilingual community learning to become biliterate. Hence, it is challenging yet, necessary to understand the pattern of literacy acquisition in biliterate children especially in a multilingual and multicultural nation like India where factors influence literacy acquisition as well as literacy failures in children.

It is well known that language and literacy skills are closely related to each other. On one hand, the components of language such as listening comprehension, phonological awareness and rapid verbal naming subserve acquisition of literacy. On the other hand, the script specific aspects such as phonemic, syllabic or morphemic structure of a script for decoding or writing subserve learning language with all its complexities. Thus, language and literacy are related to each other as language or literacy learning is largely considered as a mastery of phonological, morphological (word), syntactic and semantic aspects of spoken and written language. Broadly researchers divide language skills itself into two broad groups, while listening and reading are considered receptive skills that of speaking and writing are considered as expressive skills. Hence, it is the responsibility of a Speech-Language Pathologist to investigate the phenomenon of acquisition of literacy or biliteracy, more so in the Indian context given the peculiarities of Indian languages and scripts. In order to study acquisition of biliteracy in children in the Indian context, there is a need to develop a tool for the said purpose and examine the relevance of skills for acquisition of literacy in a language with a transparent script (Kannada) and that with an opaque script (English) that are taught across schools in Karnataka state, India. Efforts in the above direction will also help in the development of a model for biliteracy in Indian context, thus contributing to the existing theoretical information.

Research questions and aims of the study

1. Is there a developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII?

- The primary objective was to study the developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII.

2. Is there a need to develop an assessment battery for Biliterate Children?

- In order to achieve the primary objective of the study, the secondary objective of the study taken up was to develop a tool to assess biliterate children (ABC).

3. Do the existing models of literacy acquisition hold good for biliterate children?

- The data obtained on ABC tool would be examined for patterns of responses in order to compare with the existing models of literacy acquisition. Hence, the tertiary objective of the study was to derive a model of literacy acquisition in biliterate children, which will contribute to the existing models for biliteracy development.

4. If a differential pattern of literacy acquisition exists in biliterate children, what is its relevance to biliterate children with learning disability (CLD)?

- An extended objective of the study was to examine a small group of clinical population (children with learning disability-CLD) in order to check for the relevance of ABC tool for clinical purposes.

CHAPTER 3: METHOD

Acquisition of literacy skills in Kannada-English (K-E) biliterate children was studied by employing a cross-sectional normative research design. Kannada-English biliterate children from Grade V to Grade VII were selected for the study on the basis of random stratified sampling procedure. The selected participants were administered tool for Assessment of Biliterate children (ABC). The data was subjected to statistical analyses to study the acquisition of literacy skills in K-E biliterate children. In order to examine the above issue, the study was conceptualized and conducted in three phases as follows:

Phase I: Survey-For selection of participants to the study

Phase II: Selection of skills and tasks for the ABC tool

Phase III: Administration of the ABC tool on the selected participants followed by data analysis and report generation.

3.1 Phase I: Survey for Selection of Participants

The objective of conducting the survey was to select Kannada-English biliterate[6] children by exploring the language background of children studying in different schools of Mysore city. This survey[7] was taken up to estimate the number of Kannada-English biliterate children present in schools. Hundred children from Grades V, VI and VII studying in English medium from three different schools in Mysore city participated in this survey. Among the hundred children, ten children

[6]Biliterate children in the present study are those children who learnt to read and write Kannada and English in school with English as the medium of instruction.

[7] The survey report was published in Shanbal, J. C & Prema, K.S. (2007). Languages of School going Children: A Sample Survey in Mysore. *Language in India (online journal)* www.languageinindia.com.

reported that they had either Telugu, Malayalam, Tamil or Hindi as home language and ninety children reported that the home language was Kannada as indicated by the results of survey. Therefore, ninety children from Grades V, VI and VII (in the age range of 10 to 12 years) who had Kannada as their home language were selected for the study. None of these children had any history of developmental delay, language delay, and/or significant health problems as per their school records.

Although children received instructions in their schools in English with Kannada as their home language, it is quite likely that the usage of language/s by children would not be uniform owing to the unique socio-demographic status that exists in India. Therefore, in order to collect information on the usage of language/s that the children understand, speak, read and write, another survey specifically on language use was conducted. For this purpose two questionnaires were developed – one for parents and another for teachers. These questionnaires were adapted from Gutierrez-Clellen and Kreiter (2003) and Restrepo's (1998) (see Appendix I (a) and I (b). The parent questionnaire comprised of ten questions and was designed to determine the child's number of years of exposure to English language, number of language(s) spoken at home, and language(s) spoken in other settings such as school. Parents were asked to indicate what languages the child was exposed to and the percentage of time the child used those languages to interact with each member of the family. In addition, parents were asked to rate the frequency of usage of languages spoken by members of the family whom the child interacted with (0%- indicates 'Never', 25%- Rarely, 50%- Sometimes, 75%- Most of the time, 100% - Always). The results of the survey showed that 67.9% children used Kannada as their native language, followed by Tamil (9.4%), Hindi (9.4%), Malayalam (7.5%)

and Telugu (5.7%). The results also indicated that 90.6% of the families used English occasionally for communication at home.

The teacher questionnaire contained three questions to obtain an estimate of the child's language use and knowledge for each language using a 5-point rating scale for each measure (0 = *no use or knowledge*, 4 = *use all the time and native like proficiency*). In addition, the teachers were also asked to estimate the percentage of time the child was exposed to each language as a measure of language input at school (see Appendix I (b). Further, 90.6% reported that the language/s used by children in school for communication with friends was Kannada but 9.4% reported the use of English. However, 100% of the parents and teachers reported that English was used for teaching literacy skills in schools. The survey report revealed that despite English being the medium of instruction in school, English was used occasionally for the purpose of communication by the children at home.

The selected group was further examined on the following criteria in order to have a uniform group of participants for the study.

- A minimum of 75% in using Kannada (native language) at home as rated by the parents. This was based on survey data in which the parents had indicated 75% (but never 100%) of the conversation with children as being in the native language at home.
- A minimum of 25% in using English language as rated by the parents. This was based on survey data in which the parents had indicated 25% of the conversation with children was in English language at home.
- A minimum of five years of exposure and learning English language at school. The cut off for years of exposure to a second language was set at five

based on Cummins' findings that it takes approximately 3–4 years to achieve basic social language competencies in any given language (Cummins, 1984).

- A minimum score of '3' for language use in the target language as rated by the teacher. A rating of 3 for language use (i.e., child uses the indicated language sometimes, hears it most of the time) and knowledge (i.e., good knowledge with some grammatical errors, some social and academic vocabulary, understands most of what is said) was selected which indicated that children who have good knowledge of a language may not use it in certain contexts (e.g., English in school, Kannada at home; English for academic discourse, Kannada for conversational discourse).
- Children from schools following the scheme of Karnataka State Board were selected to maintain uniformity in the curriculum and the method of instruction across the schools.
- Children with at least 5 years of exposure to reading and writing in Kannada.
- Children with normal hearing, language, intelligence and behavior as per the checklist and the screening measures[8] adopted for the study.
- Children from Grade V through Grade VII were selected since the Karnataka State Board introduces English as the medium of instruction only from Grade V thus facilitating biliteracy in a formal school setting.
- Children who did not have any history of failure in academics as reported by

[8] Screening measures: The following screening instruments were used to screen the participants for normal abilities.

- Listening: Screening Checklist for Auditory Processing in Children- Yathiraj and Mascerenhas (2003) was used to screen the participants for any auditory processing disorders.
- Ling's six sound speech perception test (Ling, 1989) was used to screen the children for listening abilities- /a/, /i/, /u/, /sh/, /s/, /r/ and /m/.
- Language: Linguistic Profile Test in Kannada (Karanth, 1980) was used to screen children for language abilities.
- Intelligence: Gessel's Drawing Test (Gessel, 1973) was used to screen children for intelligence.
- Vision: Snellen's Chart (Snellen, 1862) was used to screen the participants for vision.

the teachers and parents and information collected through the survey questionnaires (Appendices Ia and Ib).

A sample size statistics was done by employing a power analysis (Machin, Campbell, Fayer & Pinol, 1997). The following formula was adopted for the analysis.

$$m = \frac{2 \times [z(1-\alpha/2) + z(1-\beta)]^2}{\Delta^2}$$

Where m is the sample size,

$z(1-\alpha)$ is a constant value of 3.2905 at 0.1% significance level,

$z(1-\beta)$ is a constant value of 1.6449 at 95% of power, and

Δ is the standardized difference i.e. difference between the means divided by the standard deviation.

$\Delta^2 = 0.394$

m= 25.05

Using the formula 'm' value was found to be 25.05, so a rounded number 25 may be considered as sample size. However a larger sample size of 30 was included to match the minimum criteria for a large sample size within a group. Hence, 30 participants in each grade (Grades V, VI and VII) were included. A total of ninety children selected as participants met the above criteria and hence were treated as cohort group for the study. All the ninety participants met the above criteria for selection of participants for the present study.

3.2 Phase II: Selection of skills and tasks for ABC tool

The ABC tool was developed after reviewing literature on the literacy related skills and acquisition of literacy skills in biliterate children. The aim of the proposed doctoral research was to study acquisition of biliteracy in the Indian context and also to examine if listening skills, phonological awareness, rapid verbal naming, reading and written language skills reported in the literature are necessary in the Indian context. Therefore, literacy related skills that are reported as crucial for reading and writing (Gholamain & Geva, 1999; Lundberg, 1998; Snowling & Nation, 1997; Veii & Everatt, 2005) were selected and the test stimuli were developed in both Kannada and English. Geva and Siegel (2000) opine that it is not easy to match two different languages along all dimensions like word length, word frequency, syllable length and structure. The structure of English and Kannada being different from each other on many dimensions, it was not considered appropriate to develop stimuli in the two languages based on word length. Therefore, familiarity of test stimuli was subjected to rating by qualified professionals as detailed in later sections. The rationale for the selection of skills with supporting literature along with the test items for each of the skills selected (listening skills, phonological awareness skills, rapid naming skills, reading skills and written language skills) is explained in the following section.

3.2.1 Listening Skills: Listening skill has been considered as an important skill for language comprehension. Children use their listening skill, listening to speech sounds in particular, to understand what has been taught in school. Literature suggests that intact listening skill is a pre-requisite to literacy development in children. There are evidences to show that listening difficulties have led to reading deficits in children (Peer, 1999; Peer & Reid, 2000; Smythe & Everatt, 2000). Hence, measure of phoneme (smaller units of speech) discrimination was used as a measure to assess listening. Yet another measure which is found to be crucial for understanding spoken language is listening comprehension. This is also found to be an important predictor of reading development in children (Veii & Everatt, 2005). Therefore, in order to test listening skills, two subtests- phoneme discrimination test and listening comprehension test in Kannada and English were developed as part of ABC tool.

i) Phoneme discrimination test in Kannada and English

There is evidence that auditory difficulties lead to reading deficits that may manifest as phonological deficits (Peer, 1999; Peer & Reid, 2000; Smythe & Everatt, 2002) in children. Veii and Everatt (2005) reported that phoneme discrimination would become an important skill when considering children learning a second language especially when the second language does not share similar phonological properties as the first or the native language of a child. Further, differences in the sounds recognized in the first and the second language along with the other factors like vocabulary in each of the languages, interference across languages, may influence development of literacy skills in biliterate children[9]. Hence, tests for phoneme discrimination in Kannada and English were developed to assess their significance to literacy acquisition in biliterate children.

15 minimal paired words that differ by one or more features of either place and/or manner were listed for phoneme discrimination test. Care was exercised to

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[9] ***An operational definition of biliteracy:*** 'Biliteracy' or 'bilingual literacy' in our context (study) refers to *sequential acquisition* of languages to learn literacy skills at home and in schools. Here, the first acquired language i.e. L1 is the native language of the child and the language the child acquires after that at school is considered second language or L2. In the context of the present study, Kannada becomes L1 and English becomes L2.

include majority of the phonemes that appear in meaningful words in each of the languages. The stimuli were subjected to verification by Speech-Language Pathologists, Audiologists and Educators. See Table 3.1 for items of phoneme discrimination subtest[10].

ii) Listening Comprehension test in Kannada and English

Listening comprehension is used as a measure of language ability which can assess children's comprehension of spoken language. A child has to understand the spoken language and also know how this spoken language is represented in written form in order to learn to read and write fluently (Juel, Griffith, & Gough, 1986; Perfetti, 1985). Series of studies conducted by Veii and Everatt (2005) have found listening comprehension to be a potential predictor to literacy in languages like Herero and English that differ in terms of transparency of their written form. While English has poor correspondence between grapheme and phoneme, Herero shows good correspondence between the two, similar to that reported for Kannada. Since, there are reported differences in phonology and orthography between English and Kannada language, listening comprehension test is included in the ABC tool to examine the acquisition of literacy skills in biliterate children.

In the present study, test material for listening comprehension consisted of three short passages presented in Kannada and three in English. All the passages comprised subject matter that was culturally familiar to the participants. Basis for framing questions was taken from that of Potts and Peterson (1985), and also from Hannon and Daneman (2001) who developed a tool to study different component processes of comprehension. Support was also taken from the information collected

[10] For e.g.,
In English subtest, /braun/-/kraun/, /ræmp/- læmp/
In Kannada test, /kappe/-/katte/ (frog-donkey), /ka:ru/-/ka:lu/ (car-leg)

from Diagnostic Assessment of Reading Comprehension (DARC) in Spanish (August, Francis & Calderon, 2003). Accordingly a series of questions were framed to assess different levels of listening comprehension such as text memory (TM), background knowledge (BK), text integration (TI) and text inference (TINF) of the selected passages. The questions were subjected to verification by Speech-Language Pathologists and Educators. The test included a total of 12 questions for each language. See Table 3.1 for a summary of listening comprehension subtests.

Table 3.1: *Tests for Listening skills*

Sl.No.	Listening Tests	No. of items	Description
(a)	Phoneme discrimination test	40 minimal pair words for phoneme discrimination	Phoneme discrimination subtest consisted of 40 items. This included almost all the phonemes of each of the languages and their possible minimal pairs along with the catch items.
(b)	Listening Comprehension test	3 passages with 4 questions each = 12 questions in each language	This subtest included 3 passages arranged in a hierarchy of difficulty in terms of terms of the mean length of utterance, vocabulary and syntactic structures.

3.2.2 Phonological Awareness test in Kannada and English

Phonological awareness refers to the ability of a child to appreciate the sound structure of words in a language. Studies on phonological awareness in English and other languages in separate groups of children (Borzone de Manrique & Signorini, 1994; Caravolas & Bruck, 1993; Cossu et al, 1995) have shown that phonological awareness in a particular language is necessarily linked to the sound system of that language. Different processes at different phonological levels have been found to contribute to reading in differing languages/script (Everatt et al., 2004; Miller-Guron & Lundberg, 2000). Stuart-Smith & Martin (1999) studied phonological awareness in English and Punjabi in Birmingham, United Kingdom. They assessed phonological awareness in both the languages to study the effect of one language on the other. They found that some of the features are language specific and this was also reflected in their literacy skills.

In the present study, three skills were selected to test phonological awareness - the segmentation, deletion and blending skills. Two lists of fifteen words and fifteen nonwords each were prepared in both Kannada and English. These non-words were derived from the true words selected from the text books. The non-words were formed by substituting or transposing letters in the word to produce a pronounceable letter string that conformed to the phonotactic rules of the language under study[11]. The stimuli were subjected to verification by Speech-Language Pathologists and Educators. See Table 3.2 on summary for phonological awareness test.

[11] For e.g., /memoraiz-pemoraiz/ in English and /kΛru-tʃΛru/ in Kannada.

Table 3.2: *Test for Phonological awareness*

Sl.No.	Phonological awareness tasks	No. of items	Total no. of items	Description
(a)	Segmentation	i) Syllable tasks 15 words 15 non-words ii)Phoneme tasks 15 words 15 non-words	60	-The child was asked to segment the words/nonwords into syllables. E.g. 'battle' can be segmented into two syllables /bæ:/ and /ʈʌl/ - The child was asked to segment the words/nonwords into phonemes. E.g. For e.g. 'cat' can be segmented into /k/, /æ/, and /ʈ/
(b)	Deletion	(i) Syllable tasks 15 words 15 non-words (ii)Phoneme tasks 15 words 15 non-words	60	-. The child was asked to delete a syllable and say the remaining part of the word/nonword. E.g. Remove /pil/ from /pillo/ only /lo:/ is left. - The child was asked to delete a phoneme and say the remaining part of the word/nonword. E.g. Remove /ɖ/ from /ɖɔg/ then /ɔg/ left.
(c)	Blending	(i) Syllable tasks 15 words 15 non-words (ii) Phoneme tasks 15 words 15 non-words	60	- The child was asked to blend syllables to get a target word/nonword. E.g. /æ/ ----- *blend*----- /pʌl/ *is* /æpʌl/ - The child was asked to blend phonemes to get a target word/nonword. E.g. /T/ ---*blend*---- /e:k/ *is* /ʈe:k/

3.2.3 Rapid Verbal Naming test in Kannada and English

Rapid automatized naming (RAN) refers to the ability to rapidly name a small number of items (colors, numbers, letters, or objects) as quickly as possible. Rapid naming ability has been linked with phonological processing ability—namely, the ability to retrieve phonological codes from long-term memory (Wagner &

Torgesen, 1987). Poor rapid naming ability is also identified as a crucial factor to predict reading failures. Around 90% of children with reading difficulties are reported to show deficits in phonological processing that influences rapid naming ability (Hynd & Cohen, 1983; Lombardino, Riccio, Hynd & Pinheiro, 1997). RAN is treated as an important measure that predicts reading skills in children. The term RAN is viewed by investigators as either rapid verbal naming, verbal fluency for letter, phonological, and/or semantic units. The most common verbal fluency tasks used in research are letter fluency, phonological fluency and semantic fluency. A few researchers have found that verbal fluency increases with age and approaches adult level by 10 years (Regard, Strauss & Knapp, 1982) whereas others (Welsh, Pennington & Groisser, 1991) have reported that children as old as 12 years were significantly less fluent than the adult group suggesting that verbal fluency as measured by phonological fluency continues to develop into adolescence. Further, studies report naming speed differences in different languages with different script structures (Patel, Snowling & de Jong, 2004). On the other hand, Cohen, Vaughn, Riccio and Hall (1999) have found that rapid verbal naming improves significantly between 6 and 12 years of age, thus indicating a developmental trend in verbal fluency. In the present study, phonological fluency task was selected to measure verbal fluency in children in both Kannada and English. In phonological fluency task, subjects have to generate as many words as possible beginning with a specified speech sound such as /m/ in a limited time (Sauzeon, Lestage, Raboutet, N'Kaoua & Claverie, 2004). A related fluency measure like the RAN also widely known as rapid verbal naming was developed in Kannada and English to measure verbal fluency in children. In the present study, phonemes /k/, /ʈ/, /ɖ/, /n/ and /r/ were chosen for

Kannada and /k/, /ʈ/, /ɖ/, /n/, /r/ for English[12]. The phonemes /ʈ/ and /ɖ/of English were not considered as alveolars in the present study as they were retroflexised due to influence of Kannada phonemes on English. In this task, rapid naming was measured and the participants were required to generate as many words as possible for a given phoneme in 60 seconds. The stimuli were subjected to verification by Speech-Language Pathologists and Educators. See Table 3.3 on summary for rapid verbal naming test.

Table 3.3: *Tests for Rapid Verbal naming*

Sl.No.	Phonemes	Description
1.	/k/, /ʈ/, /ɖ/, /n/ and /r/	Five phonemes are presented one after the other and generate as many words as possible for a given phoneme in 60 seconds.

3.2.4 Reading tests in Kannada and English

Reading ability is reported to vary across languages with differing scripts when the sound-symbol system that each of the languages follow is different. Apart from reading words, reading non-words have been used by researchers as these non-words help in assessing how well children decode them using the grapheme-phoneme correspondences and also gives a picture on the ability of children to make use of the phonological route to decode non-words. Various studies have included word as well as non-word reading as a measure in assessing reading. Wagner, Torgesen and Rashotte (1999) report that while the number of real words accurately read gives Sight Word Efficiency (SWE), the number of pseudowords (or

[12] Phonemes in Kannada (Ranganatha, 1980).and English (Carnegie Mellon University. *The CMU Pronouncing Dictionary*. http://www.speech.cs.cmu.edu/cgi-bin/cmudict)

nonwords) accurately decoded assesses Phonemic Decoding Efficiency (PDE). Therefore, two tasks were selected to test reading skill in the present study,

i) Word-Nonword Reading test in Kannada and English

ii) Reading Comprehension test in Kannada and English

i) Word-Nonword Reading test in Kannada and English

For Kannada reading test, words were selected from textbooks prescribed by the Karnataka State government for primary school grades and high school grades. The word lists were prepared by choosing the words from text books of lower grades through higher grades (Grades II to VII). Thirty single words were listed in both Kannada and English. Monosyllabic to multi-syllabic non-words in Kannada and English were prepared by transposing one letter or alphabet of a word in each of the languages (For e.g., /samara/ (fight)-/tamara/ in Kannada; 'night'-'pight' in English) Non-word reading is considered to be the best measure of phonological recoding (Gough & Tunmer, 1986; Stahl, Stahl & McKenna, 1999; Wylie & Durrell, 1970). These words were arranged in a hierarchy with respect to length and frequency of occurrence in the text books. The selection of items for English word reading test was based on the rationale suggested by Veii and Everatt (2005). This measure was included to provide a measure of the child's understanding of units of sound and how they relate to the written form (Veii & Everatt, 2005). The stimuli were subjected to verification by Speech-Language Pathologists and Educators. See table 3.4 for details of reading words-nonwords test.

Table 3.4: *Tests for Reading skill*

Sl.No.	Reading Tests	No. of items	Description
(a)	Reading Words and Non-words	30 Words 30 Non-words	Two lists of words and non-words. The non-words follow the Phonotactic rules of Kannada and English language was followed to form nonwords.
(b)	Reading Comprehension test	3 passages with 4 questions each = 12 questions in each language	Three passages arranged in a hierarchy from simple to complex passage w.r.t. mean length of utterance, vocabulary and syntactic structures.

ii) Reading Comprehension test in Kannada and English

Development of reading comprehension is critical for acquisition of literacy skills in children. Reading comprehension has been found to be a byproduct of phonological and orthographic processing and also an association between decoding and comprehension skills. Hence, any deficit in reading comprehension has not been considered as just a deficit in phonological or orthographic processing deficit but dissociation between decoding and comprehension (Perfetti, Landi & Oakhill, 2005; Scarborough, 2005). Reading comprehension may develop in a different manner in biliterate children due to a host of factors like differences in the vocabulary knowledge, exposure to the languages, languages in home environment and languages in school environment.

In the present study reading passages were adopted from comprehension subtest of the Gray Oral Reading Tests-Fourth Edition (GORT-4) (Wiederholt & Bryant, 2001) for English tool and from Reading Acquisition Profile in Kannada (Prema, 1998) for Kannada tool. Basis for framing questions was taken from that of

Potts and Peterson (1985) and Hannon and Daneman (2001) who developed a tool to study different component processes of comprehension and the Diagnostic Assessment of Reading Comprehension (DARC) in Spanish (August, Francis & Calderon, 2003). Accordingly a total of 12 questions for each language were framed pertaining to the content of the passage. The questions were framed to assess different levels of reading comprehension similar to that of listening comprehension subtest (TM, BK, TI & TINF) as explained earlier. The questions were subjected to verification by Speech-Language Pathologists and Educators. Since reading comprehension is considered as a measure of language ability (August, Francis & Calderon, 2003), this measure was used to assess the children's comprehension of written language. See Table 3.4 above for summary on reading comprehension subtests.

3.2.5 Written Language tests in Kannada and English

Writing is a complex process that requires the activation and coordination of orthographic, graphomotor and several linguistic skills, including but not limited to, semantics, syntax, spelling and writing conventions (Scott, 2005; Singer & Bashir, 2004). Text generation and quality of writing have been found to be most difficult for children in the primary grades. This has been found to affect a child's handwriting fluency (Berninger & Swanson, 1994). At this stage children would not have mastered skills in writing but concentrate more on letter formation than generating texts. Children use better written language skills and generate longer texts as they are better equipped with language skills with handwriting being more automatic at later grades (Berninger & Swanson, 1994; Shanbal, 2003; Puranik, Lombardino & Altman, 2008).

In the present study, written language test material was prepared from English and Kannada text books prescribed by the schools following Karnataka State syllabus. The checklist for disorders of written expression (Shanbal & Prema, 2001) and Tool for screening children with writing difficulties (Shanbal, 2003) was taken as a reference for the development of the test. The items were prepared and organized in a simple to complex manner. Regular and irregular words were selected for the word list. The tasks chosen for assessing written language was of three kinds- writing to dictation, copying and expository writing task (See Table 3.5). Writing to dictation task was selected in order to assess their ability to decode the word using phoneme to grapheme correspondence. This helps in assessing children's ability to listen to the words that are dictated, analyze the phoneme units of the sound, relate the phonemes to the graphemes of the language and write them down on the paper. Copying task was selected in order to assess children's ability to visualize the word stimuli and copy them down on to the paper. Expository writing task was selected to assess the overall written language ability of the child as well as vocabulary and syntax of the child in Kannada and English. Expository writing task has been selected along with dictation and copying as writing does not include only mechanics of writing, but also includes expressing thoughts coherently and appropriately (Durgunoglu & Öney, 2000). The stimuli for writing to dictation and copying were subjected to verification by Speech-Language Pathologists and Educators. See Table 3.5 for summary on written language subtests.

Table 3.5: *Subtests for Written Language skill*

Sl.No.	Written Language Test	No. of items	Description
(a)	Dictation		
	(i) Words-Non words	30 Words 30 Non-words	Two lists of 30 words and non-words each.
	(ii) Paragraph	1 paragraph	One paragraph was dictated to the child.
(b)	Copying		
	(i) Words-Non words	30 Words 30 Non-words	Two lists of 30 words and non-words each.
	(ii) Passage	1 paragraph	One paragraph presented to the child for copying.
(c)	Expository writing	Topic-'My School'	The child was asked to write a short essay on 'My School' in ten minutes.

Pilot Study

There are no standardized batteries available to assess acquisition of literacy in Kannada-English biliterate children, hence, a pilot study was necessary in order to evaluate whether the tool can be used for assessment in terms of the items and the scoring method. The items were subjected to verification by Speech-Language Pathologists, Educators and Educators. The tool developed for assessment of biliteracy (Table 3.6) was administered on a group of fifteen normal children, five children from Grades V, VI and VII. The pilot study was conducted to verify for the appropriateness of items in the ABC tool, appropriateness of instructions, appropriateness of scoring procedure and to get familiarized with the test administration by the examiner.

All the participants were individually tested. The findings of the pilot study revealed a developmental progression in the literacy skills that were assessed in the present study. A few tasks were modified after pilot data analysis. The results of the pilot study indicated that by Grade V children were able to perform with 100% accuracy on rhyming and alliteration sub-test under the phonological awareness skills. Also, Prema (1998) had reported that these skills are completely achieved by Grade III in Kannada speaking typically developing children. Hence, rhyming and alliteration tasks were deleted from the final test. Before the pilot study, three passages were prepared to assess listening comprehension and reading comprehension. After the pilot study, two passages were selected for final testing as 2nd and 3rd passages were found to be similar in complexity based on the scores of pilot study. In the written language subtest, copying task was deleted as all the participants performed accurately on this task and ceiling effect was seen by Grade V itself. All the other tasks were retained for the final testing as shown in Table 3.6.

Table 3.6: *ABC tool before pilot study*

Sl. No.	Skills		No. of items	
		Sub-skills	Kannada	English
1.	Listening	Phoneme Discrimination	40 minimal pairs	40 minimal pairs
		Listening Comprehension	3 passages 12 questions	3 passages 12 questions
2.	Phonological awareness skills	Rhyming	15	15
		Alliteration	15	15
		Segmentation	15 words 15 non-words	15 words 15 non-words
		Deletion	15 words 15 non-words	15 words 15 non-words
		Blending	15 words 15 non-words	15 words 15 non-words
3.	Rapid naming skills	Rapid verbal naming	5 phonemes	5 phonemes
4.	Reading skills	Reading Words-Nonwords	30 words 30 non-words	30 words 30 non-words
		Reading comprehension	3 passages 12 questions	3 passages 12 questions
5.	Written language skills	Dictation	30 words 30 non-words 1 passage	30 words 30 non-words 1 passage
		Copying	30 words 30 non-words 1 passage	30 words 30 non-words 1 passage
		Expository writing	/namma sha:le/ (My school)	'My school'

3.3 Phase III: Final Test Administration

Participants

Two groups of children participated in the study. Group 1 consisted of ninety typically developing biliterate children from Grades V (Mean age=10.10 years), VI (Mean age= 11.3 years) and VII (Mean age= 12.10) who participated in the study. Equal number of boys and girls were sampled (15 boys and 15 girls in each grade with a total of 45 boys, 45 girls), in the age range of 10 to 13 years. The sample was collected from three state schools which implemented the Karnataka state government policy[13] with English as the medium of instruction. State schools were selected for the study to make sure that there was no difference in the curriculum that was taught to the children in school. In these selected schools, Kannada is taught as a subject and not as a medium of instruction. However, the results of the survey conducted in Phase I had indicated that the children speak Kannada at home as well as in school and rarely use English outside the school setting. This procedure ensured that the final sample comprised first language Kannada speaking children with English as the second language.

To examine the pattern of development of literacy skills on biliterate clinical group, the ABC tool was administered on children with learning disability (LD). So Group 2 consisted of a small clinical group of children with learning disability (LD). Ten biliterate children with Learning disability (LD) formed the clinical group for the present study. The LD group had three children from Grade V (LD1, LD2, and LD3) and Grade VI (LD4, LD5, and LD6) four children from Grade VII (LD7, LD8, LD9, and LD10). All the children in LD were diagnosed as children with LD based on Test for early reading skills (Rae & Potter, 1981 adapted to Indian children by Loomba, 1995). All the children studied Kannada and English in schools with English as the medium of instruction. Demographic information of children is given in Table 3.7. The Table 3.8 shows the final ABC tool after the pilot study[14].

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[13] In India, a common schooling system is not followed throughout the country. The schooling systems are controlled by the state government or the central government. Vast majority of Indian school-children are enrolled in the state government boards. The other boards include the Central Board of Secondary Education (CBSE), Council for the Indian School Certificate Examinations (CISCE), National open school and the International school system. The text books in these boards differ in terms of the structure of the syllabi.

[14] After the pilot study, rhyming and alliteration tasks from phonological awareness subtest and copying tasks from written language awareness subtest were excluded in the final ABC tool.

Table 3.7: *Demographic data for children with Learning disability (LD)*

Sl. No.	Children with Learning disability			
	Code	Grade	Age	Gender
1.	LD1	V	10 years 2 months	Male
2.	LD2	V	10 years 6 months	Male
3.	LD3	V	10 years 3 months	Female
4.	LD4	VI	11 years 1 month	Male
5.	LD5	VI	11 years 8 months	Male
6.	LD6	VI	11 years 6 months	Male
7.	LD7	VII	11 years 9 months	Male
8.	LD8	VII	11 years 7 months	Male
9.	LD9	VII	11 years 10 months	Male
10.	LD10	VII	12 years 3 months	Male

Test Material

Table 3.8 shows the final ABC tool modified after conducting the pilot study. The test stimuli for the ABC tool in Kannada and English are presented in the Appendix IIa and IIb.

Table 3.8: *Final ABC tool after pilot study*

Sl. No.	Skills	Sub-skills	No. of items: Kannada	No. of items: English
1.	Listening	Auditory Discrimination	30 minimal pairs	30 minimal pairs
		Listening Comprehension	2 passages 5 questions	2 passages 5 questions
2.	Phonological awareness skills	Segmentation	15 words 15 non-words	15 words 15 non-words
		Deletion	15 words 15 non-words	15 words 15 non-words
		Blending	15 words 15 non-words	15 words 15 non-words
3.	Rapid verbal naming skills	Phonemes	5 phonemes	5 phonemes
4.	Reading skills	Reading Words-Non-words	30 words 30 non-words	30 words 30 non-words
		Reading comprehension	2 passages 5 questions	2 passages 5 questions
5.	Written language skills	Dictation	30 words 30 non-words 1 passage	30 words 30 non-words 1 passage
		Expository writing	/nanna ʃa:le/ (My school)	'My school'

Procedure

An informed consent from the parents or caregivers and due permission Heads of the schools were sought before administration of the test. The participants were tested individually during school hours. Children were tested in a fairly quiet and noise free environment. All the children were first tested in Kannada and then in English. Practice trials always preceded the final testing to ascertain that the participants followed the instructions and were familiarized to the test. The testing was carried out in 4 sessions for each child and each session lasted for about 45 minutes. Each child was tested for approximately 180 minutes. Approximately 300 hours was spent in the process of assessing the children. The data was recorded on a response sheet. Oral responses to listening comprehension and reading comprehension were recorded on to a digital voice recorder for further analysis. Written language samples on paper were collected for further analysis. Scoring procedure for each subtest in the final ABC tool is given in Table 3.9. The procedure for testing each of the subtests in the final ABC tool is explained in the following sections,

3.3.1 Listening Subtests

This subtest consisted of two tasks,

i) Phoneme discrimination subtest in Kannada and English

   The test stimuli were presented orally to each child and the child was asked to say if the two pairs of words sounded same or different (E.g.: /memoraiz-pemoraiz/ in English and /kΛru-tʃΛru/ in Kannada). A brief practice session was held before the actual test. The responses were recorded on a response sheet. A score of '1' was given for correct response and '0' for incorrect response. See Table 3.9 phoneme discrimination subtest for scoring procedure.

ii) Listening comprehension subtest in Kannada and English

   Instructions were given to the child that a passage would be read and questions would be asked on the passage. The child was asked to listen to the passages that were read out orally and answer the questions presented orally (Appendix IIa and IIb). Neither the questions nor the passage was re-read and no clues were given to the child while answering. The listening comprehension score was a measure of the accuracy of the child's response to questions on the content of each passage read to the child. The responses were recorded on a digital recorder and coded for analysis. See Table 3.9 for scoring procedure of listening comprehension.

3.3.2 Phonological Awareness Subtest

The phonological awareness tasks were administered individually and practice items were used to explain each task to the child prior to actual testing. The word stimuli were always administered first followed by non-words stimuli in both practice and final testing (E.g.: /bæʈʈʌl/-word, /tʃæʈʈʌl/-nonword). In each trial the test items were presented verbally to the child. Scores for word and non-word tasks were noted (see Appendix IIa and IIb). See Table 3.9 for scoring procedure of phonological awareness subtest.

3.3.3 Rapid Verbal Naming Subtest

Five phonemes /k/, /ʈ/, /ɖ/, /n/ and /r/ that are reported to be most frequently occurring phonemes in Kannada and English (Ranganatha, 1982) were used in this subtest. The participants were asked to say as many words as possible beginning with these phonemes in one minute. The number of words produced with the target phoneme, were counted as correct responses. Number of such correct words produced in one minute, was considered as score for rapid naming. See Table 3.9 for scoring procedure of rapid verbal naming subtest.

3.3.4 Reading subtest

This subtest consisted of two tasks;

i) Kannada-English Word-Nonword Reading test

Word reading: In this task, the Kannada words were presented first and then the English words. The participants were instructed to read aloud as many words as they could in the language represented. Any errors made by the participants were recorded. The total number of words read correctly provided the measure of performance on this subtest. This task was used to assess the children's basic reading skills in recognizing and reading individual written words.

Non-word reading: The participants were instructed to read all non-words aloud, with the examiner recording the non-words read correctly. The nature of orthography of Kannada permits only one way of pronouncing non-words based on appropriateness decoding of syllables. However, owing to the nature of English orthography, alternative ways of pronouncing English non-words were allowed if the responses conformed to English grapheme-phoneme rules or which produce a non-word by appropriate analogy with known English word parts. This was based on the measure followed to analyze reading of non-words in bilingual children in a study conducted by Veii and Everatt (2005). See Table 3.9 for scoring procedure of reading words-nonwords subtest.

ii) Reading Comprehension subtest in Kannada and English

On the reading comprehension subtest, the children were asked to read passages orally. After each passage, questions related to the passage were asked and the child was instructed to answer the questions orally. Prior instructions were given to the children to read out the passage and answer the questions related to the passage. Children were not allowed to reread the passage when answering the questions. The comprehension score was a measure of the accuracy of the child's responses to questions about the content of each passage. The verbal responses were recorded on a digital recorder and coded for analysis. See Table 3.9 for scoring procedure of reading comprehension.

3.3.5 Written language subtest

Written language subtest consisted of three tasks:

i) Dictation

In this task, words and non-words were dictated to the child and the child was instructed to listen carefully and write down the dictated words and sentences. Two repetitions of the stimuli were allowed during testing. Number of correctly written words was considered as a measure for this task. See Table 3.9 for scoring procedure of writing to dictation.

ii) Expository writing

In this task, the child was asked to write a short essay on 'My School' in ten minutes. Scoring procedure of Puranik, Lombardino and Altmann (2008) and ToSC-WD (Shanbal & Prema, 2003) was followed for this task.

Ethical considerations

The study was conducted with the understanding and consent of the children, their parents and the teachers. The parents of all the participants signed a consent form permitting testing of their children. Due permission was also sought from the Heads of the schools. They were provided information on the aims, method and approximate duration of testing. All the participants were assured that the testing was harmless, and that there was no financial benefit. They were assured of the confidentiality of personal and test information.

3.4 Scoring and Data Analysis

The following scoring procedure was followed for each subtest and the data was coded for further analysis using SPSS software Version 16.0 (SPSS Inc., 2007). Table 3.8 shows the scoring procedure adopted for each of the subtests in the present study.

Table 3.9: *Scoring and Data Analysis*

Sl.No.	Tests	Scoring Procedure
1.	Listening tests	
	(i)Phoneme discrimination	A score of ‘1’was given for every correct response and ‘0’ for every incorrect response. The errors were also analyzed further to see if there was an error for discrimination of place, manner and voicing features. These responses were noted down.
	(ii) Listening Comprehension	The responses were analyzed for accuracy and content. For measuring *accuracy* a score of ‘2’was given for appropriate response without prompting, ‘1’ for partially appropriate response after the prompt “tell me more about that” and ‘0’ for inappropriate answer and “don’t know” responses.
2.	Phonological awareness tests	The responses were analyzed for *accuracy*. A score of ‘1’was given for every correct response and ‘0’ for every incorrect response. The errors were further analyzed qualitatively for each of the three tasks-segmentation, deletion and blending. These responses were noted down.
3.	Rapid Verbal Naming	The number of words generated in one minute was counted as a measure for rapid naming.
4.	Reading tests	
	(i) Reading words/non-words	The responses were analyzed for *accuracy*. A score of ‘1’was given for every correct response and ‘0’ for every incorrect response. Alternative ways of pronouncing English non-words were allowed, with correct responses being those that conform to English grapheme-phoneme rules or which produce a non-word by appropriate analogy with known English word parts. This measure was included to provide a measure of the child’s understanding of units of sound and how they relate to the written form. The reading errors were further analyzed qualitatively to look for errors while reading regular words and

		regularizing irregular words.
	(ii) Reading comprehension	The responses were analyzed for accuracy and content. For measuring *accuracy* a score of ‘2’was given for appropriate response without prompting, ‘1’ for partially appropriate response after the prompt “tell me more about that” and ‘0’ for inappropriate response and “don’t know” responses.
5.	Written language tests	
	(i) Dictation of words	The responses were analyzed for *accuracy*. A score of ‘1’was given for every correctly written word and ‘0’ for every incorrect word. Alternative ways of writing English non-words were allowed, with correct responses being those that conform to English phoneme-grapheme rules or which produce a non-word by appropriate analogy with known English word parts. This measure was included to provide a measure of the child’s understanding of units of sound and how they relate to the oral form.
	(iii) Expository writing	Assessment protocol for written language awareness as suggested by Puranik, et al., (2008) was followed for analysis. The written samples were analyzed for total number of words, T-units, number of clauses, clause density, spelling errors, grammatical t-units and convention (including capitalization and punctuation). • Total number of words (TNW): The total number of words written in the text. Each word in the text whether the word comprised a single letter or more was considered as ‘word’ for count. This is used to measure the productivity and written fluency. • Number of T-units (T-UNIT): A T-unit is a sentence. It is considered to be one main clause with all subordinate clauses embedded in it as defined by Hunt (1965). This will be used to measure syntactic complexity. • Mean length of T-unit (MLT-UNIT): This is a measure of syntactic complexity. This will be calculated by dividing TNW by T-UNIT. $\text{MLT-UNIT} = \frac{\text{TNW}}{\text{T-UNIT}}$ • Number of clauses (CLAUSES): A clause is a group of words containing a subject and a predicate. This is a measure of productivity. • Clause density (C-DENSITY): This measure is calculated by the ratio of CLAUSES to T-UNITS. This is another measure of syntactic complexity. C-DENSITY= <u>CLAUSES</u>

		T-UNIT • Percentage of grammatical T-units (GRAM T-UNIT): This measure is calculated by using the ratio of number of T-units without errors divided by the total number of T-units in the sample. Grammaticality of sentences will be based on the standard academic Kannada and English. A T-unit containing more than one error will be given an error code only once because this measures the percentage of grammatically correct T-units and not the number of errors. This is a measure of accuracy. GRAM T- UNIT= $\frac{\text{Number of T-units without errors}}{\text{Total number of T-units}}$ • Percentage of spelling errors (SPELL): SPELL measure is calculated by dividing the number of spelling errors by TNW. A word will be counted as a spelling error only once if the same spelling is used every time. However, if the word is spelt differently every time then each incorrect spelling is considered as an error. This is a measure of accuracy. SPELL= $\frac{\text{Number of spelling errors}}{\text{TNW}}$ • Writing conventions (CONVEN): This is a measure which checks the appropriate use of punctuation marks like initial capital letters and end periods written by the participants in the text.

Statistical Analyses

The data was coded and subjected to appropriate statistical procedures using the SPSS (Statistical Package for Social Sciences) Version 17.0 for the analysis of the data and the details of the analyses procedures will be given in the following sections. Table 2D Curve Version 5.01 (http://download.cnet.com/TableCurve-2D/3000-2053_4-10308067.html) was used to represent the regression data on a scatter plot using the linear equation y=a+bx.

Reliability measures

Reliability measures were done in order to establish the reliability of the ABC tool. Two types of reliability measures were carried out for which two different judges were involved. These judges were Speech-Language Pathologists (Post-graduates) by profession and were matched for gender, education and work experience. They were aware of the purpose of the study and were instructed on how to carry out the scoring and analysis.

Test-retest reliability: This was carried out on 10% of the data from each of the three Grades V, VI and VII. The ABC tool was re-administered on these children within two weeks of the first assessment. Analysis was carried out by the examiner in the same way as described before. The scores obtained were subjected to statistical analysis, the reliability co-efficient alpha was calculated and was found to be 0.8 that showed high reliability between the first and the second assessments.

Inter- and intra-judge reliability: Analysis of data was done for scores on a few subsections of the ABC tool- listening comprehension, reading words-nonwords, reading comprehension, writing to dictation and expository writing tasks under written language subsection. 10% of the data from each Grades V, VI and VII were analyzed by the judge. The judge was instructed on scoring and analysis procedures and also given practice trials. Scores of both the examiner and the other judge were tabulated for statistical analysis. Reliability coefficients alpha was calculated and revealed that inter rater reliability for listening comprehension was 0.75, reading words-nonwords was 0.90, reading comprehension was 0.81, writing to dictation was 0.80 and written language subsection was 0.79.

CHAPTER 4: RESULTS AND DISUSSION

The objectives of the present study are as follows,

4. The primary objective was to study the developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII.

5. In order to achieve the primary objective of the study, the secondary objective of the study taken up was to develop a tool to assess biliterate children (ABC).

6. The tertiary objective of the study was to derive a model of literacy acquisition in biliterate children, which will contribute to the existing models for literacy development.

5. An extended objective of the study was to examine the relevance of ABC battery on a small group of clinical population (children with learning disability-LD).

Data obtained on ninety typically developing normal children with the ABC tool was compiled, coded and subjected to four types of statistical analyses. Statistical analyses were carried out using the software SPSS 17.0 (Statistical Package for Social Sciences, version 17.0).

1) First, a descriptive analysis of sample to derive mean performance on measures of listening skills, phonological awareness skills, rapid verbal naming skills, reading skills and written language skills in Kannada and English was done. A Two way repeated measures ANOVA was done with grades (Grades V, VI and VII) as independent factor; skills and languages were included as other two factors.

2) Correlational analysis was conducted to examine the associations among the components of literacy skills in Kannada and English.
3) Hierarchical multiple regression analysis was conducted to investigate the contribution of different skills towards literacy in English and Kannada.
4) Discrminant function analysis was done to derive Discrminant functions for biliteracy.

In order to check for the gender effect within each skill, Mann Whitney U test and Independent t-test were carried out for the different components (listening, phonological awareness, rapid verbal naming, readings and written language) of the ABC tool. These analyses revealed no significant difference in the performance between male and female participants. Hence, in the final analyses, data was combined to compare the performance across Grades V, VI and VII.

4.1 Performance of children on listening skills

Listening skill was assessed with two sub skills- phoneme discrimination and listening comprehension. The results on phoneme discrimination revealed that all the children performed accurately for phoneme discrimination subtest both in Kannada and English. Only the data on listening comprehension was submitted to further statistical analyses.

4.1.1 Performance of children on listening comprehension skills

Listening comprehension was assessed for two passages each in each of the two languages, Kannada and English. Children were asked to listen to the passages and answer the questions after listening to the passages. The performance of children on listening comprehension (LC) was analyzed using two way repeated measures ANOVA with grade as an independent factor. Here, the two factors employed for statistical analysis are listening comprehension and the two languages.

The two way repeated measures ANOVA was done which revealed an overall mean and standard deviation (SD) scores, main effects of dependent variables (languages and listening comprehension tasks), independent variable (grade) and interaction effects for the above factors. Post-hoc Duncan test was done to evaluate the significant difference across the three Grades V, VI and VII. Table 4.1 shows the overall mean and SD scores of children on listening comprehension in both Kannada and English.

Table 4.1. *Mean and SD scores on listening comprehension (Maximum score=16.0)*

Languages	Grades					
	V		VI		VII	
	Mean	SD	Mean	SD	Mean	SD
Kannada	8.73	0.37	10.53	1.96	12.40	2.25
English	7.83	0.19	9.43	1.19	12.10	2.49

Analysis of the results revealed that, the mean scores was better in Kannada (Mean=11.18, SD=2.52) than in English (Mean=9.57, SD=2.01). There was a significant main effect seen for listening comprehension in Kannada and English, $F (1, 87) = 66.87$, $p<0.001$. The results also showed that the performance improved from Grade V through Grade VII in Kannada (Mean scores ranging from 9.20-13.10) and in English (Mean scores ranging from 8.46-11.16). There was a significant main effect seen across grades, $F (2, 87) = 33.74$, $p<0.001$. There was a significant interaction effect between language and grades at $F (2, 87) = 5.08$, $p<0.001$. The analysis of results and Post hoc Duncan test showed that there was a significant difference in the performance across Grades V, VI and VII. A developmental progression was also seen in the performance of children in Kannada and English (see Figure 4.1.1 below).

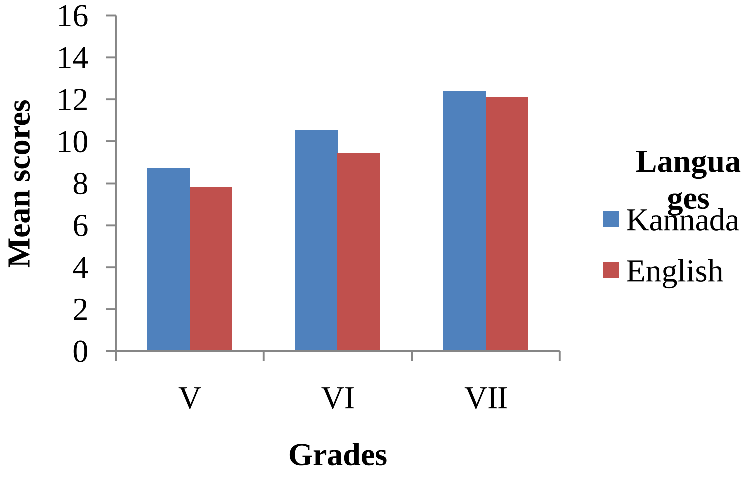

Figure 4.1.1. Mean sores on listening comprehension in Kannada and English

Further, one way analysis of variance (ANOVA) was done for each of the components that were assessed as part of listening comprehension. These components were assessed in both Kannada and English for children across Grades V through VII. Children were assessed on two passages in Kannada and English. After listening to each passage four questions were asked on these passages. These questions were assessed at different levels of comprehension- text memory (TM), text integration (TI), background knowledge (BK) and text inference (TINF). Results for each of these components are elaborated in the following section and also depicted in Figures 4.1.2 to 4.1.6.

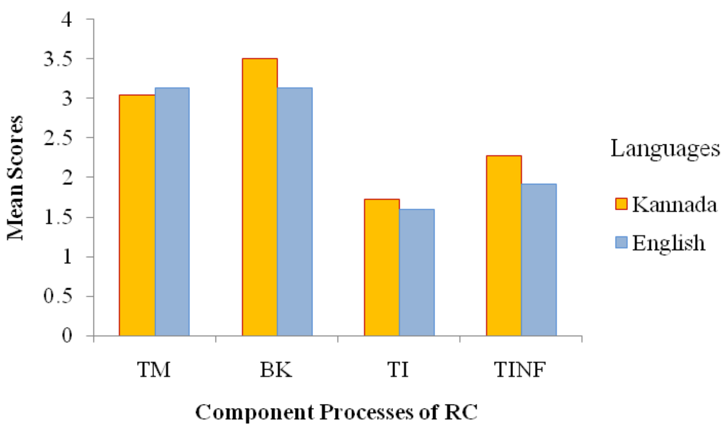

Figure 4.1.2. Mean scores on components of LC

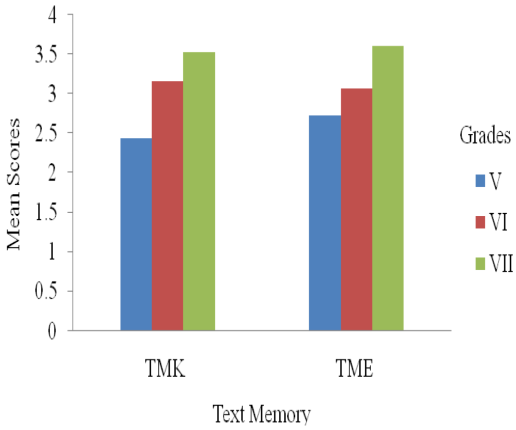

Figure 4.1.3. Mean scores on Text Memory (TM) on LC across grades

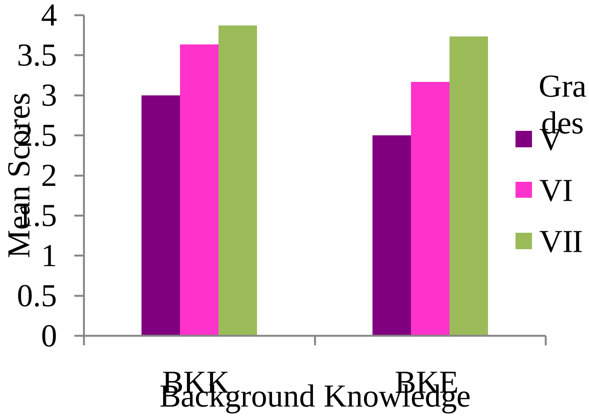

Figure 4.1.4.: Mean scores on Background Knowledge (BK) on LC across grades

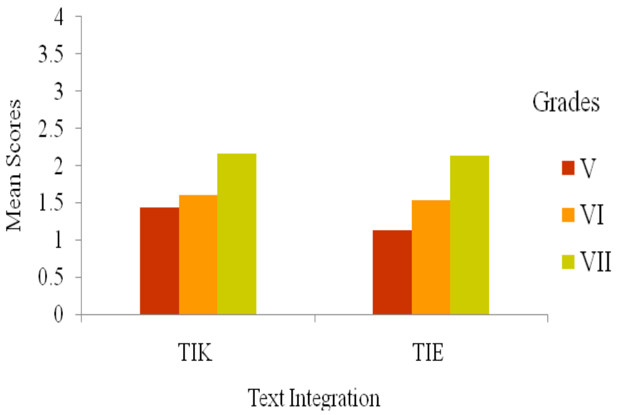

Figure 4.1.5.: Mean scores on Text Integration (TI) on LC across grades

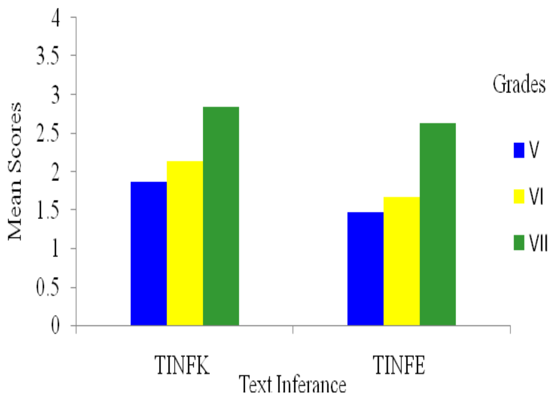

Figure 4.1.6. Mean scores on Text Inference (TINF) on LC across grades

Note: TMK=Text memory in Kannada, TME=text memory in English, BKK=Background knowledge in Kannada, BKE=Background knowledge in English, TIK=Text integration in Kannada, TIE=Text Integration in English, TINFK=Text Inference in Kannada, TINFE=Text Inference in English

Figure 4.1.2 shows performance of children on listening comprehension (LC) for various levels of comprehension. The results revealed that the mean scores were better in Kannada than in English. Performance of children on TM was found to be better in Kannada (Mean=3.04, SD=0.86) than in English (Mean=3.13, SD=0.64).

Figure 4.1.2 shows mean scores for TM across Grades V, VI and VII. Analysis of results also showed a developmental trend for TM across Grades V through VII in Kannada (Mean ranging from 2.43-3.53) and English (Mean ranging from 2.73-3.60). There was a significant difference for TM in Kannada at $F(2, 87) = 17.421$, $p < 0.001$ and English, $F(2, 87) = 20.005$, $p < 0.001$. Post-hoc Duncan test results showed a significant difference between Grades V and VI on TM in Kannada but no significant difference between Grades VI and VII. However analysis of results for LC in English revealed a significant difference across Grades V through VII.

Analysis of results also revealed that mean scores for BK was better in Kannada (Mean=3.5, SD=0.67) than in English (Mean=3.13, SD=0.83) (Figure 4.1.3). A developmental trend for BK across Grades V through VII in Kannada (Mean ranging from 3.00-3.87) and English (Mean ranging from 2.5-3.73) (Figure 4.1.4). There was a significant difference in the mean scores of children on BK in Kannada at $F(2, 87) = 18.46$, $p < 0.001$ and English, $F(2, 87) = 25.16$, $p < 0.001$. Post-hoc Duncan test results showed a significant difference between Grades V and VI on BK in Kannada but no significant difference between Grades VI and VII. However analysis of results for LC in English revealed a significant difference across Grades V through VII.

Figure 4.1.5 shows mean scores for TI in Kannada and English. The results revealed that mean scores of children was better in Kannada (Mean=1.73, SD=0.7) than in English (Mean=1.6, SD=0.81). Analysis of results also showed a developmental trend for TI across Grades V through VII in Kannada (Mean ranging from 1.43-2.16) and English (Mean ranging from 1.13-2.13) (Figure 4.1.5). There was a significant difference in the mean scores of children on TI for LC in Kannada at $F(2, 87) = 8.662$, $p < 0.001$ and English, $F(2, 87) = 14.89$, $p < 0.001$. However, analysis of results in English revealed a significant difference across Grades V through VII.

Figure 4.1.6 shows mean scores for TINF in Kannada and English. The results revealed that mean scores of children was better in Kannada than in English. Mean scores of children for TINF was found to be better in Kannada (Mean=2.27, SD=0.89) than in English (Mean=1.92, SD=0.91). Analysis of results also showed a developmental trend for TINF across Grades V through VII in Kannada (Mean ranging from 1.87-2.83) and English (Mean ranging from 1.47-2.63) (Figure 4.1.6). There was a significant difference in the mean scores of children on TI in Kannada at $F(2, 87) = 11.39$, $p < 0.001$ and English, $F(2, 87) = 19.88$, $p < 0.001$. Post-hoc Duncan test results showed no significant difference between Grades V and VI on TI in Kannada but showed significant difference between Grades VI and VII. Similar results were found on TINF in English with no significant difference between Grades V and VII and significant difference between Grades VI and VII.

Further, Figure 4.1.1 shows that the mean scores were better on BK and TM in comparison to TINF and TI. This finding was found to be true across Grades V through VII in both Kannada and English. The results indicate that the mean scores for BK and TM were higher than TINF and TI but did not reach the maximum even by Grade VII in both Kannada and English. The results suggest that the development of listening comprehension skills continue even beyond Grade VII.

To summarize, statistical analysis for listening comprehension (LC) scores showed a developmental sequence across Grades V through VII with increased mean scores from Grades V through VII. This was found to be true in both Kannada and English. The results also revealed a better performance in Kannada than in

English. This difference was more significant in lower grade (Grade V) than in higher grades (Grades VI and VII). Results on analysis of components of listening comprehension (TM, BK, TI, and TINF) also revealed a developmental sequence in both Kannada and English. Further, the results revealed that for TM and BK in Kannada, there was a significant difference in the mean scores in lower Grades V and VI, but, no significant difference in mean scores between Grades VI and VII. Whereas, for TI and TINF in Kannada, there was a significant difference in the mean scores of children in higher Grades VI and VII and no significant difference between Grades V and VII. In English, all the four components revealed a significant difference across Grades V through VII. The results indicated that children acquire TM and BK skills before TI and TINF skills in both Kannada and English (Figure 4.1.1).

Discussion

The results revealed that the listening comprehension skill in biliterate children showed a developmental progression from Grades V through VII in both Kannada and English. Although listening comprehension is said to be more central processing skill, the rate of acquisition of listening comprehension in Kannada was found to be different from that in English across grades (Table 4.1). The performance of children was better in Kannada than in English (Table 4.1). However, there was a significant main effect for listening comprehension in Kannada and English and also showed a significant interaction effect between languages and grades.

Since, English is a second language of the participants, language experience in English was not as much as it was for Kannada. In a survey (Shanbal & Prema, 2007) conducted earlier (details mentioned in the 3.1 section of method chapter) it was found that 90.6% of children used Kannada for communication at school most of the time and only 9.4% of the children used English for communication in school. The survey also reported that the children used Kannada 75% of the time and used English 25% of the time at home as reported by the parents (This was the criteria set for selection of children for the study as majority (around 90%) of the children met the above criteria for 75%-25% for language use of Kannada and English respectively). The findings are in support of the view by Mouzaki and Spantidakis (2006) that language experience in school going children is related to the familiarity with words of academic curriculum essential for adequate listening and also to strengthen the internal lexicon. The results are in support of studies that acquisition of listening skills in two different languages can vary with the language experience and the academic vocabulary that children are equipped within the earlier grades (de Quiros, 2008; Durgunoglu & Oney, 1999; Gough & Tunmer, 1986). Better performance in Kannada than in English even by Grade VII, suggests that the children have not attained adequate primary level language skills like word decoding or listening accuracy in order to achieve the higher level listening comprehension skills which require linguistic and cognitive abilities. The findings of present study support the premise that both decoding and listening are necessary for successful listening comprehension. In addition insufficient development of lower level skills like decoding can prevent the deployment of higher level processes due to inaccurate or laborious listening (Gough & Tunmer, 1986; Hoover & Gough, 1990; Perfetti, 1985; Stanovich, 1991). The findings also suggest that there are other subskills which contribute to listening comprehension in children at different stages. The lower level subskills like the BK and TM contributed to listening comprehension across grades, however the findings suggested that these subskills were achieved by

Grade VII. The higher level subskills like TI and TINF appear to develop beyond Grade VII.

In order to study the different components of listening comprehension further analysis was done. The different components assessed were- text memory (TM), text integration (TI), access background knowledge (BK) and text inference (TINF). Figures 4.1.2 to 4.1.6 indicate that the performance of children was better on components of text memory (TM) and background knowledge (BK) compared to text integration (TI) and text inference (TINF). Also a developmental trend was observed in the performance of children from Grades V through VII across these components. It was found that performance of children improved for TM and BK from Grade V through Grade VII. Figures 4.1.3 and 4.1.4 indicate that performance of children improved from Grades V through VII in both Kannada and English. Whereas, for TI and TINF, the performance of children did not approximate the mean even after Grade VII suggesting that the acquisition of TI and TINF would continue even beyond Grade VII. Performance of children was poorer for the component process on TI than TINF in both Kannada and English. Further, the data also revealed that there appeared to be a parallel growth in both the languages from Grades V through VII for TI and TINF of listening comprehension that involve a central processing skill. Processes related to TI and TINF would be more difficult for younger children (Grade V) than TM and BK. This finding is indicative of a developmental progression of higher cognitive skills like integrating and drawing inference from a given text (August, et al., 2006) which is still in the process of acquisition in children and also indicative of the fact that integration and inference are skills that appear later developmentally. Similar developmental differences were observed in components assessed in study by Hannon and Daneman (2001) for reading comprehension. They have found that TI and TINF have been major predictors to identify less skilled readers. They attributed this to the processes affected in the less skilled readers for TI and TINF that aid in integrating newly encountered information with information encountered earlier in the text or difficulty in retrieval from long term memory (Anderson & Pearson, 1984; Daneman, 1991). Hence, TI and TINF are appear to be more complex and an advanced cognitive skill compared to BK and TM (which is more of retrieval from short-term memory). Further, this difficulty in integrating information may lead to difficulty also in getting the overall gist or infer from the passage (Palincsar & Brown, 1985). Thus, children in Grade V who are relatively less skilled in listening, than children in Grade VI and VII show more difficulty in making inferences during listening However, the mean scores did not reach a maximum even by Grade VII in both suggesting that development of listening comprehension skills might continue beyond Grade VII.

The findings of the present study suggest that listening comprehension is not a script dependent phenomenon and hence considered as a central language processing. These findings are in support of Veii (2006) who reported that listening comprehension is a central language processing phenomenon as it was found to be crucial in both Herero and English.

For accuracy in listening comprehension both lower and higher subskill level components are essential. As suggested by Hannon and Daneman (1998) and Long, Oppy and Seely (1994) while BK and TM are lower level cognitive skill, TI and TF are higher level cognitive skill which appear to develop beyond Grade VII. So, listening comprehension is basic to learning that would involve knowledge of language/ academic vocabulary and involves higher cognitive skills essential for any language and hence, may be a central processing phenomenon. This suggests that given the complexities of listening comprehension for bilingual-biliterate children, there is a need to create language rich environment in the school languages to facilitate acquisition of biliteracy.

4.2 Performance of children on phonological awareness skills

Phonological awareness test comprised of syllable segmentation (SS), phoneme segmentation (PS), syllable deletion (SyD), phoneme deletion (PD), syllable blending (SB) and phoneme blending (PB) tasks. Two way repeated measures ANOVA was done with grades (Grades, VI and VII) as independent factor and the phonological awareness skill and languages (Kannada and English) as other two factors under study. The mean and standard deviation (SD), main effects of dependent variables (languages, tasks and type of stimuli), independent variable (grade), and interaction effects of above were analyzed.

Table 4.2. *Mean and SD scores on Phonological awareness tasks (Maximum score= 96.00 for all the tasks)*

Languages	Grades					
	V		VI		VII	
	Mean	SD	Mean	SD	Mean	SD
Kannada	91.43	5.13	91.73	3.59	92.60	4.19
English	82.50	6.93	84.20	4.07	87.56	8.54

The mean scores on phonological awareness tasks revealed that performance of children in the lower grades was poorer than those in the higher grades in both the languages (Table 4.2). It was found that overall children performed better in Kannada than in English. The results revealed a significant main effect between the two languages at $F (1, 87) = 146.75$ ($p< 0.001$). Post-hoc Duncan test revealed a significant difference between Grades V and VII but no significant difference between Grades V and Grade VI and also between Grade VI and Grade VII. It was found that children in Grade V performed poorer than Grade VI and VII with the mean ranging from 91.43 to 92.60 for Kannada. Similar developmental progression was seen from Grade V through Grade VII (mean ranging from 82.50-87.56) for English. A significant interaction effect was also seen between languages and grades at $F (2, 87) = 3.718$, ($p < 0.05$).

Further, two way repeated measures ANOVA was conducted separately for all the six tasks i.e. syllable segmentation (SS) for words and non-words, phoneme segmentation (PS) for words and non-words, syllable deletion (SD) for words and non-words, phoneme deletion for words and non-words, syllable blending (SB) and phoneme blending (PB) for words and non-words. This was analyzed between the two languages, Kannada and English. Tables 4.2.1 and 4.2.2 show mean and SD scores for all the sub-skills across Grades V, VI and VII in English and Kannada. The results are described in the following sub-sections.

Table 4.2.1. *Mean and SD scores for Phonological awareness sub-skills (Maximum score= 16.00 for words and non words)*

Languages	Kannada						English					
Grades	V		VI		VII		V		VI		VII	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SS	16.00	0.00	16.00	.00	16.00	0.00	12.50	2.27	14.23	2.06	13.66	2.17
PS	12.53	3.28	14.30	1.66	14.80	1.97	10.10	3.58	12.56	2.47	12.83	2.24
SD	15.73	.82	15.83	.64	15.96	.18	13.20	2.53	14.20	2.17	14.73	1.59
PD	12.83	2.39	14.43	1.40	15.40	1.10	12.30	2.53	13.66	2.35	14.30	2.05
SB	16.00	0.00	16.00	.00	16.00	0.00	15.96	.18	16.00	.00	16.00	0.00
PB	15.93	0.15	16.00	.00	16.00	0.00	16.00	.00	16.00	.00	16.00	0.00

Note: SS=Syllable segmentation, PS=Phoneme segmentation, SD=Syllable deletion, PD=Phoneme deletion, SB= Syllable blending, PB=Phoneme blending.

Table 4.2.2. *Mean and SD scores on Phonological awareness subskills (Maximum score= 8.00 for words and non words)*

		Kannada			English		
GRADES		V	VI	VII	V	VI	VII
SS							
Words	Mean	8.00	8.00	8.00	6.56	7.53	7.13
	SD	0.00	0.00	0.00	0.97	0.86	0.93
Non-words	Mean	8.00	8.00	8.00	5.93	6.70	6.53
	SD	0.00	0.00	0.00	1.91	1.51	1.40
SyD							
Words	Mean	7.90	7.96	8.00	7.33	7.53	7.60
	SD	0.30	0.18	0.00	0.92	0.89	0.72
Non-words	Mean	7.83	7.86	7.96	5.86	6.66	7.13
	SD	0.53	0.50	0.18	1.79	1.49	1.04
SB							
Words	Mean	8.00	8.00	8.00	8.00	8.00	8.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00
Non-words	Mean	8.00	8.00	8.00	7.96	8.00	8.00
	SD	0.00	0.00	0.00	0.18	0.00	0.00
PS							
Words	Mean	6.70	7.63	7.73	5.46	6.86	6.76
	SD	1.70	0.61	0.69	1.96	1.13	1.13
Non-words	Mean	5.83	6.66	7.06	4.63	5.70	6.06
	SD	1.82	1.26	1.41	2.07	1.66	1.43
PD							
Words	Mean	6.63	7.80	7.86	6.33	7.13	7.60
	SD	1.21	.48	.34	1.42	.97	.72
Non-words	Mean	6.20	6.63	7.53	5.96	6.53	6.70
	SD	1.49	1.24	.86	1.80	1.67	1.55
PB							
Words	Mean	7.93	8.00	8.00	8.00	8.00	8.00
	SD	0.25	0.00	0.00	0.00	0.00	0.00
Non-words	Mean	8.00	8.00	8.00	8.00	8.00	8.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00

Note: SS=Syllable segmentation, PS=Phoneme segmentation, SyD=Syllable deletion, PD= Phoneme deletion, SB= Syllable blending, PB=Phoneme blending.

The results obtained on each phonological awareness task in Kannada and English are described in the following sections.

4.1.1 Syllable Segmentation (SS)

Analysis of the results on SS tasks indicated that, the performance of children was better in Kannada than in English (Table 4.2.2). There was also a significant main effect between Kannada and English on SS task, $F (1, 84) = 120.37$, $p<0.001$. A significant interaction effect was seen between the two languages and across the three grades at $F (2, 84) = 5.125$, $p<0.01$ level.

With reference to the type of stimuli, it was observed that the mean scores were higher for Kannada (Mean= 8.00, SD=0.00) than in English (Mean range = 6.56 -7.13) for both words and non-words. However, in Kannada, while the scores reached a ceiling by Grade V for words (Mean= 8.00, SD=0.00), that for was poorer and that for English task were also lower than that for Kannada stimuli (Mean range=5.93- 6.53). A highly significant main effect was also found for type of stimuli i.e., words and non-words, $F (1, 84) = 19.83$, $p<0.001$. The analysis of scores of SS task indicated that the performance of children was better in Kannada than in English and for word stimuli than for non-word stimuli across all the three grades. A developmental progression was also seen in the performance of children on SS task in English. Developmental progression could not be traced for SS task in Kannada, since a ceiling was observed at Grade V itself. Further post hoc Duncan test showed that there was a significant difference between the performance of children in Grade V and Grade VI; Grade V and Grade VII at $p<0.05$ level. There was no significant difference in children of Grades VI and VII.

4.1.2 Syllable Deletion (SyD)

Analysis of the results on SyD tasks indicated that, the performance of children was better in Kannada than in English (see Table 4.2.2). There was also a highly significant main effect between Kannada and English on SyD task, $F(1, 84) = 74.20$, $p<0.001$. A significant interaction effect was seen between the two languages and across the three grades at $F(2, 84) = 3.399$, $p<0.05$ level.

With reference to the type of stimuli, it was observed that the performance of children in all the three grades was better in Kannada (Mean ranging from 7.90-8.00) than in English (Mean ranging from 7.33-7.60) for both words and non-words. However, in Kannada, while the scores reached a ceiling by Grade VII for words (Mean= 8.00, SD=0.00), on non-words it was poorer and that the scores for English were lower than that for Kannada stimuli (Mean range=5.86-7.13). A highly significant main effect was also found for type of stimuli i.e., words and non-words, $F(1, 84) = 63.10$, $p<0.001$. A significant main effect was observed across the three grades (V, VI and VII) for type of stimuli as well, $F(2, 84) = 3.941$, $p<0.05$. The analysis of scores of SyD task indicated that the performance of children was better in Kannada than in English and on word stimuli than for non-word stimuli across all the three grades. A developmental progression was also seen in the performance of children on SyD task in English. Further post hoc Duncan test showed that there was a significant difference between the performance of children in Grade V and Grade VI; Grade V and Grade VII at $p<0.05$ level. There was no significant difference in performance of Grade VI and Grade VII children.

4.1.3 Syllable Blending (SB)

Analysis of the results on SB task showed that the performance of children in Kannada was similar to the performance of children in English (Table 4.2.2). There was no significant main effect in the performance of children between Kannada and English. There was no significant interaction effect seen between the two languages across the three grades.

With reference to the type of stimuli, it was observed that the performance of children in all the three grades was similar in Kannada (Mean= 8.00, SD=0.00) and in English (Mean= 8.00, SD=0.00) for both words and non-words. And in both Kannada and English, the scores reached a ceiling by Grade V for words and for non-words (Mean= 8.00, SD=0.00). There was no significant main effect for type of stimuli and across grades. The analysis of scores of SB task indicated that the performance of children was similar in Kannada and in English and on word stimuli and non-word stimuli across all the three grades. Since a ceiling was observed at Grade V itself for SB task in Kannada and English the developmental progression from Grades V through VII could not be traced for both Kannada and English.

4.1.4 Phoneme Segmentation (PS)

Analysis of the results on PS tasks indicated that, the performance of children was better in Kannada than in English (Table 4.2.2). There was also a highly significant main effect between Kannada and English on PS task, $F(1, 84) = 45.21$, $p<0.001$.

With reference to the type of stimuli, it was observed that the performance of children was better for words when compared to non-words (Table 4.2.2). The performance of children in all the three grades was better in Kannada (Mean ranging from 6.70-7.73) than in English (Mean ranging from 5.46-6.86) for both words and non-words. A highly significant main effect was also found for type of stimuli i.e., words and non-words, F (1, 84) =57.003, $p<0.001$. A significant main effect was observed across the three grades (V, VI and VII) for type of stimuli as well, F (2, 84) =11.88, $p<0.001$. The analysis of scores of PS task indicated that the performance of children was better in Kannada than in English and for word stimuli than for non-word stimuli across all the three grades. A developmental progression was also seen in the performance of children on PS task in Kannada and English. Further post hoc Duncan test showed that there was no significant difference between the performance of children in Grades V and VI. There was a significant difference between Grades V and VII as well as Grades VI and VII at $p<0.05$ level.

4.1.5 Phoneme Deletion (PD)

Analysis of the results on PD tasks indicated that, the performance of children was better in Kannada than in English (see Table 4.2). There was also a highly significant main effect between Kannada and English on PD task, F (1, 84) =8.69, $p<0.001$.

With reference to the type of stimuli, it was observed that the performance of children was better for words when compared to non-words (see Table 4.4). The performance of children in all the three grades was better in Kannada (Mean ranging from 6.63-7.86) than in English (Mean ranging from 6.33-7.60) for both words and non-words. A highly significant main effect was also found for type of stimuli i.e., words and non-words, F (1, 84) =28.35, $p<0.001$. A significant main effect was observed across the three grades (V, VI and VII) for type of stimuli as well, F (2, 84) =16.599, $p<0.001$. The analysis of scores of PD task indicated that the performance of children was better in Kannada than in English and for word stimuli than for non-word stimuli across all the three grades. A developmental progression was also seen in the performance of children on PD task in Kannada and English. Further post hoc Duncan test showed that there was a significant difference between the performance of children in Grades V and VI; Grades VI and VII; Grades V and VII at $p<0.05$ level.

4.1.6 Phoneme Blending (PB)

Analysis of the results on PB task showed that the performance of children in Kannada was similar to the performance of children in English (see Table 4.2.2). There was no significant main effect in the performance of children between Kannada and English. There was no significant interaction effect seen between the two languages across the three grades.

With reference to the type of stimuli, it was observed that the performance of children was similar in Kannada (Mean= 8.00) and in English (Mean= 8.00) for both words and non-words, except for Grade V in Kannada (Mean=7.93). However, in Kannada, while the scores reached a ceiling effect by Grade VI for words and non-words (Mean= 8.00), the scores reached a ceiling for English task in Grade V itself. There was no significant main effect for type of stimuli and across grades. The analysis of scores of PB task indicated that the performance of children was similar in Kannada and in English and for word stimuli and non-word stimuli across all the three grades. Since a ceiling was observed at Grade VI itself for PB task in Kannada and at Grade V itself for those in English, the developmental progression could not be traced for both Kannada and English from Grades V through VII.

In general, results of two-way repeated measures ANOVA on phonological awareness skill revealed that, overall, performance of children was better in

Kannada than in English on all the phonological awareness tasks. Results revealed that the performance of children was better on syllable related tasks than phoneme related tasks. Within the type of stimuli, performance of children was better for words than for non-words. A developmental progression was observed where the performance of children was found to improve from Grade V through Grade VII. Developmental progression was also found on tasks like SS, SyD, PS and PD. A ceiling was observed on SB and PB tasks for both Kannada and English by Grade V itself.

Discussion

The results of the present study revealed a developmental trend across the skills in Kannada and in English (Table 4.2.1). However, performance of children in Grade V was better on a few tasks such as blending and the scores reached the maximum by Grade V itself. Other skills such as syllable segmentation, syllable deletion, phoneme segmentation and phoneme deletion were in the process of development even by Grade VII. This trend was seen for both words and non-words. Performance for non-words was however, poorer than the words in the earlier grades in comparison to the later grades (Table 4.2.2). Similar developmental sequence for phonological awareness has been reported in studies conducted in languages with structural differences in orthography like Herero and English (Veii & Everatt, 2008).

The performances of children on phonological awareness in Kannada and English may be schematically represented as shown in Figures 4.2.1 and 4.2.2 respectively. The findings revealed that the performance of children on phonological awareness tasks such as syllable segmentation (SS), syllable deletion (SyD), phoneme segmentation (PS) and phoneme deletion (PD) was not similar in Kannada and English.

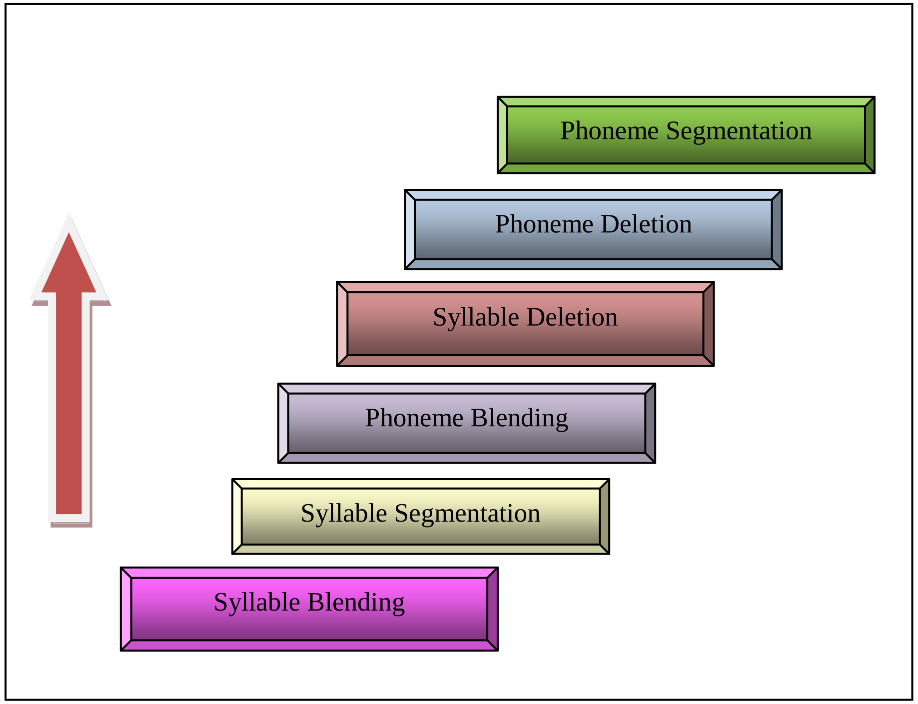

Figure 4.2.1: Schematic representation for Phonological awareness in Kannada

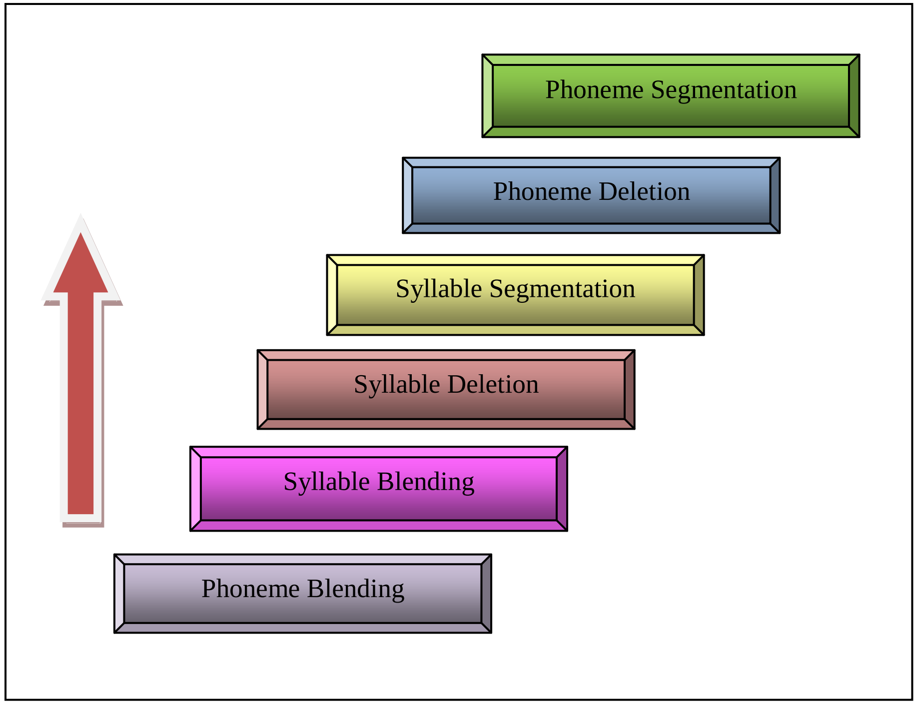

Figure 4.2.2: Schematic representation for Phonological awareness in English

Performance of children was better in Kannada (transparent orthography) than in English (opaque orthography) suggesting children acquire differential skills in phonological awareness depending on the nature of script. The findings of the study are in support of the script dependent posited by Geva and colleagues (Geva & Siegel, 2000; Gholamain & Geva, 1999) and the psycholinguistic grain size theory of reading development proposed by Ziegler and Goswami (2005). Kannada and English differ both in terms of granularity and consistency. While, in Kannada the larger grain size is a syllable, that in English is the phoneme. Since children in the present study are more sensitive to the syllables than phonemes, their performance lag is evident for tasks in English. Kannada is considered as a transparent alphasyllabary which is more consistent that an opaque alphabetic language such as English. The findings of the study are in support of Goswami (2002) who opined that children develop phonological awareness skill rapidly in more consistent orthographies. Since structure of Kannada is such that it is more consistent and more transparent, children tend to be highly sensitive to structure of Kannada than English and hence achieve skills better in Kannada than English. Nag (2007) reported that children developed phonological sensitivity to Kannada by Grades III to IV.

The results indicated that performance of children was better on syllable based tasks than the phoneme based tasks in both the languages. The findings are in support of the psycholinguistic grain size theory put forth by Ziegler and Goswami (2005). Since, larger grain sizes in alphasyllabary script such as Kannada is a syllable, children develop sensitivity to syllables much earlier than phonemes. The present study supports the study by Anthony, Lonigan, Driscoll, Phillips and Burgess (2003) who investigated the order of acquisition of phonological sensitivity skills at various grain sizes in 2-6 year old children. They found that children's progression of sensitivity to linguistic units followed the hierarchical model of word structure as shown in Figure 4.2.3 below. They found that children generally mastered syllable level skills before phoneme-level skills. Studies across different languages have yielded a similar picture in most, despite differences in the phonological structure of the languages being learned.

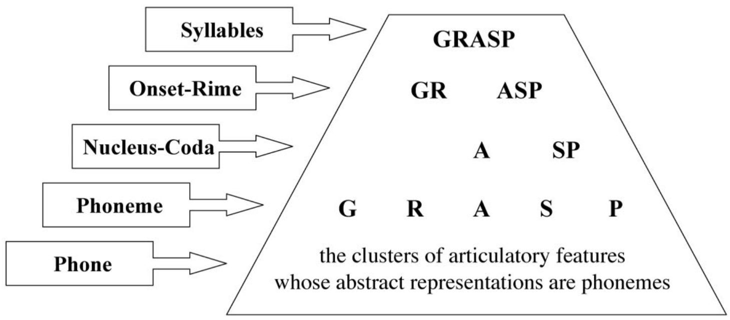

Figure 4.2.3: A schematic depiction of different psycholinguistic grain sizes.
(Source: *Ziegler & Goswami, 2005*)

Further support from this can be derived from various studies that are summarized in the following Table 4.2.3 by Ziegler and Goswami (2005). Despite the structure of language, the data across different languages shows that in all languages, syllable awareness is much better than phoneme awareness. The findings are also in support of Nag (2007) who reported that children learning Kannada are found to show greater sensitivity to syllable. She attributed advanced syllable awareness in Kannada to be due to the salience of this unit in the orthographic representations in Kannada. Nag (2007) reported that phoneme sensitivity in Kannada was markedly observed during the Grade III or IV much later than that achieved for English (earliest by Grade I).

Table 4.2.3. *Data (% Correct) From Syllable and Phoneme Counting Tasks in Kindergarten and First-Grade Children across Different Languages (Cited by Ziegler & Goswami, 2005)*

Language	Study	Kindergarten		First grade	
		Syllable	Phoneme	Syllable	Phoneme
Turkish	Durgunoglu & Oney (1999)	94	67	98	94
Italian	Cossu, Shankweiler, Liberman,Katz, & Tola (1988)	80	27	100	90
Greek	Harris & Giannouli (1999)	85	0	100	100
French	Demont & Gombert (1996)	69	2	77	61
English	Liberman, Shankweiler, Fischer, & Carter (1974)	48	17	90	70

The findings are in support of various studies conducted in Indian languages such as Hindi and Kannada in comparison to English (Karanth, 1998; Prakash, Rekha, Nigam & Karanth, 1993; Prakash & Rekha, 1992; Prakash, 2003; Prema & Karanth, 2003). These studies indicated that phonological awareness develops as a function of the characteristics of the writing systems of languages. They opined that in the Indian alphasyllabaries, the stages at which different levels of awareness appear, the time between the stages and the necessity to master it in order to have competence vary according to the nature of the script.

Results of the present study revealed that there was a difference in the performance of manipulation tasks between the lower grade and the higher grade children. And this varied in both Kannada and English depending on the nature of the phonological awareness tasks. In Kannada, children seem to have acquired the blending tasks earlier than the deletion or the segmentation tasks. From the Figures 4.2.1 and 4.2.2, it is evident that the acquisition of phonological awareness skills is not only based on the syllable or the phoneme but its manipulation tasks like blending, deletion and segmentation. The results indicated that phoneme segmentation was the last skill to be achieved in both Kannada and English. Despite, the differences in structure of Kannada and English, segmentation task is the most difficult task for Kannada-English biliterate children for two reasons-first, phoneme is not a basic unit for Kannada which is an alphasyllabary, and second children may be employing the syllabary rules to phoneme segmentation in English in turn affecting the performance in English. These findings are in support of Karanth (2006) attributed to the teaching system in schools. Traditionally the separate components of each phoneme in a written symbol are not dealt independently in the lower grades but at a much later stage while teaching grammar in school. Kannada and most other Indian scripts are taught syllabically. The script is introduced in stages from the beginning to the end. In Kannada, consonant component and vowel component are not learnt separately and then combined to form syllable. Instead, children are taught the entire syllabary and all their possible CV combinations with a primary vowel embedded in them. These reports suggest that children are taught in a manner that they are well equipped with syllables in Kannada rather than phonemes.

Though similarity in the development of PA skills across languages is true, performance differences have been observed in terms of the manipulation tasks assessed for phonological awareness skills. This may be because of the characteristics of spoken language. For example, in the present study, blending task was found to be the easiest for Grade V, while segmentation and deletion was complex at syllable and the phoneme levels and children in Grades VI and VII were found to show poor performance on these tasks. This may be because cognitive demands on segmentation task are much more than deletion or blending task. The blending task involves only two processes for completion i.e., the children need to listen to the speech sounds and conjoin or blend the sounds before saying it aloud. On the other hand, for the deletion task the children listen to the entire word with particular attention to the specific speech sound unit that has to be deleted and then delete only the specific speech sound before saying aloud the rest of the word. Segmentation will involve a complex task of listening to the test word and further segmenting them into their finer units. Children will have a greater cognitive demand to segment the word into units, store them and retrieve all the units accordingly. This task may be much more demanding for younger children and improves with older children in the higher grades. The findings are in support of the study by Geudens and Sandra (2003) who also opined that the segmentation task that was used in their study was too demanding for their younger participants than the older children. These demands may further vary with the systems of languages that are processed. For example, in the present study mean scores were better on syllable segmentation task in Kannada than in English and this was achieved by Grade V itself in Kannada, whereas in English it continued to develop beyond Grade VII (see Figure 4.2.1 and 4.2.2. This again accounts to processing of script structure of each of these languages. Kannada is an alpha-syllabary language whose basic unit is a syllable which is a larger grain size unit. And English is an alphabetic language whose basic unit is a phoneme which is a smaller grain size unit. So, children with Kannada language background tend to perform better on syllable manipulation tasks and when they try to use the same processing strategy in English, it does not work out as in English they will have to have knowledge of smaller phoneme units. The differences can be attributed to the syllabic sensitivity in Kannada, in contrast to the phonemic awareness in English. Children appear to rely on phonological sensitivity while dealing with Kannada, on the other hand, they appear to rely on phonological awareness while dealing with English. This finding is in support of Stanovich' s (2000) suggestion on subtle differences between 'phonological sensitivity' and 'phonological awareness' viewpoint, to separate the term 'sensitivity' from 'awareness'. In the present study *'phonological sensitivity to Kannada'* is more relevant and it refers to a continuum from a shallow sensitivity of large phonological units (syllable) to a deep sensitivity of smaller phonological units which is referred to as *'phonological awareness in English'* (Stanovich, 2000). The findings are also in support of Nag (2007) who reported that phonological sensitivity is crucial for reading Kannada wherein syllable sensitivity is achieved before phonemic awareness in English.

4.3 Performance of children on rapid verbal naming (RVN)

Rapid naming in the present study was assessed by recording the number of words that the children generated in one minute with the given phoneme. Number of these words were counted and considered as a measure of rapid naming. Performance of children on rapid naming was analyzed using two way repeated measures ANOVA with grade as independent factor. The two factors are number of words generated in one minute for phonemes /k/, /n/, /r/, /ʈ/ and /ɖ/[15] and the two languages, English and Kannada. Mean and SD scores, significant main effects and interaction effects if any, and post-hoc Duncan tests to check for differences in performance of children across the three grades, V, VI and VII were derived by Two-way repeated measures ANOVA. Table 4.3 shows overall mean and standard deviation (SD) scores across Grades V, VI and VII for the two languages under study, Kannada and English. Figure 4.3 shows comparison of performance of children with mean and SD scores in Kannada and English.

Table 4.3. *Mean and SD scores for rapid verbal naming*

Languages	Grades	Minimum	Maximum	Mean	SD
Kannada	V	6.00	17.00	12.70	1.88
	VI	11.00	23.00	14.60	2.69
	VII	13.00	22.00	16.63	2.01
English	V	4.00	15.00	9.27	1.99
	VI	7.00	17.00	11.23	2.11
	VII	9.00	16.00	13.00	2.06

[15] The phonemes /ʈ/ and /ɖ/ of English were not considered as alveolars in the present study as they were retroflexised due to influence of Kannada phonemes on English.

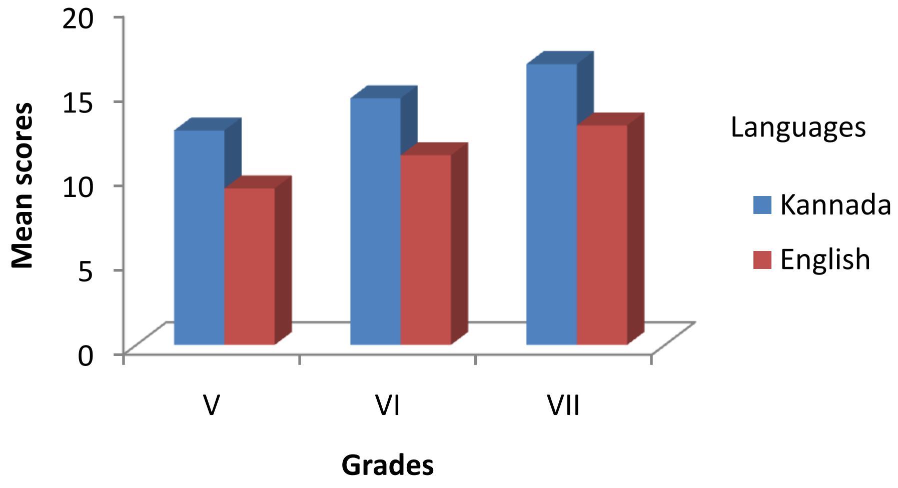

Figure 4.3. Mean scores on rapid verbal naming

Table 4.3 shows that the mean scores of children were better in Kannada (Mean ranging from 12.70-16.63) than in English (Mean ranging from 9.27-13.0). This finding suggests that the children produced more number of words in Kannada than in English within one minute. The results also revealed a significant main effect for grades at F (2, 87) = 26.309, p<0.001, languages at F (1, 87) = 16.387, p<0.001and phonemes at F (1, 348) = 292.665, p<0.001. A significant interaction effect was seen between phonemes and grades at F (8, 348) = 2.583, p<0.01 and also between languages and phonemes at F (4, 348) = 299.192, p<0.001. Overall it was found that on rapid naming across Grades V, VI and VII, the mean scores of children was better in higher grades in comparison to lower grades; and the mean scores was better in Kannada than in English.

One-way analysis of variance (ANOVA) was employed to examine the mean scores of children on specific phonemes on rapid naming. Tables 4.3.1 and 4.3.2 show the mean and SD scores for rapid verbal naming for specific phonemes in Kannada and English respectively. Results in Table 4.3.1 showed that mean scores on rapid naming with the phoneme /k/ was highest in all the three grades (Mean scores 12.70, 14.60 & 16.63 across Grades V, VI & VII respectively), while that for /ɖ/ was the least (Mean scores 4.10, 4.86 & 5.86 across Grades V, VI & VII in that order.), the other phonemes /n/, /r/ and /ʈ/ falling in between the two. Figures 4.3.1 and 4.3.2 show performance of children on rapid verbal naming for Kannada and English respectively.

Table 4.3.1. *Mean and SD scores (in parenthesis) on rapid verbal naming*

Phonemes	Grades					
	V		VI		VII	
	Kannada	English	Kannada	English	Kannada	English
/k/	12.70 (1.87)	9.26 (1.99)	14.60 (2.69)	11.23 (2.11)	16.63 (2.00)	13.00 (2.06)
/n/	9.20 (2.13)	7.70 (2.05)	11.30 (2.42)	9.46 (1.99)	12.13 (2.67)	9.86 (2.48)
/r/	8.50 (1.97)	7.53 (2.51)	10.23 (2.73)	9.36 (2.88)	11.76 (2.17)	9.73 (2.46)
/ʈ/	4.66 (2.29)	9.53 (2.62)	5.43 (2.28)	11.13 (1.81)	6.80 (1.21)	11.93 (2.33)
/ɖ/	4.10 (2.05)	8.00 (1.98)	4.86 (2.16)	10.30 (1.70)	5.86 (1.56)	11.26 (2.77)

Results of one-way ANOVA employed to examine the mean scores of children on specific phonemes on rapid naming in English revealed that mean scores on rapid naming with the phoneme /k/ was highest in all the three grades (9.26, 11.23 & 13.00 across Grades V, VI & VII respectively), while that for /r/ was the least (7.53, 9.36 & 9.73 across Grades V, VI & VII in that order.), the other phonemes /n/, /ɖ/ and /ʈ/ falling in between the two. Results on rapid naming for the phoneme /n/ showed that children in Grade V produced less number of words compared to Grades VI and VII (Mean ranging from 9.20-12.13). Similarly, for phoneme /ɖ/, children in Grade V produced less number of words compared to Grades VI and VII (Mean ranging from 8.00-11.26). Also, for phoneme /ʈ/, children in Grade V produced lesser words than Grades VI and VII (Mean ranging from 9.53-11.93). A developmental progression was observed for rapid verbal naming in all the phonemes in English from Grades V though VII. Analysis of results further revealed that there was a significant main effect for phonemes at F (4, 348) =292.665, p<0.001. There was also a significant interaction effect for phonemes across Grades V, VI and VII at F (8, 348) =2.583, p<0.01. Post-hoc Duncan test revealed a significant difference in the performance of children across Grades V, VI and VII. Results revealed a developmental progression on rapid verbal naming from Grades V through VII in both Kannada and English.

Further one way repeated measures ANOVA was employed to compare the mean scores of children on rapid naming for phonemes in both the languages, Kannada and English. Analysis of the results in Kannada revealed that for the phoneme /k/, children in Grade V produced lesser number of words compared to Grades VI and VII (Mean ranging from 12.70-16.63 across the three grades). Similarly, for phoneme /n/ children in Grade V produced less number of words compared to Grades VI and VII (Mean ranging from 9.20-12.13). For phoneme /r/, children in Grade V produced less number of words compared to Grades VI and VII (Mean ranging from 8.50-11.76). For phoneme /ʈ/, children in Grade V produced lesser words than Grades VI and VII (Mean ranging from 4.66-6.80). For phoneme /ɖ/, children in Grade V produced lesser words than Grades VI and VII (Mean 4.10-5.86). A developmental progression was observed for rapid verbal naming in all the phonemes in Kannada from Grades V though VII.

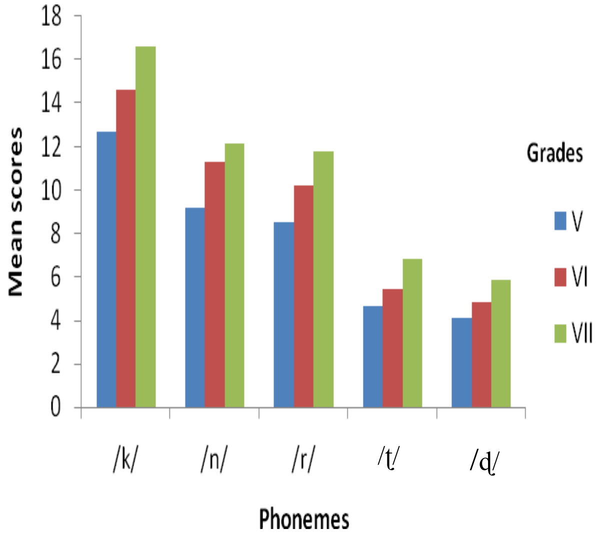

Figure 4.3.1. Mean scores for rapid verbal naming in Kannada

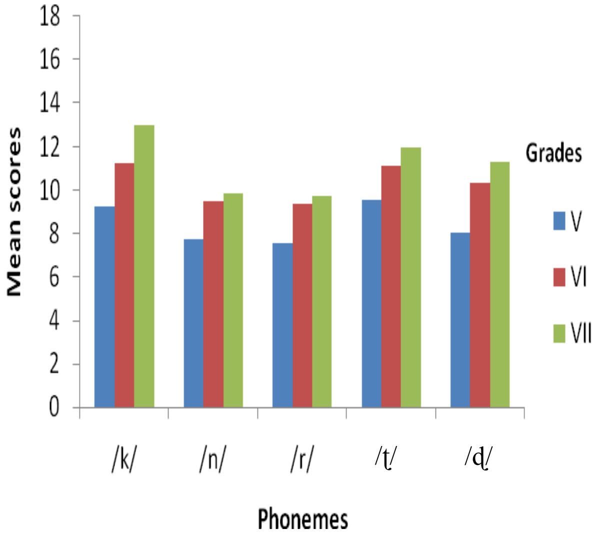

Figure 4.3.2. Mean scores for rapid verbal naming in English

To summarize, it was found that the performance of children on rapid naming showed a developmental progression in Kannada as well as in English (Figures 4.3.1 and 4.3.2). It was also found that children produced more words in Kannada for phonemes /k/, /n/ and /r/ when compared to English. Only for phonemes /ʈ/ and /ɖ/, children produced more words in English than in Kannada. A developmental progression was noted in rapid naming of all the phonemes wherein the performance improved from lower grades to higher grades.

Discussion

Analysis of results showed that on rapid verbal naming, the performance of children was better in Kannada than in English (Tables 4.3.1 and 4.3.2). Results also revealed developmental progression in Kannada and English across Grades V through VII (Figures 4.3.1 and 4.3.2). This indicates that naming which is an expressive language skill is showing a developmental trend in Kannada and English and children continue to improve from Grades V through VII in both the languages.

This finding is in support of Regard, Strauss, and Knapp (1982) ; Welsh, Pennington and Groisser (1991) and Cohen et al., (1999) who reported a developmental trend in rapid verbal naming between 6 and 12 years of age. Rapid naming ability is linked with phonological processing ability- an ability to retrieve phonological codes from long-term memory (Wagner & Torgesen, 1987). In order to retrieve words for a phoneme, children need to actively learn attaching the phoneme to retrieve the words from their phonologic or semantic lexicon. It is easier for children in the higher grades as they have mastered the skill and can automatically retrieve these words from their phonological memory compared to younger children. It could also be that younger children are still in the process of constructing memory representations to words from phonemes. Though rapid naming was considered to be a skill crucial only during the early years of learning literacy (Wagner et al., 1997), the present study indicated that it played a significant role in literacy even in the higher grades. The differences for rapid naming skills in two different types of scripts, the underlying phonological sensitivity skill that is likely to be a facilitating factor, would have a major role even in Grades V through VII.

Analysis of results showed that on rapid verbal naming, the performance of children was better in Kannada than in English (Tables 4.3.1 and 4.3.2). Results also revealed developmental progression in Kannada and English across Grades V through VII (Figures 4.3.1 and 4.3.2). This indicates that naming which is an expressive language skill is showing a developmental trend in Kannada and English and children continue to improve from Grades V through VII in both the languages. This finding is in support of Regard, Strauss, and Knapp (1982); Welsh, Pennington and Groisser (1991) and Cohen et al., (1999) who reported a developmental trend in rapid verbal naming between 6 and 12 years of age.

The results also showed that the number of words generated was more in Kannada than in English for /n/ and /r/ when compared to English. Only for phonemes /ʈ/ and /ɖ/, children produced more words in English than in Kannada. As mentioned earlier the frequency of occurrence of phonemes in Kannada and English (Ranganatha, 1982; The CMU Pronouncing Dictionary. http://www.speech.cs.cmu.edu/cgi-bin/cmudict) contributed to the differences in words. Transparent orthographies like Kannada permit simple direct one-to-one correspondence between letters and sounds of words, thus making phonological encoding simpler and easier to retrieve (Gholamain & Geva, 1999; Geva & Siegel, 2000). Whereas, English with a less transparent orthography, involves more complex relationships between letters and sounds. And these differences in letter-sound correspondence may complicate the process of phonological encoding making it difficult to retrieve in a given time. Support for this may be drawn from research which suggests that more transparent the grapheme-phoneme structure of a language (i.e., the more word pronunciation directly matches spelling), the better the naming speed that would predict reading (DeJong & Van der Leij, 2003; Korhonen, 1995; Landerl, 2003; Novoa, 1988; Van den Bos, 1998; Wimmer, 1993). Wolf et al. (2002) also support the view that greater orthographic regularity in more transparent languages reduces the demand for phonological analysis and hence speed up naming in transparent languages than less transparent languages.

Apart from the ease of phonological encoding facilitated by the script, it is likely that the frequency of occurrence of phonemes in a given language that leads to faster access of lexicon with higher frequency and slower access with lower frequency phonemes supports that rapid verbal naming is a measure of central processing skill, however governed by script specific features. The findings of the present study on rapid verbal naming indicate that the common underlying linguistic and cognitive processes (such as working memory, verbal ability, naming and phonological skills) influence the development of reading. Further statistical analysis of the data on correlation and regression revealed that, RVN predicted reading and writing in both Kannada and English suggesting the importance of a common underlying linguistic and cognitive processes in the development of reading across all languages (Geva, 2000). Similar rapid naming difficulties which correlated with reading difficulties are reported in studies with other transparent languages like Finnish (Korhonen, 1995), Spanish (Escribano, 2007; Jimenez, 2008), German (Frith et al., 1998; Landerl, 2001; Wimmer, Mayringer & Landerl, 2000).

4.4 performances of children on reading skill

In the present study reading skill was assessed with two different tasks-(a) reading single words-nonwords and (b) reading comprehension

4.4.1 Performance of children on reading words-nonwords

Reading task included reading a list of words and non-words in Kannada and in English by children in Grades V, VI and VII. In the present study, scores on reading and languages were considered as the two factors for statistical analysis were. Scores on writing to dictation for words and non-words (considered as type of token) and languages, Kannada and English were considered as the two factors for statistical analysis. Two way repeated measures ANOVA was done to analyze the performance of children across grades in Kannada and English.

Analysis revealed mean and standard deviation (SD) scores, main effects of dependent variables (languages and words/nonwords), independent variable (grade) and interaction effects. Post-hoc Duncan test was done to evaluate the significant difference across the three Grades V, VI and VII. Table 4.4.1 shows mean and standard deviation (SD) scores across Grades V, VI and VII for reading words and nonwords in Kannada and English. Statistical main effect and corresponding interaction effects are explained in the following sections.

Table 4.4.1. *Mean and SD scores on reading words and nonwords (N= 30 in each grade; Maximum score=60)*

Reading tasks	V		VI		VII		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Kannada	57.40	2.06	58.86	1.19	59.43	1.25	58.56	1.76
English	52.36	3.96	56.20	2.88	57.23	2.59	55.26	3.80

The results revealed that there was an improvement in the mean scores from Grades V through VII (Table 4.4.1). Results showed a significant difference in the mean scores across the three Grades, V, VI and VII at F (2, 87) =22.107, p<0.001. Further, Post-hoc Duncan tests revealed a significant difference in the mean scores between Grades V and VI; Grades VI and VII. However, there was no significant difference in the mean scores of Grade VI and Grade VII. The results also revealed that there was a highly significant main effect for the two languages, Kannada and English at F (1, 87) =127.948, p<0.001. Mean scores indicated a better performance in Kannada than in English. A highly significant interaction effect was also seen between languages and grades at F (2, 87) =9.038, p<0.001, suggesting that performance of children was better in Kannada than in English across the three Grades V, VI and VII (Table 4.4.1). The results suggest a developmental trend for reading in both Kannada and English across grades (Figure 4.4.1).

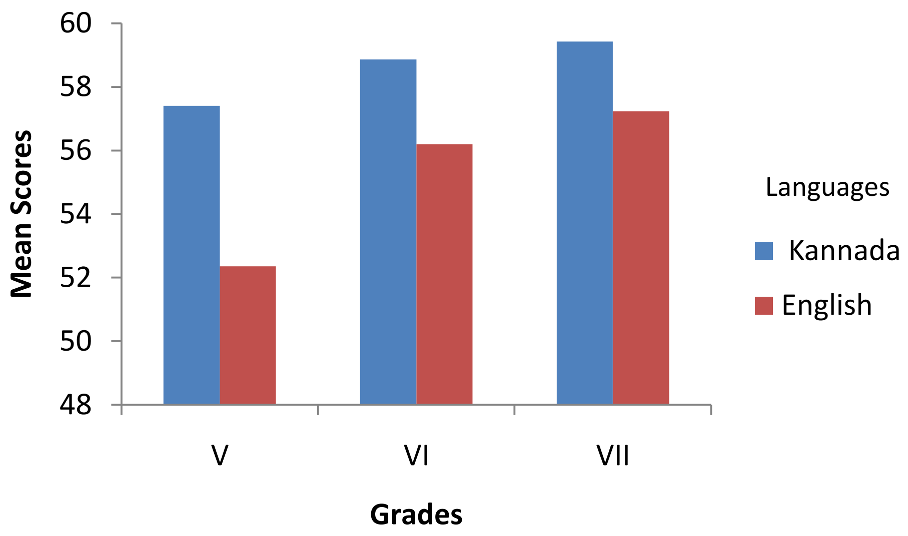

Figure 4.4.1: Mean scores on reading

Table 4.4.1.1. *Mean and SD scores on reading words and nonwords (N= 30 in each grade; Maximum score=30)*

Reading		V		VI		VII	
		Mean	SD	Mean	SD	Mean	SD
Kannada	Words	29.30	1.08	29.93	0.25	29.87	0.49
	Non-words	28.10	1.44	28.93	1.22	29.58	0.92
English	Words	28.00	1.74	29.53	0.73	29.67	0.70
	Non-words	24.36	2.59	26.66	2.32	27.64	2.12

a) Reading words-nonwords in Kannada

Analysis of results for Kannada revealed that the mean scores revealed a significant main effect at $F (1, 87) = 39.661$, $p<0.001$. The mean scores were better for words (Mean=29.70, SD= 2.78) than non-words (Mean=28.87, SD= 2.16) but there was no statistical significant difference between words and nonwords. A significant main effect was found for grades at $F (2, 87) = 13.683$, $p<0.001$. On reading in Kannada, there was a significant interaction effect between English and grades at $F (2, 87) = 4.252$, $p<0.05$. There was no significant interaction effect between the type of token and grades. Post-hoc Duncan test showed a significant difference in the mean scores between Grades V and VI; Grades VI and VII. There was no significant difference in the mean scores between Grades VI and VII. Results in Table 4.4.1.1 shows that the mean scores improved from Grade V to Grades VI and VII (Mean scores ranging from 28.00 to 29.67) suggesting a developmental pattern for reading words in Kannada. Figure 4.4.1.1 shows a developmental progression in the performance of children from Grades V through VII.

Analysis of results for reading non-words in Kannada revealed a developmental progression from Grades V through VII. Table 4.4.1.1 shows that there is an improvement in the mean scores of children for reading non-words in Kannada from

Grades V through VII. On reading non-words the mean scores was lower in Grade V than Grades VI and VII (Mean ranging from 28.10 to 29.58). Post-hoc Duncan test revealed a statistically significant difference across Grades V, VI and VII. Figure 4.4.1.1 shows a developmental progression from Grades V through VII. Performance on writing to dictation for non-words in Kannada and English was poorer than writing to dictation for non-words in Kannada (Figure 4.4.1.1).

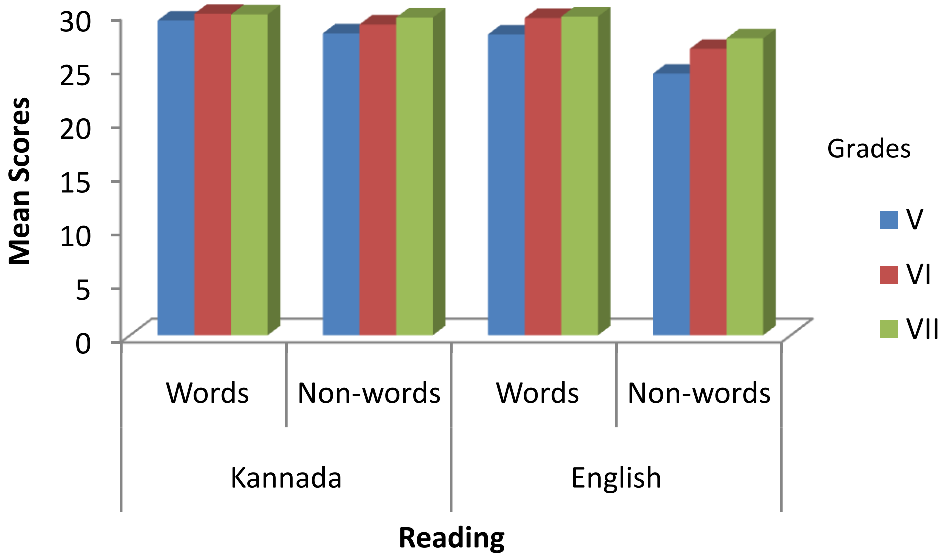

Figure 4.4.1.1. Mean scores on reading words and nonwords

b) Reading words-nonwords in English

Analysis of results for English revealed that the mean scores revealed a significant main effect at F (1, 87) =210.876, $p<0.001$. The mean scores were better for words (Mean=29.07, SD= 1.38) than non-words (Mean=26.20, SD= 2.69) and this was found to be statistically significant across grades at F (2, 87) =19.212, $p<0.001$. On reading in English, there was a significant interaction effect between English and grades at F (2, 87) =5.028, $p<0.01$. Post-hoc Duncan test showed a significant difference in the mean scores between Grades V and VI; Grades VI and VII. There was no significant difference in the mean scores between Grades VI and

VII. Results in Table 4.4.1.1 shows that on reading words in English, the mean scores improved from Grade V to Grades VI and VII (Mean scores ranging from 28.00 to 29.67). Figure 4.4.1.1 shows a developmental progression in the performance of children from Grades V through VII.

Analysis of results for reading non-words in English revealed a developmental progression from Grades V through VII. Table 4.4.1.1 shows that there is an improvement in the mean scores of children for reading non-words in English from Grades V through VII. On reading non-words the mean scores was lower in Grade V than Grades VI and VII (Mean ranging from 24.36 to 27.64). Post-hoc Duncan test revealed a statistically significant difference across Grades V, VI and VII. Figure 4.4.1.1 shows a developmental progression from Grades V through VII. Performance on writing to dictation for non-words in Kannada and English was poorer than writing to dictation for non-words in Kannada (Figure 4.4.1.1).

To summarize, a developmental progression was observed across the three Grades V, VI and VII for reading in both Kannada and English. This progression was significant for reading non-words in both the languages across Grades V through VII. A significant difference was observed for reading non-words in English by children in all the three grades. The developmental progression was significant for reading both words and non-words in both Kannada and English across Grades V through VII. The findings of the study suggest that, while reading in Kannada did not reveal significant difference between words and non-words (type of token), that in English showed a highly significant difference between words and non-words at $F(1, 87) = 60.098$, $p<0.001$.

Discussion

Overall a developmental trend was seen across the three Grades V, VI and VII for reading words and non-words in Kannada as well as in English. This difference in performance was found to be significant across the two languages in the earlier grade, i.e., in grade V. Children in grade V performed better on reading Kannada words than English words (see Figure 4.4.1). This difference in performance between the two languages was found to have reduced by Grade VI and Grade VII. Also to note, children in the higher grades read almost all the words in the list in both Kannada and English. The mean scores of children in Grade V reached the maximum, but not at Grades VI and VII in Kannada than English. This also suggests that word reading is developing at faster rate in Kannada than in English, thus consistent with script dependent hypothesis. This hypothesis predicts that reading acquisition is different and is dependent on the nature of script. This supports view points of researches who believe that the complexity of orthography alters the rate of literacy acquisition like reading (Geva & Siegel, 2000). Kannada which is a more regular and transparent language may permit a simple direct one-one correspondence between letters and sounds of words. Irregular and less transparent languages like English, however, use more complex relationships between letters and sounds. These differences in letter-sound correspondence rules may have led to differences in the development of reading processes.

This supports research findings by Veii and Everatt (2005) that also support the differences in scripts to be contributing to the differences in reading acquisition between languages in children. Further, script dependent viewpoint can also explain that accurate reading in Kannada reaches good levels of performance early in learning, whereas English may require more learning and greater experience as it follows a different script system and rule governing system compared to the native language. The older the child (higher grades), the greater their experience with the English script, better will be their performance in reading English compared to children in the lower grades. This also supports the findings of Geva and Siegel (2000) who stated that experience with a language and its script plays a role in reading acquisition.

The findings of the present study also showed that there was a significant difference in the performance of children for reading non-words in Kannada and English, which was evident across all the three grades V, VI and VII. The children performed better for reading non-words in Kannada than in English across all the three grades. Also, it was found that children performed better on words than non-words in both the languages, though the difference was lesser in Kannada and greater in English (Figure 4.4.1). These finding are in consensus with Wimmer and Goswami (1994) who studied in German-English bilinguals for cross-language comparisons. They used a similar method as that of the present study (onset of words was exchanged to form the non-word). They also found that children performed poorer for reading non-words in English than in German, due to poor phonological decoding ability for reading English non-words. Though German and English are from the same Germanic origin, German is found to have regularity in terms of spelling-sound correspondence compared to English. Similarly, Kannada is a more regular orthography compared to English, hence even if the stimuli is a non-word (which does not carry any meaning in Kannada), due to its accurate spelling-sound correspondence children can decode the units and read them better in Kannada than in English.

The findings on reading single words-nonwords suggest that performance was better in Kannada than English. Children made fewer errors while reading Kannada than English. In English, the error types that were commonly seen were those of regularizing irregular words. For e.g., ‘night’ was read as either /niʈ/ or /naiʈ/. These errors were greater for irregular nonwords. For e.g., ‘pight’ was read as /piʈ/. The error types on irregular nonwords in Kannada were lesser than in English. These findings suggest that for reading nonwords children do not require the language knowledge as the nonwords do not carry any meaning. Children are required to learn the orthographic principles of a language. In the present study the phonological errors (For e.g., /niʈ/ for ‘naiʈ’) in English indicated that children are familiar with the Kannada orthographic rules by Grade V itself and they appear to employ Kannada orthographic rules to decode English irregular nonwords. Lack of knowledge of G-P-C correspondence in English indicates that children are unable to read irregular nonwords in English. If we can assume that there is transfer of skills from Kannada to English causing errors in irregular nonwords then transfer of skills from transparent to opaque language in biliterates is likely to have negative effect.

Also, the developmental trend that was observed in the present was significantly evident for reading non-words between both the languages across all the three grades (see Figure 4.4.1.1) especially in reading English non-words. There was a significant difference in the performance of children for reading words and non-words in English suggesting that reading non-words in English becomes a very strong indicator to reveal the graded performance for assessing reading in children from younger to older grades. Thus the present study also supports findings of research in cross-language comparisons. Frith, Wimmer and Landerl (1998) studied 7-12 year old German-English children. They found that by age 7 itself children performed 75% and above in German, whereas, for English non-word reading children had not reached that level even by age 12 years. They depicted this developmental trend using the cross-language learning rate effect. Similar trend was seen in the present study also, which showed that children's performance improved with grades V, VI to VII. Reading for non-words especially in English has been found to be difficult for children who are learning also a regular orthography. This finding is in support of Goswami, Ziegler, Dalton and Schneider (2001) and Frith et al., (1994) who also attributed better performance in later grades due to instruction in school and experience they have gained in the later grades.

Further this can be explained using the psycho-linguistic grain size theory supporting Ziegler and Goswami (2005) views. Psycholingusitic grain size theory suggests that differences in reading accuracy across languages reflect fundamental differences in the phonology of the languages and the reading strategies that are developed in response to orthography of that particular language. This for example has been explained for more orthographically consistent alphabetic languages like Greek, German, Spanish or Italian in comparison to less orthographically consistent alphabet language, English. More orthographically consistent languages may rely more on grapheme-phoneme recoding strategies because grapheme-phoneme correspondences are relatively consistent. Whereas in English, children cannot use smaller grain sizes as easily because inconsistency is found to be much higher for smaller grapheme units than for larger units (Treiman et al., 1995). As a result, for English, they need to use a variety of strategies supplementing grapheme-phoneme conversion strategies which can aid them in reading. The findings of present study are in support of the view that, for reading English one would require a more sophisticated processing architecture like two separate routes (direct and indirect routes). And this may be achieved through instruction and learning that takes place through years of schooling. Whereas, a consistent regular orthography like Kannada would not require such sophistication in processing for reading. Hence, children have done much better in Kannada compared to English even on non-word reading.

4.4.2 Performance of children on reading comprehension

The reading comprehension subtest comprised of two passages each in Kannada and English. Children were asked to read the passages and answer the questions. Here, the two factors employed for statistical analysis are reading comprehension for two passages each in each of the two languages, Kannada and English.

In the present study, two-way repeated measures ANOVA was done. Mean and standard deviation (SD) scores, main effects of dependent variables (languages and reading comprehension tasks), independent variable (grade) and interaction effects for the above factors were derived. Post-hoc Duncan test was done to evaluate the significant difference across the three Grades V, VI and VII. Table 4.4.2 shows the overall mean and SD scores on reading comprehension in both Kannada and English.

Table 4.4.2. *Mean and SD scores on reading comprehension*
(Maximum score=16.0)

Languages	Kannada			English		
Grades	V	VI	VII	V	VI	VII
Mean	9.20	11.26	13.10	8.46	9.10	11.16
SD	1.44	2.25	2.10	1.61	1.32	1.98

Analysis of the results revealed that, the mean scores of children was better in Kannada (Mean=11.18, SD=2.52) than in English (Mean=9.57, SD=2.01). There was a significant main effect seen in the mean scores of children for reading comprehension in Kannada and English, $F(1, 87) = 66.87$, $p<0.001$. The results also showed that the mean scores of children improved from Grade V through Grade VII in Kannada (Mean scores ranging from 9.20-13.10) and in English (Mean scores ranging from 8.46-11.16). There was a significant main effect seen across grades, F (2, 87) =33.74, p<0.001. There was a significant interaction effect between language and grades at F (2, 87) =5.08, p<0.001. The analysis of results and post hoc Duncan test showed that there was a significant difference between the mean scores of children across Grades V, VI and VII. A developmental progression was also seen in the mean scores of children in Kannada and English. Figure 4.4.2 shows the developmental progression in the mean scores of children for reading comprehension in Kannada and English.

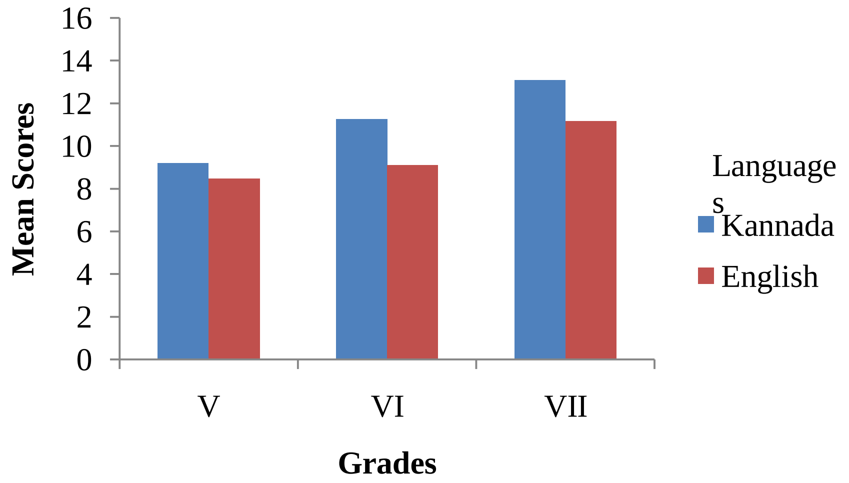

Figure 4.4.2. Mean scores of children on reading comprehension (RC)

Further one way analysis of variance (ANOVA) was done for four components of reading comprehension under study. These components were assessed in both Kannada and English for children across Grades V through VII. Children were assessed on two passages in Kannada and English. After reading each passage four questions were asked based on passages. The questions were framed to assess different levels of comprehension- text memory (TM), text integration (TI), access background knowledge (BK) and text inference (TINF). Results are depicted in Figures 4.4.2 (a) to 4.4.2 (e).

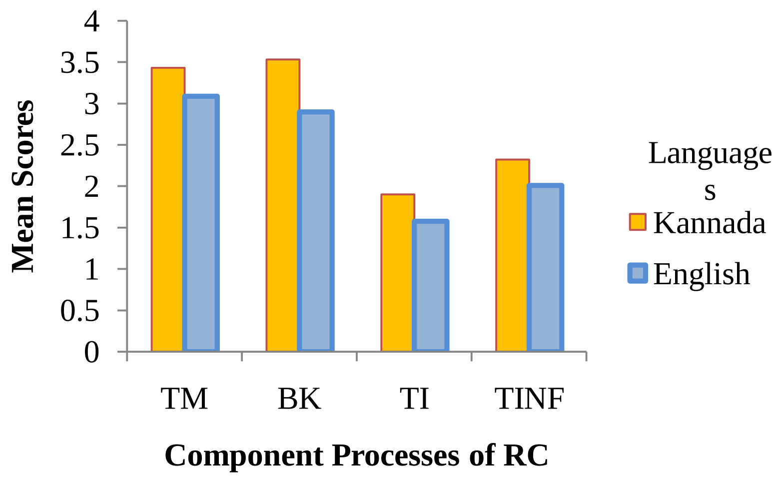

Figure 4.4.2.1. Mean scores on components of RC

Figure 4.4.2.1 shows overall mean scores of children for reading comprehension (RC) on various components. Overall, the results revealed that the mean scores of children were better in Kannada than in English. Mean scores of children on TM of RC was found to be better in Kannada (Mean=3.43, SD=0.71) than in English (Mean=3.09, SD=0.73). There was a significant difference in the mean scores of children for TM in Kannada at F (2, 87) = 12.77, $p < 0.001$ and English, F (2, 87) = 54.03, $p < 0.001$. Figure 4.4.2 (b) shows mean scores of children on TM across Grades V, VI and VII. Analysis of results also showed a developmental trend for TM across Grades V through VII in Kannada (Mean ranging from 3.03-3.87) and English (Mean ranging from 2.67-3.83). Post-hoc Duncan test results revealed that mean scores of children on TM in Kannada showed a significant difference between Grades V, VI and VI. However analysis of results in English revealed no significant difference between Grades V and VII, but a significant difference between Grades VI and VII was found.

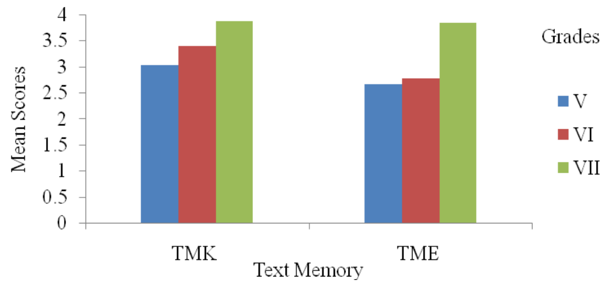

Figure 4.4.2.2. Mean scores on Text Memory (TM) of RC

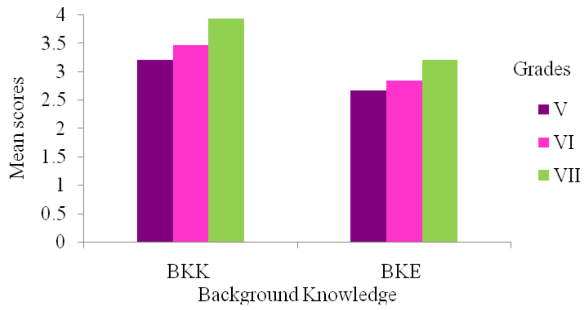

Figure. 4.4.2.3. Mean scores on Background Knowledge (BK) of RC

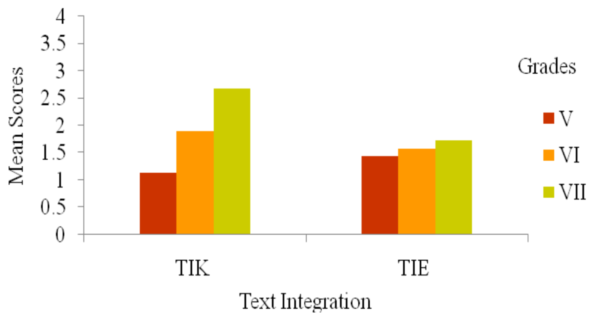

Figure 4.4.2.4. Mean scores on Text Integration (TI) of RC

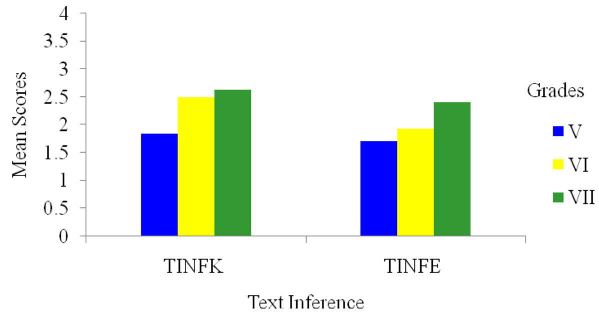

Figure 4.4.2.5. Mean scores on Text Inference (TINF) of RC

Note: TMK=Text memory in Kannada, TME=text memory in English, BKK=Background knowledge in Kannada, BKE=Background knowledge in English, TIK=Text integration in Kannada, TIE=Text Integration in English, TINFK=Text Inference in Kannada, TINFE=Text Inference in English.

Analysis of results also revealed that mean scores of children for BK was found to be better in Kannada (Mean=3.53, SD=0.96) than in English (Mean=2.9, SD=0.9) (Figure 4.4.2.1). There was a significant difference in the mean scores of children for BK in Kannada at $F(2, 87) = 4.85$, $p< 0.01$. However, there was no significant difference in the mean scores of children for BK in English. Analysis of results showed a developmental trend for BK across Grades V through VII in Kannada (Mean ranging from 3.20-3.93) and English (Mean ranging from 2.67-3.20) (Figure 4.4.2.3). Post-hoc Duncan test results revealed that mean scores of children on BK showed no significant difference across Grades V, VI and VII in Kannada and English.

Figure 4.4.2.1 shows mean scores of children on TI for RC in Kannada and English. Mean scores of children for TI was found to be better in Kannada (Mean=1.9, SD=1.01) than in English (Mean=1.5, SD=0.63). There was a significant difference in the mean scores of children for TI in Kannada at $F(2, 87) = 22.954$, $p< 0.01$. However, there was no significant difference in the mean scores of children on TI in English. Analysis of results also showed a developmental trend for TI across Grades V through VII in Kannada (Mean ranging from 1.13-2.67) and English (Mean ranging from 1.43-1.73) (Figure 4.4.2.4). Post-hoc Duncan test results revealed that the mean scores of children on TI in Kannada showed significant difference across Grades V, VI and VII. However analysis of results in English did not reveal significant difference in the mean scores of children across Grades V, VI and VII on TI.

Figure 4.4.2.1 shows mean scores of children on TINF in Kannada and English. Mean scores of children for TINF was found to be better in Kannada (Mean=2.32, SD=0.9) than in English (Mean=2.01, SD=1.09). There was a significant difference in the mean scores of children for TI in Kannada at $F(2, 87) = 7.41$, $p< 0.01$ and English, $F(2, 87) = 3.37$, $p< 0.05$. Analysis of results also showed a developmental trend for TINF across Grades V through VII in Kannada (Mean ranging from 1.83-2.63) and English (Mean ranging from 1.7-2.4) (Figure 4.4.2.5). Post-hoc Duncan test results revealed that the mean scores of children on TI in Kannada showed significant difference between Grades V and VI but showed no significant difference between Grades VI and VII. Analysis of results on TINF in English revealed that there was no significant difference between Grades V and VI;

Grades VI and VII, however, there was a significant difference between Grades V and VII.

Further, Figure 4.4.2.1 shows that the mean scores of children was better on BK and TM in comparison to TINF and TI. This finding was found to be true across Grades V through VII for both Kannada and English. The results indicate that, children acquire skills of BK and TM much earlier than TINF and TI for reading comprehension in both Kannada and English.

To summarize, the results on reading comprehension (RC) indicated a developmental sequence from Grades V through VII in both Kannada and English. While, this difference was large in the lower grade (Grade V), it was reduced in the higher grades (Grades VI and VII). Results on analysis of four components (TM, BK, TI, and TINF) for reading comprehension revealed a developmental sequence in both Kannada and English. However, the results indicated there was no significant difference in the performance of children in English on BK, TI and TINF components of RC and only a significant difference for TM between lower Grades V and VI. There was a significant difference in the performance of children for components in Kannada. The results indicated that children acquire TM and BK skills before TI and TINF skills (Figure 4.4.2.1).

Discussion

The results on reading comprehension revealed that, the performance of children was better in Kannada than in English (Table 4.4.2). There was a significant main effect in the performance of children for reading comprehension in Kannada and English. There was difference in scores between Kannada and English in the lower grade (Grade V) but not in the higher grades (Grades VI and VII). This finding suggest that in the lower grade reading comprehension that is said to depend on decoding skills is facilitated by the orthography of Kannada but not so in English (Geva and Siegel, 2000). Hence, these findings suggest that while, in the lower grade, reading comprehension is script dependent (as children comprehend text after decoding the words in the text and depend on script features while reading), that in the higher grades, reading comprehension may not be script dependent as decoding becomes more automatic and comprehension only depends on the central language processing skills. Better scores in Kannada than English can be attributed to the transparency in orthography of Kannada. A transparent orthography is stated to facilitate comprehension, as decoding is less demanding (Posner & Kar, in press) which enable children to visually decode the text easily in Kannada and store information in their short-term memory or even retrieve information from their background knowledge faster and more accurately due to their language experience with Kannada.

The results also showed that the performance of children improved from Grade V through Grade VII in both Kannada and English. This indicates a developmental progression in the performance of children from Grades V through VII as expected in both Kannada and English. However, this also indicates that overall, though reading comprehension seems to be more central processing skill, the rate of acquisition of reading comprehension in Kannada is different from acquisition of reading comprehension in English as observed across grades (Table 4.4.2). This suggests that by the time children reached Grade VII, performance of children would be better in Kannada than in English. The difference could be explained on the basis of script differences between Kannada and English and also to background knowledge of language. This can be attributed to the transparency in orthography of Kannada. A transparent orthography is believed to facilitate comprehension, as decoding is less demanding (Posner & Kar, personal communication March 23, 2010) which may enable children to decode the text easily in Kannada and store information in their short-term memory or even retrieve information from their background knowledge faster and more accurately due to their language experience with Kannada. Since English is a less transparent language and also a second language of these children, language experience in English is not adequate as it is in Kannada. Language experience here is related to the familiarity with words of academic curriculum essential not only for fluent reading but also to strengthen the internal lexicon (Mouzaki & Spantidakis, 2006). This finding is also in support of various other studies that acquisition of reading skills in two different languages can vary with the language experience and the academic vocabulary that children are equipped with in the earlier grades (de Quiros, 2008; Gough & Tunmer, 1986; Durgunoglu & Oney, 1999).

Any of these factors may have influenced a better performance in Kannada than in English. This difference is evident in Grade VII, may be because the children have not attained adequate primary level language skills like word decoding or reading accuracy in order to achieve the higher level reading comprehension skills which requires linguistic and cognitive abilities. This finding is in support of studies (Gough & Tunmer, 1986; Hoover & Gough, 1990; Perfetti, 1985; Stanovich, 1991) who stated that both levels of skills are considered necessary for successful reading comprehension. In addition, they also reported that insufficient development of lower level skills prevents the deployment of higher level processes due to inaccurate or laborious reading. Unlike listening comprehension, the performance of children was found to be better on reading comprehension (Tables 4.4.1for LC and 4.4.2 for RC).

Support for these findings are taken from Hannon and Daneman (2001) keeping in view that overall reading comprehension is not a script dependent skill but a central processing skill. Further componential analysis of the data also revealed that reading comprehension is more of a central processing skill as data on component process reveals a parallel growth in both the languages from Grades V through VII. Processes related to TI and TINF would be more difficult for younger children (Grade V) than TM and BK. This finding is indicative of a developmental progression of higher cognitive skills like integrating and drawing inference from a given text (August, et al., 2006). Similar developmental differences were observed in components assessed in study by Hannon and Daneman (2001). They have found that TI and TINF were major predictors to identify less skilled readers. This may be because processes that aid in integrating newly encountered information with information encountered earlier in the text or retrieval from long term memory (Daneman, 1991; Anderson & Pearson, 1984) is more difficult and an advanced cognitive skill compared to BK and TM (which is more of retrieval from short-term memory). Further, this difficulty in integrating information may lead to difficulty also in getting the overall gist or infer from the passage (Palincsar & Brown, 1985). Thus, children in Grade V who are less skilled in reading, than children in grade VI and VII show more difficulty in making inferences during reading (Hannon & Daneman, 1998; Long, Oppy & Seely, 1994) as less skilled readers show difficulty in integrating newly encountered information with information encountered earlier in the text as they have less capacity to keep the earlier information active in temporary storage and hence have problems in making inferences as well.

Results also indicate that when performance of children was compared for listening comprehension and reading comprehension, it was found that, children in

Grade V performed better on reading comprehension than listening comprehension (Tables 4.4.1 and 4.4.2 respectively). However, the difference in performances of children in the higher Grades VI and VII reduced for both languages in Kannada as well as in English. This indicates that children in lower grades are more dependent on getting information better through reading the text rather than listening to text information. This finding is in contrast to various other findings state that listening comprehension skills are better than reading comprehension skills especially in younger children like the first graders (Beimiller, 2003; Hoover & Gough, 1990). This may not hold good for the older children like the children in Grades V through VII who were found to be equally dependent on listening as well as reading comprehension. This may be because by this age children have mastered if not all some of the skills termed as school-based forms of literate language (Gee, 1999) for Kannada and English. These results suggest a common core that corresponds to higher level academic language use as Francis (1999) calls it and that holds good for the present study that children would have learnt these skills at least by Grade VII. As Beimiller (2003) suggests that comprehension is increased when the content is relevant to the experiences of the reader, and when the reader is able to develop a mental image of what was read. A correlational analysis further revealed that listening comprehension is related to reading comprehension especially in English which is indicative of the fact that both are dependent on each other as studies earlier have already suggested that improvement in reading comprehension is seen when there is an improvement in listening comprehension (Hoover & Gough, 1990; Sticht & James, 1984). In spite of differences quoted in literature that the processing mechanism involved in listening is not the same as in reading comprehension (former processed through an auditory mode and latter through the visual mode), the children seem to overcome these differences in the higher grades like Grades V through VII. This supports the view of Stanovich, Cunningham, and Freeman (1984) who reported that the relationship between reading comprehension and listening comprehension is very close, especially as children get older and reading comprehension becomes more constrained by knowledge and understanding, rather than basic word-level decoding. In adults, listening and reading comprehension are strongly correlated (Bell & Perfetti, 1994; Gernsbacher, Varner, & Faust, 1990). Although there are important differences between spoken language and written language, evidence suggests that listening and reading comprehension depend on very similar underlying processes especially in the higher grades. Rayner, Foorman, Perfetti, Pesetsky and Seidenberg (2001) argued that learning to read enables a person to comprehend written language to the same level as comprehending spoken language. Overall the results indicate that listening comprehension or reading comprehension skills of biliterate children in the higher grades do not differ since the skill does not appear to be governed by the nature of script but could be a central processing phenomenon as children move towards higher grades.

4.5. Performance of children on written language

In the present study written language skills was assessed with two different tasks-(a) writing to dictation and (b) expository writing task.

4.5.1 Performance of children on writing to dictation

The scores for writing to dictation were analyzed for the accuracy of writing correct words without errors. Alternative ways of writing English non-words were allowed, with correct responses being those that conform to English phoneme-grapheme rules or which produce a non-word by appropriate analogy with known English word parts. Mean scores for writing to dictation of a list of words and non-words in Kannada and in English for Grades V, VI and VII were computed. Scores on writing to dictation for words and non-words (considered as type of token) and languages, Kannada and English were considered as the two factors for statistical analysis. Two way repeated measures ANOVA was done to analyze the performance across grades in Kannada and English.

Analysis revealed mean and standard deviation (SD) scores, main effects of dependent variables (languages and words/nonwords), independent variable (grade) and interaction effects. Post-hoc Duncan test was done to evaluate the significant difference across the three Grades V, VI and VII. Table 4.5.1 shows mean and standard deviation (SD) scores across Grades V, VI and VII for writing to dictation for words and nonwords in Kannada and English. Statistical main effect and corresponding interaction effects are explained in the following sections.

Table 4.5.1. *Mean and SD scores on writing to dictation*

(N= 30 in each grade; Maximum score=60)

Writing to dictation	V		VI		VII		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Kannada	42.63	6.66	51.43	4.59	57.50	2.20	50.52	7.78
English	35.30	7.73	45.43	5.92	53.00	3.19	44.57	9.35

The results of two-way repeated measures ANOVA revealed that there was an improvement in the mean scores from Grades V through VII (see Table 4.5.1). A significant main effect was found across Grades at $F(2, 87) = 81.380$, $p<0.001$. Post-hoc Duncan tests revealed that there was a significant difference in the mean scores across Grades V through VII. The results revealed that mean scores were better for Kannada (Mean=50.52, SD=7.78) than for English (Mean=44.57, SD=9.35) and that there was a significant main effect between the two languages, Kannada and English at $F(1, 87) = 172.478$, $p<0.001$. A significant interaction effect was seen between languages and grades at $F(2, 87) = 3.269$, $p<0.05$ and between languages and type of token at $F(1, 87) = 32.07$, $p<0.001$. For the type of token, scores on writing to words was better than non-word and this was found to be significant at $F(1, 87) = 51.960$, $p<0.001$. The results suggested that performance was better for writing to dictation in Kannada than in English across Grades V, VI and VII (see Figure 4.5.1).

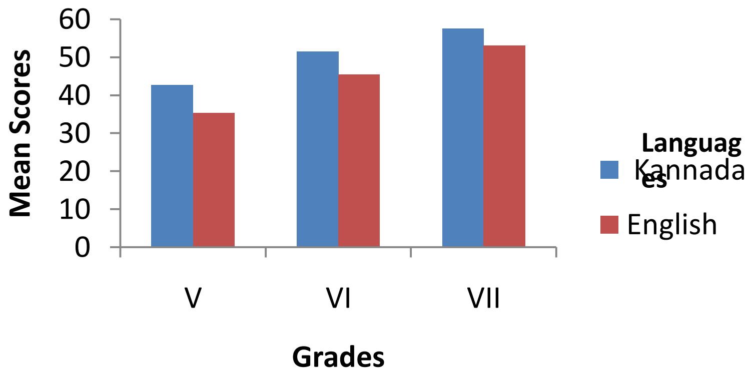

Figure 4.5.1. Mean score for writing to dictation

Table 4.5.2. *Mean and SD scores on writing to dictation of words-nonwords (N= 30 in each grade; Maximum score=30)*

Writing to dictation		V		VI		VII	
		Mean	SD	Mean	SD	Mean	SD
Kannada	Words	21.20	3.30	25.93	2.27	28.80	1.15
	Non-words	21.43	3.65	25.50	2.37	28.90	1.80
English	Words	18.63	3.89	23.66	2.46	26.96	1.51
	Non-words	16.66	4.23	21.76	3.69	26.03	1.77

a) Writing to dictation in Kannada

Analysis of results for Kannada revealed an overall significant main effect for mean scores across Grades V, VI and VII at $F (1, 87) = 49.101$, $p<0.001$. Results revealed that in Kannada, the mean scores were better for words (Mean=25.31, SD=3.95) than non-words (Mean=25.28, SD=4.08), however, this was not statistically significant across grades (Table 4.5.1). There was no significant interaction effect for writing to dictation between type of token and grades. Results in Table 4.5.2 showed that on writing to dictation of words in Kannada, there was an improvement in the mean scores from Grades V through VII. Mean scores were found to be lower for Grade V than for Grades VI and VII (Mean ranging from 21.20 to 28.80 for all the three grades) (Figure 4.5.2) and a significant main effect was found for grades at $F (1, 87) = 71.426$, $p<0.001$. Post-hoc Duncan test revealed that there was a significant difference in the mean scores across Grades V through VII.

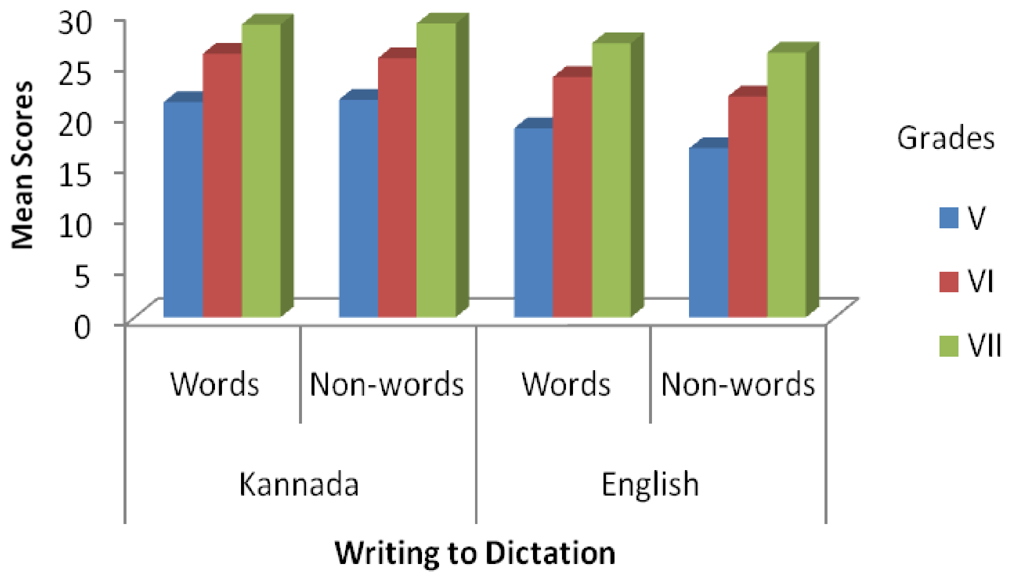

Figure 4.5.2. Mean scores for writing to dictation for words-nonwords

On writing to dictation for non-words in Kannada, the results revealed that the mean scores revealed a developmental progression from Grades V through VII. Table 4.5.2 shows that there is an improvement in the mean scores for writing to dictation for non-words in Grades V, VI and VII. On writing to dictation for non-words, the mean scores for Grade V were poorer than Grades VI and VII (Mean ranging from 21.43-28.90). Post-hoc Duncan test revealed that this difference was statistically significant for all the three Grades V, VI and VII. Figure 4.5.2 shows a developmental progression in the mean scores for writing to dictation of non-words.

b) Writing to dictation for words-nonwords in English

Results of writing to dictation of English (WDE) revealed that the mean scores were better for words (Mean=23.09, SD= 4.42) than non-words (Mean=21.49, SD= 5.11) and this was found to be statistically significant at $F(2, 87) = 60.098$, $p<0.001$. A significant main effect was found in the mean scores across Grades V, VI and VII, $F(1, 87) = 67.501$, $p<0.001$. On writing to dictation in

English, there was no significant interaction effect for writing to dictation between English and grades. Post-hoc Duncan test showed a significant difference in the mean scores across Grades V through VII. Results in Table 4.5.2 shows that for writing to dictation of words in English, there was an improvement in the mean scores from Grade V to Grades VI and VII (Mean scores ranging from 18.63 to 26.96). Figure 4.5.2 shows a developmental progression in the performance from Grades V through VII.

Results on writing to dictation for non-words in English revealed a developmental progression from Grades V through VII. Table 4.5.2 shows that there is an improvement in the mean scores for writing non-words in English to dictation from Grades V through VII. On writing non-words to dictation, the mean scores was lower in Grade V than Grades VI and VII (Mean scores ranging from 16.66 to 26.03). Post-hoc Duncan test revealed a statistically significant difference across Grades V, VI and VII. Figure 4.5.2 shows a developmental progression from Grades V through VII. Performance on writing non-words in Kannada and English to dictation for was poorer than writing non-words in Kannada to dictation (Figure 4.5.2).

To summarize, a developmental progression was observed across the three Grades V, VI and VII for writing words and nonwords to dictation in Kannada and English (Figures 4.5.1 and 4.5.2). Though, performance was better for words than non-words in both Kannada and English, results revealed that it was not statistically significant for Kannada but significant for English. The developmental progression was significant for writing to dictation of both words and non-words in both Kannada and English across Grades V through VII. The findings of the study suggest that while, writing to dictation in Kannada did not reveal significant difference between words and non-words (type of token), that in English showed a highly significant difference between words and non-words at F (1, 87) =60.098, p<0.001.

Discussion

Overall a developmental trend was seen across the three Grades V, VI and VII for writing words and non-words in Kannada and English to dictation (Figure 4.5.1). This difference in performance was found to be significant between the two languages in the lower grade (Grade V). Performance of Grade V was found to be better for words in Kannada than in English (Figure 4.5.2). Difference in performance between Kannada and English was found to be reduced by Grades VI and VII. Children appear to have mastered a few skills for writing to dictation equally well for words in both Kannada and English in the higher grades. Results also revealed that while in Kannada there was no significant difference between words and nonwords that in English showed a statistical significant difference between words and nonwords. Errors were greater for writing nonwords than words in English. For e.g., typical errors made on English nonwords were those on irregular nonwords such as ‘pight’ which was written as ‘pit’. These were considered as phonological errors as they suggest that children employed the orthographic principle to write the word on dictation. They did not employ the phoneme to grapheme correspondence (P-G-C) rules in English for the irregular nonwords. Similar errors were observed for irregular real words. For e.g., Irregular real word ‘length’ was written as ‘lenth’. While the errors in English is attributed to lack of awareness of P-G-C rules in English, that in Kannada were due to lack of mastery of a few orthographic principles in Kannada. For e.g., nonwords such as ‘ನಾರ್ಕಟಕ’ (/na:rkaʈaka/) in which the ‘ರ್’ /ar/ is pronounced before /k/ while in writing it follows /k/ thus making it irregular). These errors were observed in the writing sample of children in the lower grade (Grade V). The errors of such kind reduced in the higher grades (Grades VI and VII) in Kannada. The pattern of errors suggest that by Grade VII, children have mastered the orthographic principle for irregular words in Kannada but continue to develop learning the rules of English even beyond Grade VII (Figure 4.5.2).

Writing to dictation requires a child to process phonological to orthographic information (hears the word, analyses its phonological components and associates the components with the grapheme to write the word) referred to as phoneme to grapheme correspondence (referred to as grapheme to phoneme correspondence while reading). By nature of the structure of English language itself, it is less transparent and irregular language which follows a poor phoneme to grapheme correspondence (P-G-C). As mentioned earlier due to its nature, Kannada script is more transparent compared to English, due to its high symbol-sound and sound-symbol correspondence, writing to dictation of nonwords is expected to be as accurate as words. For e.g., a word such as 'ಬಾಲಕ' /ba:laka/ (boy) and a nonword such as 'ಸಾಲಕ' /sa:laka/ (no meaning in Kannada) requires a child to substitute /sa:/ for /ba:/. There are only few irregular forms in Kannada such as 'ರ್' /ar/ and 'ಅಂ' /am/ which appears as an irregular form when they appear in words like 'ಕರ್ನಾಟಕ' /karna:ʈaka/ and 'ಕಾರಂಜಿ' /ka:ramji/ need to put the nasal diacritic. Nature of these irregular words is explained in the previous section. In Kannada, graphemes are easily visualized for phonemes as a specific grapheme represents particular syllable (CV) which are called 'aksharas' or letters in Kannada. In English, irregularity exists in the way a sound and symbol are mapped (poor phoneme to grapheme correspondence). For e.g., in English ‘length’ an irregular word is pronounced as /lent/, however, the grapheme ‘g’ is considered silent and does not represent any phoneme in this context. So, the notion of ‘spelling’ in English is not similar to ‘spelling’ in Kannada as in Kannada spelling refers to the knowledge of orthographic principles (Prema, 1998). Given the nature of Kannada syllabary (with regular grapho-phoneme correspondence), unlike English, the writing skills depend on the knowledge of orthographic principles rather than the knowledge of spelling (defined as naming the individual alphabets that make up a word). Unlike in English, role of spelling is stressed in the acquisition of reading, in a script such as Kannada, knowledge of orthographic principles is one of the important factors in the acquisition of reading (Prema, 1998). These factors may influence the performance of children also on writing to dictation of words-nonwords and hence a child writes better in Kannada than in English.

The performance in writing to dictation seems to follow the results for reading, except that in reading, children employ grapheme-phoneme correspondence for visual decoding of words. The results suggest that writing to dictation follows reading in Kannada, and children listen to the word compare the orthography and produce in writing. As suggested in literature orthographic sensitivity is crucial for literacy acquisition and is achieved only at a certain age or extent of exposure to that language. The findings are in support of Prema (1998) who reported that writing follows reading in Kannada. In the present study though both Kannada and English are introduced at the same time (by Grade I), children produced fewer errors on writing in Kannada than in English. This suggests that while exposure to language may be a crucial factor for reading, writing requires mastery of orthographic sensitivity especially in Kannada. The findings suggest that children have mastered the skill to writing in Kannada due to the ease with which children can associate for phonological (or syllable) to orthography (akshara) in Kannada. The differences in reading and writing between Kannada and English could also be due to the nature of orthography. This can be explained by the fact that a reader of an Indian script does not learn the vowel component and consonant component separately and then combine them to form a syllable. Rather, the child first learns the basic syllabary with primary forms of vowels and consonants and then the entire syllabary containing all possible CV combinations by rote (Karanth, 2006).

Greater spelling errors in English may be because Indian children appear to use the same strategy (orthographic principle against P-G-C rules in English) as they do while decoding Kannada word for reading and producing the same while writing. Hence, in the present study the type of errors seen in English was more of the phonological type of errors, for e.g., the words 'sauce' was written as 'saus'. As mentioned earlier, children are still in the process of mastering the irregularity of P-G-C rules in English and hence, tend to make more errors by regularizing irregular words while writing English. Other errors found were on words like 'night' were written as 'nite' or 'nit' by children in Grade V and a few children in Grade VI. These errors were not found in Grade VII. This indicates that irregular words in English such as 'night' or 'sauce' require exposure to the words and rules in English which children learn in the course of time. Subsequent exposure to the printed word 'night' may then allow children to infer that 'igh' represents the medial vowel sound for /ai/ in the word /naiʈ/.

In a transparent orthography like Kannada, the mappings from letters to sound are much more consistent, and there are very few irregular words (like put kannada form /karma/ in which the /ar/ is pronounced before /m/ whereas in writing the /ar/ grapheme is placed after /m/ grapheme). As Gupta and Jamal (2006) reported that errors in reading in Hindi and English were dependent on the transparency of orthography and more errors were seen for reading in English. The present study seems to follow the pattern of differences in orthography which contribute to reading errors may be contributing to writing errors as well. This is because reading and writing are dependent on each other, despite the nature of orthography.

Support for these findings can also be taken from Wimmer and Goswami (1994) who reported that the transparency of orthography has a direct effect on reading development. The reported that if an orthography is highly transparent, with very consistent mappings from spelling to sound, then grapheme-phoneme correspondences should be easier to detect and use: a direct effect. In a less transparent orthography, the underlying rules may be less consistent, and may be more complex in terms of being context-sensitive and operating at different phonological levels. With such orthographies, it may be more adaptive initially to learn spelling patterns for individual words, and then to use various strategies such as analogy to try and read new words. While reading is considered a decoding skill and requires grapheme to phoneme correspondences, that of writing requires phoneme to grapheme correspondence. Better performance for writing to dictation in Kannada than in English suggests that Kannada, a transparent orthography is easier and requires little effort from children to decode the words and execute it in writing. Greater errors in English suggest that children are still in the process of learning to write using their own strategies.

The results suggest that for writing nonwords in English, children appeared to employ the orthographic principles used for Kannada instead of employing spelling rules that is essential for English. It appeared that for writing nonwords, children used the lexical-semantic route of Kannada instead of the phonological route that is important for English. Therefore, strategies used for reading and writing are different for Kannada and English. Children in the lower grades (Grades V and VI) were found to be more sensitive to the orthographic rules in Kannada and the analysis of writing errors in English indicated that children attempted to use similar orthographic rules in English as they did for Kannada. The findings suggest that strategies for reading and writing in Kannada and English are different and this needs attention for teaching the Indian children in the biliteracy context. The findings of the present study suggests that, in spite of being biliterates, children have not acquired the P-G-C rules required for English and still adhere to orthographic rules of Kannada to English. Hence, transfer of skills (reference) could be taking place from Kannada to English which seem to cause interference in English, similar to the findings reported for reading words-nonwords. However, further studies are warranted to strengthen the findings of transfer of skills in Kannada and English.

4.5.2 Performance of children on expository writing

In the present study written language was assessed by employing expository writing task (WS). Children were instructed to write on a topic 'My school' in Kannada and in English. The written sample was analyzed using a modification of Nelson, Bahr and Van Meter's (2004) and Puranik, Lombardino and Altmann (2008) protocol for analyzing written language. A total of eight variables were analyzed in Kannada and in English.

- Total number of words (TNW)
- Number of T-units (T-UNIT)
- Mean length of T-UNIT (MLT-UNIT)
- Number of clauses (CL)
- Clause density (CLD)
- Percentage of spelling errors (SPELL)
- Percentage of grammatical T-units (GRAM T-UNIT)
- Punctuation and Capitalization errors (CONVEN)

Performance of children on writing task was analyzed using two way repeated measures ANOVA with grade as independent factor. Two way repeated measures ANOVA was employed for each of the above variables separately to analyze the differences across grades and between languages. The two factors are languages i.e., Kannada and English and the other factor is the variable under analysis. Two-way repeated measures ANOVA lend details on mean and SD scores for the data, significant main effects if any and interaction effects if any. Post-hoc Duncan test was done to check for differences in performance of children across Grades V, VI and VII. Table 4.5.3 shows mean and standard deviation (SD) scores across Grades V, VI and VII for the two languages under study, Kannada and English.

Table 4.5.3. *Mean and SD scores on expository writing task*

Expository writing	V		VI		VII	
	Mean	SD	Mean	SD	Mean	SD
WSK	86.81	14.18	150.59	26.61	183.02	15.93
WSE	141.57	23.95	173.52	27.80	197.34	15.12

Note: WSK= Expository writing in Kannada, WSE= Expository writing in English

Table 4.5.3 shows that the means scores are higher for written language in English than in Kannada. The mean scores were higher in English (Mean scores ranging from 141.57 to 197.34) than in Kannada (Mean scores ranging from 86.81 to 183.02) across Grades V through VII. While the mean scores on majority of the subtest are better for Kannada stimuli than for English stimuli, the higher scores in English on expository writing task needs to be explained with reasons. In view of the structural differences between Kannada and English and the common measure employed for writing analysis, it is plausible that the scores for Kannada do not truly reflect their performance. This premise is discussed detail later in greater.

The findings suggest that structure of languages Kannada and English are such that they necessitate specific measures for assessment of written language in Kannada and English. These scores need not reflect actual skills in writing Kannada and English.

Table 4.5.4. M*ean and SD scores for measures on expository writing task*

Languages		Kannada			English		
Grades		V	VI	VII	V	VI	VII
TNW	Mean	55.70	98.40	117.53	99.16	116.23	126.20
	SD	10.32	17.90	9.42	18.40	19.84	9.16
T-Unit	Mean	7.66	17.76	25.96	10.26	20.40	28.63
	SD	1.53	5.44	5.41	1.68	7.32	4.40
MLT-UNIT	Mean	7.38	5.83	4.64	9.66	6.42	4.50
	SD	1.42	1.30	0.86	1.36	2.51	0.71
CL	Mean	8.43	20.36	29.66	11.60	22.06	32.20
	SD	1.63	6.25	5.24	2.48	7.58	4.68
CLD	Mean	1.10	1.14	1.17	1.13	1.08	1.12
	SD	.012	0.13	0.12	0.12	0.10	.072
SPELL	Mean	5.24	5.69	3.10	6.72	3.72	3.68
	SD	1.96	1.98	1.42	2.65	2.21	2.38
GTU	Mean	0.45	0.57	0.79	0.34	0.42	0.68
	SD	0.12	0.16	0.10	0.14	0.29	0.10
CONVEN	Mean	0.72	0.86	0.13	1.17	1.66	0.26
	SD	1.09	1.04	0.43	1.25	1.64	0.69

Note: TNW= Total number of words, T-UNIT =Number of T-units, MLT-UNIT=Mean length of T-UNIT, CL= Number of clauses, CLD= Clause density, SPELL= Percentage of spelling errors, GRAM T-UNIT=Percentage of grammatical T-units, CONVEN=Punctuation and Capitalization

4.5.2.1 Total number of words (TNW)

The results showed that there was a significant main effect in the mean scores for total number words (TNW) produced, $F (1, 87) = 252.51$, $p<0.001$. Also a significant interaction effect was found between TNW and Grades V, VI and VII, $F (2, 87) = 50.35$, $p<0.001$ level. Results showed a developmental progression across grades where children in Grade V produced fewer words than Grades VI and VII (see Table 4.5.4 for mean scores across the three grades). Post-hoc Duncan test showed a significant difference in the performance of children across Grades V, VI and VII.

The results showed that there was a developmental progression in the performance of children in both Kannada and English for TNW. In Kannada, children in Grade V (Mean=55.70, SD=10.32) produced fewer words than Grade VI

(Mean=98.40, SD=17.90) and Grade VII (Mean=117.53, SD= 9.42). Post-hoc Duncan test revealed a significant difference in the performance of children across Grades V, VI and VII. Similar results were found for the performance of children across grades for writing in English. Children in Grade V (Mean=99.16, SD=18.40) produced fewer words than Grade VI (Mean=116.23, SD=19.84) and Grade VII (Mean=126.20, SD=9.16). There was an improvement in the performance of children from Grade V through Grade VII. Post-hoc Duncan test showed that there was a significant difference in the performance of children across Grades V, VI and VII.

4.5.2.2 Number of T-units (T-UNIT)

The results showed that there was a significant main effect in the performance of children for number of T-units (T-UNIT) produced, $F(1, 87) = 28.26$, $p<0.001$. There was no interaction effect found between T-UNIT and grades. There was a developmental progression found in the performance of children across the three grades where in children in Grade V were found to produce less number of words than Grades VI and VII (see Table 4.5.4 for mean scores across grades). Further post-hoc Duncan test for T-UNIT showed that there was a significant difference in the performance of children across Grades V, VI and VII.

Two-way repeated measures ANOVA revealed that the performance of children to produce T-UNITS in Kannada improved from Grade V (Mean=7.66, SD=1.53) to Grade VI (Mean=17.76, SD=5.44) and Grade VII (Mean=25.96, SD=5.41) (see Table 4.5.4). Post-hoc Duncan test revealed a significant difference in the performance of children across Grades V, VI and VII. There was a developmental progression found in the performance of children across the three grades where in children in Grade V were found to produce less number of T-

UNITS than Grades VI and VII. Similar results were found in the performance of children across grades in English. Children in Grade V (Mean=10.26, SD=1.68) produced fewer T-UNITS than Grade VI (Mean=20.40, SD=7.32) and Grade VII (Mean=28.63, SD=4.40). There was an improvement in the performance of children from Grade V to Grade VII. Further post-hoc Duncan test showed that there was a significant difference in the performance of children across Grades V, VI and VII.

4.5.2.3 Mean length of T-UNIT (MLT-UNIT)

The results showed that there was a significant main effect in the performance of children for mean length of T-UNIT (MLT-UNIT) produced, $F(1, 87) = 29.19$, $p<0.001$. There was also a significant interaction effect found between MLT-UNIT and grades, $F(2, 87) = 18.29$, $p<0.001$. There was a developmental progression found in the performance of children across the three grades and children in Grade V were found to have lower MLT-UNIT than Grades VI and VII (see Table 4.5.4 for mean scores across the three grades). Post-hoc Duncan test for MLT-UNIT showed that there was a significant difference in the performance of children across Grades V, VI and VII.

Two-way repeated measures ANOVA revealed that the performance of children to produce MLT-UNIT in Kannada and English. Mean scores improved from Grade V for Kannada (Mean=7.38, SD=1.42) and English (Mean=9.66, SD=1.36) to Grade VI (Mean=5.83, SD=1.30) for Kannada and English (Mean=6.42, SD=2.51) and Grade VII for Kannada (Mean=4.64, SD=0.86) and English (Mean=4.50, SD=0.71) (see Table 4.5.4). Post-hoc Duncan test showed that there was a significant difference in the performance of children across Grades V, VI and VII. There was a developmental progression found in the performance of children across the three grades where in children in Grade V were found to produce less number of MLT-UNIT than Grades VI and VII.

4.5.2.4 Number of clauses (CL)

The results showed that there was a significant main effect in the number of clauses (CL) produced by children, F (1, 87) =23.42, p<0.001. There was no significant interaction effect found between CL and grades. Children in Grade V produced fewer clauses (CL) than Grades VI and VII (see Table 4.5.4 for mean scores across the three grades). Results indicated a developmental progression across grades. Results revealed that the number of CL produced by children in Kannada improved from Grade V (Mean=8.43, SD=1.63) to Grade VI (Mean= 20.36, SD= 6.25) and Grade VII (Mean= 29.66, SD= 5.24) (see Table 4.5.4). There was a developmental progression in the performance of children across the three grades where in children in Grade V were found to produce less number of CL than Grades VI and VII. Similar results were found in the performance of children across grades in English. Children in Grade V (Mean=11.60, SD=2.48) produced fewer CL than Grade VI (Mean= 22.06, SD=7.58) and Grade VII (Mean= 32.20, SD=4.68). There was an improvement in the performance of children from Grades V through VII. Post-hoc Duncan test revealed a significant difference in the performance of children for CL across Grades V, VI and VII in both Kannada and English.

4.5.2.5 Clause density (CLD)

The results showed that there was no significant main effect in the performance of children for CLD. There was also no significant interaction effect found between CLD and grades. Two-way repeated measures ANOVA revealed that the measure CLD showed an improved performance of children in Kannada from

Grades V to VII. However, the CLD in English did not reveal any such trend in the mean scores (see Table 4.5.4 for mean scores).

4.5.2.6 Percentage of spelling (SPELL)

The results indicated that there was no significant main effect in the percentage of spelling (SPELL) by children. There was a significant interaction effect between SPELL and across grades, $F (2, 87) = 12.078$, $p<0.001$.There was a developmental progression found in the performance of children across the three grades and children in Grade V produced fewer accurate spellings than children in Grades VI and VII (see Table 4.5.4 for mean scores across the three grades). Further post-hoc Duncan test for SPELL showed that there was a significant difference in the performance of children across Grades V, VI and VII.

Analysis of results revealed that the percentage errors in spelling produced by children in both Kannada and English. The percentage of errors was higher in Grade V for Kannada (Mean= 5.24, SD= 1.96) and English (Mean= 6.72, SD= 2.65), Grade VI for Kannada (Mean= 5.69, SD= 1.98) and English (Mean= 3.72, SD= 2.21) compared to Grade VII for Kannada (Mean= 3.10, SD= 1.42) and English (Mean= 3.68, SD=2.38) (see Table 4.5.4). Post-hoc Duncan test showed that there was no significant difference in the mean scores of children between Grades V and VI. There was a significant difference between Grades VI and VII. This indicates that children improve their spelling from Grades V through VII. The mean scores revealed a developmental progression across grades and children in Grades V and VI showed more spelling errors than Grade VII.

4.5.2.7 Percentage of grammatical T-UNITS (GRAM T-UNIT)

The results showed that there was a significant main effect in the percentage of grammatical T-UNITS shown by children, $F(1, 87) = 21.141$, $p<0.001$. A significant main effect was also seen across grades, $F(2, 87) = 57.513$, $p<0.001$. There was no significant interaction effect found between GRAM T-UNIT and grades. Mean scores of children revealed a developmental progression across grades and children in Grade V showed fewer GRAM T-UNIT than in Grades VI and VII (see Table 4.5.4 for mean scores across the three grades). Post-hoc Duncan test for revealed a significant difference in the mean scores of children across Grades V, VI and VII.

Analysis of results revealed that the GRAM T-UNIT produced by children in both Kannada and English. The scores improved from Grade V for both Kannada (Mean= 0.45, SD=0.12) and English (Mean= 0.34, SD= 0.14) to Grade VI for Kannada (Mean= 0.57, SD=0.16) and English (Mean= 0.42, SD=0.29) and Grade VII for Kannada (Mean= 0.79, SD= 0.10) and English (Mean= 0.68, SD= 0.10) (see Table 4.5.4). Post-hoc Duncan test showed that there was no significant difference in the mean scores of children across Grades V and VI. There was a significant difference between Grades VI and VII. An improvement in the mean scores of children across Grades V through VII indicated a developmental progression across grades and children in Grade V produced less number of GRAM T-UNIT than Grades VI and VII.

4.5.2.8 Convention including punctuation and capitalization (COVEN)

The results showed that there was a significant main effect in the convention including punctuation and capitalization (COVEN) errors made by children, F (1,

87) =8.05721.141, $p<0.01$. A significant main effect was also seen across grades, $F(2, 87) = 14.487$, $p<0.001$. There was no significant interaction effect found between PUNC and grades. Results showed a developmental progression across grades and children in Grade V produced greater PUNC errors than in Grade VI and Grade VII (see Table 4.5.4 for mean scores across the three grades). Further post-hoc Duncan test for PUNC revealed no significant difference in the mean scores of children between Grades V and VI. There was a significant difference in the mean scores of children between Grades VI and VII.

Analysis of results revealed that the PUNC errors made by children in both Kannada and English. The errors reduced from Grade V for Kannada (Mean= 0.72, SD= 1.09) and English (Mean= 1.17, SD= 1.25) to Grade VI for Kannada (Mean= 0.86, SD= 1.04) and English Grade VII (Mean= 0.13, SD= 0.43) (see Table 4.5.4). Post-hoc Duncan test showed no significant difference in the mean scores of children across Grades V and VI. There was a significant difference between Grades VI and VII. Results indicated a developmental progression across grades and children in Grade V made more errors in PUNC than Grade VI and Grade VII.

In general, the results on written language skills for expository writing task revealed a developmental progression in the mean scores of children from the lower grades to higher grades (Grade V to Grade VII). This developmental progression was significant for total number of words (TNW), number of T-units (T-UNIT), mean length of T-UNIT (MLT-UNIT), number of clauses (CL), percentage of spelling errors (SPELL) and percentage of grammatical T-units (GRAM T-UNIT) measures. Children in Grade V produced fewer words, fewer T-units and fewer MLT-units compared to children in Grades VI and VII. Children in Grade V produced more spelling errors and fewer grammatical T-UNITS than children in

Grades VI and VII. Developmental progression was not significant for clause density and punctuation and capitalization errors, although the mean scores were better in higher grades (Grades VI and VII) than lower grade (Grade V). Children in Grade V produced more punctuation and capitalization errors than Grades VI and VII in both Kannada and English.

Discussion

In the present study, TNW and T-UNITs were calculated as measures of *productivity*, MLT-UNIT, CL and CLD were measures of *syntactic complexity* and SPELL, GRAM T-UNIT and CONVEN as measures of *accuracy* for assessing written language skills. Consistent patterns were demonstrated in the performance of children at different grade levels. The mean scores of children in Grade V on almost all the variables was consistently lower than the mean scores of children in Grade VI and Grade VII. Following the principle of Puranik, Lombardino and Altmann (2008), the eight variables examined for written language on expository writing task were categorized into three constructs: productivity, complexity, and accuracy of writing.

Productivity: Examination of the descriptive data shows a steady increase in the mean scores of all the measures of productivity from Grades V through VII in both Kannada and English writing. In both the languages, children in Grades VI and VII used more words, produced greater number of T-units and clauses than children in Grade V. These results are consistent with findings from previous studies on written language showing that measures of productivity are sensitive to changes in age and grade (Berman & Verhoevan, 2002; Nelson & Van Meter, 2007; Puranik et al., 2008). It was also found that children used more words (greater TNW), produced greater number of T-units and clauses in English than in Kannada across all Grades V, VI and VII (see Table 4.5.4). These differences in productivity can also be due to the differences in the structure of Kannada and English. While, the structure of Kannada is such that morphemes are usually fused to form words used for speech or in writing text, that of English requires use of different words to convey different meaning. In English, construction of clauses is essential with subject and predicate for a grammatically correct sentence to convey information in the text. For e.g., A sentence in English 'I have many friends at school' contains 6 words with 6 free and one bound morphemes. If this sentence is conveyed through writing in Kannada it would be written as- 'ಶಾಲೆಯಲ್ಲಿ ನನಗೆ ಹಲವಾರು ಸ್ನೇಹಿತರಿದ್ದಾರೆ.' (/ʃa:lejalli nanage halava:ru sne:hitaridda:re/) contains 4 words with 4 free morphemes and 5 bound morphemes with fused morphemes, for e.g., The word 'ಶಾಲೆಯಲ್ಲಿ' /ʃa:lejalli/ is formed when 'ಶಾಲೆ' /ʃa:le/ is fused with 'ಅಲ್ಲಿ' /alli/. In order to convey the same meaning in writing, English requires more number of words compared to Kannada, hence, this can contribute to producing more TNW in English than in Kannada. The agglutinative nature (i.e., each word may be a combination of several morphemes) of Kannada itself may have led children to produce less number of words than English. Similarly, a sentence in English for e.g., 'I eat lunch that my mother packs' contains 2 clauses. If this sentence is conveyed through writing in Kannada it would be written as 'ನಾನು ನಮ್ಮ ಅಮ್ಮ ಕಟ್ಟಿದ ಊಟ ತಿನ್ನುತ್ತೇನೆ.' (/na:nu namma amma kaʈʈida u:ʈa tinnutte:ne/) contains only 1 clause. Hence, in Kannada writing information can be conveyed with lesser number of words (TNW) shorter sentences or fewer clauses, T-UNITS and lower CLD, while structure of English requires greater number of words (TNW), longer sentences, greater number of clauses, T-UNITS and higher CLD. The findings suggest that structure of languages Kannada and English necessitates specific measures for assessment of written language in Kannada and English.

Complexity: Significant improvement across grades was observed only for MLT-unit which was used as one of the measures of complexity. The MLT-unit was found to show a decreasing trend across Grades V, VI and VII in both Kannada and English. This indicates that children are using shorter units to convey their ideas with advancing age or grades. Previous studies which applied MLT as a measure of syntactic complexity (Scott, 1988; Puranik et al., 2008) found no significant improvement across age and also a found a slow increase in MLT as a function of age. Present study contradicts the above studies and showed a slow decrease in the MLT-unit rather than an increase in the MLT-unit. Another measure of complexity that was examined was CLD. No significant improvement was found across grades in the present study. The mean scores indicated a very slow increase in CLD from Grade V to Grade VII in Kannada, however, this trend was not observed in English. Consistent with the results of findings of Hunt (1970) and Nipold, Ward-Lonergan, and Fanning (2005), Puranik, et al., (2008) children in Grade VI and Grade VII showed a marginal increase in CLD over Grade V in Kannada. The trend was not true for CLD measure in English. This could be because children writing in English may be constrained while using words from their vocabulary to convey their ideas, whereas, children writing in Kannada have vocabulary enough to frame sentences to express their ideas. Older children could produce more complex sentences in Kannada than younger children in Grade V.

Accuracy: Percentage of spelling errors and percentage of grammatically correct T-units used as measures of accuracy, both showed a developmental trend across Grades V, VI and VII. On the spelling measure, a greater proportion of spelling errors was found for Grade V compared Grades VI and VII. This indicates that the spelling accuracy improved from Grades V through VII suggesting a developmental pattern. This pattern of improved spelling accuracy with age and grade has been noted in other studies (Berman & Verhoevan, 2002; Nelson & Van Meter, 2003, Puranik et al., 2008). Considerable variability was observed in spelling performance as noted in the standard deviations obtained. The variability in terms of the type of words that the children have selected to express their ideas and unfamiliarity with respect to its spelling may be other factors for spelling in Kannada and English. In the present study, spelling errors were greater in English than in Kannada. These errors were greater in Grade V than Grades VI and VII. However, the errors were found to reduce in English especially in the higher Grades VI and VII (see Table 4.5.4), whereas, in Kannada no such trend was noticed. Spelling in English is not similar to 'spelling' in Kannada. Spelling in Kannada refers to the knowledge of orthographic principles (Prema, 1998). Given the nature of Kannada alphasyllabary (with regular grapho-phoneme correspondence), unlike English, the writing skills depend on the knowledge of orthographic principles rather than the knowledge of spelling (defined as naming the individual alphabets that make up a word). Unlike in English, role of spelling is stressed in the acquisition of reading, in a script such as Kannada, knowledge of orthographic principles is one of the important factors in the acquisition of reading (Prema, 1998). Findings of the present study suggested that children appeared to have learnt the orthographic principles in Kannada, whereas they appear to employ the orthographic rules of Kannada to English (when English requires phoneme to grapheme correspondence to write words rather than the orthographic rules). Therefore children appear to make fewer errors in Kannada compared to that in English.

Percentage of GT-units which was yet another measure of accuracy also showed a similar developmental trend from Grades V to VII both in Kannada and English. The fact that children learn grammatical complexity with age was found to be true in the present study. Children in the earlier grades produced fewer grammatically correct sentences than children in the later grades. This is yet another evidence to prove that syntactic development to written language is in parallel to oral language. Noteworthy, in the present study is that, GT-unit indices were higher in Kannada compared to indices in English in all the Grades V, VI and VII. This suggests that syntactic complexity in written language is also dependent on the oral language which is the native language of a child. The second language which is still developing due to academic learning is probably taking some more time to reach the level of the first language syntactic complexity.

Finally children at different grade levels did not differ significantly on the two writing conventions measures used in the present study. The present study looked for simple writing conventions like capitalization and punctuations. There is little research on developmental changes in punctuation and capitalization in children. In the present study most basic punctuations like comma, full-stop, exclamation and double quotation were observed. Children in Grade V confined punctuation usage to full-stop and comma in both Kannada and English. Children in the higher Grades VI and VII used slightly complex punctuation marks like double quotation and also exclamation marks along with comma and full stops. Capitalization errors (as part of convention) was analyzed only for English as by nature of Kannada script, capitalization is not used in writing Kannada text. Hence, comparison was made only for punctuation errors in Kannada and English as both the writings involve same rules for punctuation.

Chall (1983) reported that a marked shift in literacy skills occurs at Grade III itself when children are expected to have mastered the basic reading skills and begin to read for meaning. In addition to this, oral vocabulary has been found to show a steep growth with children learning about 9,000 new words from Grade I to III but 20,000 from Grades III to V (Anglin, 1993). Similarly children have been found to show rapid progress in their ability to use more morphologically complex words (Anglin, 1993). This shift or growth in reading abilities, vocabulary and morphology seems to be reflected in the writing of children in the present study with the performance of children in Grades VI and VII being better than those in Grade V on almost all the measures of written language.

4.6 Correlation, Regression Analysis and Discrminant Function Analyses

Analysis of the data on two-way repeated measures ANOVA indicated a clear developmental trend across Grades V through VII on all the skills under study except for syllable segmentation, phoneme blending and syllable blending of phonological awareness skill that reached a ceiling (Mean scores reached a maximum by Grade V itself (Table 4.3). In order to examine the relationship among the components of listening comprehension (LC), phonological awareness (PA), rapid verbal naming (RVN), reading and written language skills and also to extrapolate or identify the skills that would serve as predictors of good reading and writing, statistical measures of correlation and regression analyses were employed. The analyses of results are discussed with reference to correlational analysis of skills (listening, rapid verbal naming, phonological awareness, reading and writing) within and between Kannada and English languages. The data was subjected to regression analysis to extract potential predictors of reading and writing in Kannada and in English. The abbreviations are expanded as given in the footnote[16].

4.6.1 Correlational analysis

Table 4.6.1 shows Pearson's correlations for measures of *listening, rapid verbal naming, phonological awareness, reading and written language* in Kannada and English. Within the two sub-skills of listening, since scores on phoneme discrimination reached the maximum (Maximum score=40), these scores were not

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[16] *Note:* LCK=Listening comprehension in Kannada, LCE=Listening comprehension in English, PAK=Phonological awareness in Kannada, PAE=Phonological awareness in English, RVNK=Rapid verbal naming in Kannada, RVNE=Rapid verbal naming in English, RK= Reading words-nonwords in Kannada, RE=Reading words-nonwords in English, RCK=Reading comprehension in Kannada, RCE=Reading comprehension in English, WSK=Spontaneous writing in Kannada, WSE= Spontaneous writing in English, WDK= Writing to dictation in Kannada, WDE= Writing to dictation in English.

considered for further analysis. A bivariate Pearson’s correlational analysis was done on all the variables in both the languages, Kannada and English. Table 4.6.1 shows Inter-correlations and Pearson’s correlation co-efficient values for the five skills under study -listening, rapid verbal naming, phonological awareness, reading and writing tasks in both Kannada and English. Note that RK and RE refer to the total score for reading words and nonwords in Kannada and English respectively. Similarly, WDK and WDE refer to the total score for writing to dictation of words and nonwords in Kannada and English respectively.

On listening skill, scores on phoneme discrimination were eliminated in both Kannada and English as it was found that all the children in Grades V, VI and VII performed the task. The results on listening comprehension in Kannada (LCK) showed a positive correlation with reading single words-nonwords in Kannada (RK) which was found to be statistically significant ($r=0.305$, $p<0.01$). It was also found that LCK correlated with reading comprehension in Kannada (RCK) ($r=0.276$, $p<0.01$), and writing to dictation in Kannada (WDK) ($r=0.306$, $p<0.01$).These results indicate that LCK showed significant correlation with RK, RCK and WDK. Further, listening comprehension in English (LCE) showed positive correlation with PAE ($r=0.313$, $p<0.01$), RE ($r=0.361$, $p<0.01$), RCE ($r=0.393$, $p<0.01$), and WDE ($r=0.572$, $p<0.01$). A summary of the results for listening comprehension are shown in Figure 4.6.1.

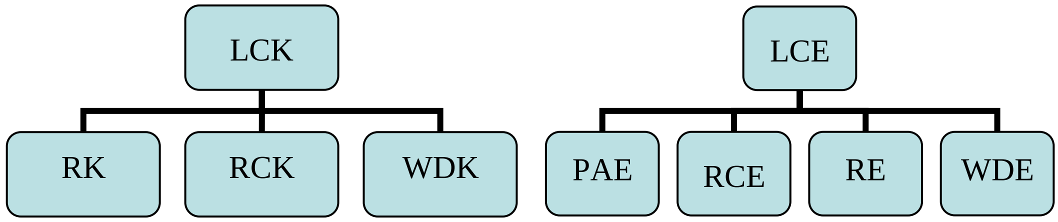


Figure 4.6.1. Schematic representation of variables correlating with LCK and LCE

On phonological awareness skill in Kannada (PAK) correlational analysis revealed significant positive correlation with RCK (r=0.307, p<0.01) and WDK (r=0.0.363, p<0.01). Results of phonological awareness skill in English (PAE) revealed significant positive correlation with RE (r=0.0.394, p<0.01) and WDE (r=0.0.384, p<0.01), but a negative correlation with WSE (r=-0.201, p<0.05). A summary of the results for phonological awareness are shown in Figure 4.6.2.

Figure 4.6.2. Schematic representation of variables correlating with PAK and PAE

Rapid verbal naming (RVNK) showed positive correlation to RK (r=0.261, p<0.01), RCK (r=0.309, p<0.01), WDK (r=0.226, p<0.05), and WSK (r=0.604, p<0.01). The results indicated that RVNK showed significant high positive correlation to written language on expository writing. In English, correlational analysis revealed that RVNE correlated with RE (r=0.212, p<0.05) and WSE (r=0.467, p<0.01). A summary of the results for rapid verbal naming shown in Figure 4.6.3.

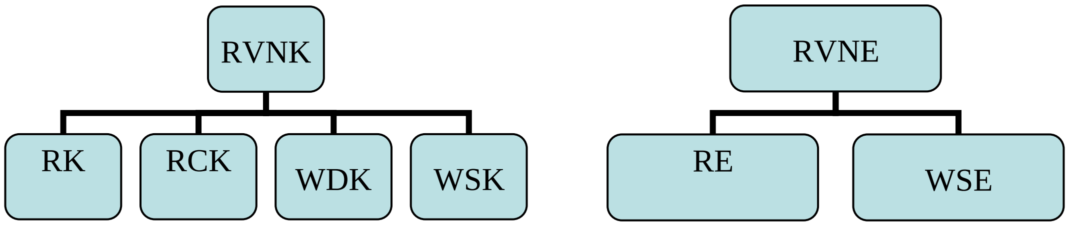


Figure 4.6.3. Schematic representation of variables correlating with RVNK and RVNE

Reading single words and nonwords (RK) showed positive correlation to LCK (r=0.261, p<0.05), WSK (r=0.273, p<0.05), RVNK (r=0.261, p<0.05), RCK (r=0.388, p<0.01), WDK (r=0.426, p<0.01) and WSK (r=0.273, p<0.01). Similarly, in English, RE showed positive correlation with LCE (r=0.361, p<0.01), PAE (r=0.394, p<0.01), RVNE (r=0.212, p<0.05), RCE (r=0.254, p<0.01), WDE (r=0.536, p<0.01) and WSE (r=0.349, p<0.01). A summary of the results for reading single words-nonwords are shown in Figure 4.6.4.

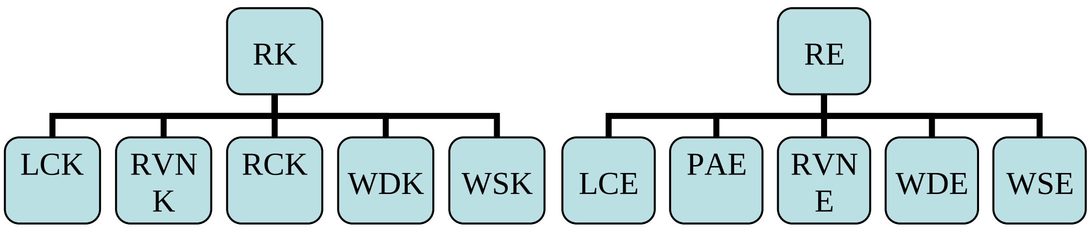


Figure 4.6.4. Schematic representation of variables correlating with RK and RE

Reading comprehension (RCK) showed positive correlation with PAK (r=0.307, p<0.01), RVNK (r=0.309, p<0.01), RK (r=0.388, p<0.01), WDK (r=0.586, p<0.01) and WSK (r=0.313, p<0.01). For RCE, results indicated a high positive correlation with LCK (r=0.344, p<0.01). In English, results revealed that RCE showed positive correlation with LCE (r=0.393, p<0.01), RE (r=0.254, p<0.01) and WDE (r=0.426, p<0.01). A summary of the results for reading comprehension are shown in Figure 4.6.5.

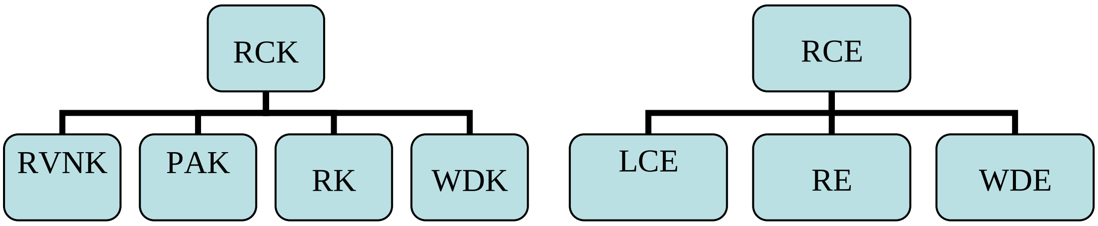


Figure 4.6.5. Schematic representation of variables correlating with RCK and RCE

Statistical analysis was employed separately for writing to dictation (WD) and expository writing (WS). Correlational analysis on writing to dictation in Kannada (WDK) revealed a significant positive correlation with LCK ($r=0.306$, $p<0.01$), PAK ($r=0.363$, $p<0.01$), RVNK ($r=0.226$, $p<0.05$), RK ($r=0.426$, $p<0.01$), and RCK ($r=0.586$, $p<0.01$). Writing to dictation in English (WDE) showed significant positive correlation with LCE ($r=0.572$, $p<0.01$), PAE ($r=0.384$, $p<0.01$), RE ($r=0.36$, $p<0.01$), RVNE ($r=0.296$, $p< 0.05$) and RCE ($r=0.426$, $p<0.01$). Correlational analysis on expository writing in Kannada revealed (WSK) a significant positive correlation with RVNK ($r=0.604$, $p<0.01$), RK ($r=0.273$, $p<0.01$) and RCK ($r=0.344$, $p<0.01$). Expository writing in English (WSE) showed significant positive correlation with RVNE ($r=0.467$, $p<0.01$), RE ($r=0.349$, $p<0.01$) and negative correlation with PAE ($r=0.201$, $p<0.01$). A summary of the results for writing to dictation and expository writing are shown in Figures 4.6.6. and 4.6.7 respectively.

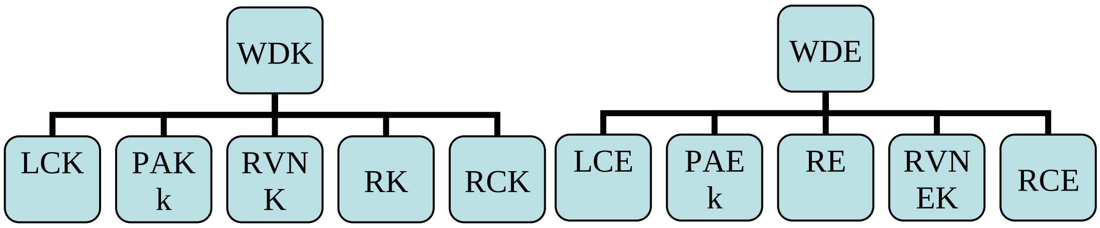


Figure 4.6.6. Schematic representation of variables correlating with WDK and WDE

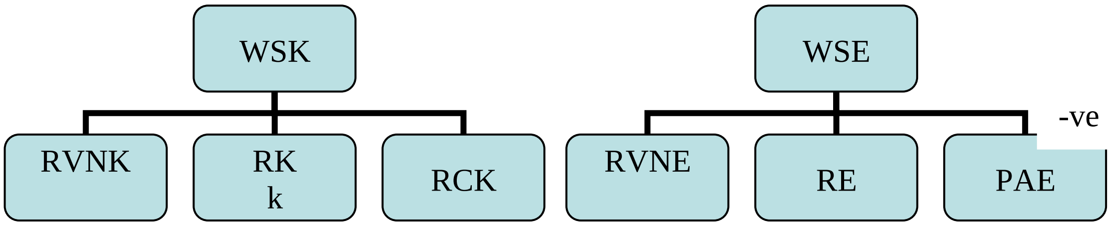


Figure 4.6.7. Schematic representation of variables correlating with WSK and WSE

Table 4.6.1: *Intercorrelations among skills in Kannada and English*

	LCK	PAK	RVNK	RK	RCK	WDK	WSK	LCENG	PAENG	RVNE	RE	RCENG	WDE	WSE
LCK	-	-	-	.305**	.276**	.306**	.054	.553**	-	-	.248**	-	.394**	-
PAK	-	-	-	-	.307**	.363**	.001	.342**	.570**	.130	.264**	-	.393**	-
RVNK	-	-	-	.261**	.309**	.226*	.604**	-	-	.690**	.330**	.212**	.256**	.577**
RK	.305**	-	.261*	-	.388**	.426**	.273**	.242**	.166	.264**	.636**	.354**	.402**	.371**
RCK	.276**	.307**	.309**	.388**	-	.586**	.344**	.261**	.267**	.276**	.374**	.650**	.592**	.316**
WDK	.306**	.363**	.226*	.426**	.586**	-	-	.579**	.334**	-	.556**	.481**	.884**	-
WSK	-		.604**	.273**	.344**	-	-	-	-	.522**	.331**	-	-	.832**
LCE	.553**	.342**	-	.242*	.261*	.579**	-	-	.313**	-	.361**	.393**	.572**	-
PAE	-	.570**		.166	.267**	.334**	-	.313**	-	-	.394**	-	.384**	-.201*
RVNE	-	-	.690**	.264**	.276**	-	.522**	-	-	-	.212*	-	.296*	.467**
RE	.248*	.264*	.330**	.636**	.374**	.556**	.331**	.361**	.394**	.212*	-	.254**	.536**	.349**
RCE	-	-	.212*	.354**	.650**	.481**	-	.393**	-	-	.254**	-	.426**	
WDE	.394**	.393**	.256**	.402**	.592**	.884**	-	.572**	.384**	.296*	.536**	.426**	-	-
WSE	-	-	.577**	.371**	.316**	-	.832**	-	-.201*	.467**	.349**	-	-	-

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Note: LCK=Listening comprehension in Kannada, LCE=Listening comprehension in English, PAK=Phonological awareness in Kannada, PAE=Phonological awareness in English, RNK=Rapid verbal naming in Kannada, RNE=Rapid verbal naming in English, RK= Reading words-nonwords in Kannada, RE=Reading words-nonwords in English, RCK=Reading comprehension in Kannada, RCE=Reading comprehension in English, WSK=Spontaneous writing in Kannada, WSE= Spontaneous writing in English, WDK= Writing to dictation in Kannada, WDE= Writing to dictation in English.

4.6.2 Regression analysis

Further, a stepwise multiple regression analysis was done to extract the potential predictors for reading and writing in Kannada and English. Analysis was done separately for variables in Kannada and English. A stepwise regression was performed, where in the first step, reading words and nonwords were added up to form the overall reading scores (RE overall) as the dependent variable and all the other factors (including listening comprehension, rapid verbal naming, phonological awareness, reading comprehension, writing to dictation and expository writing) as the independent variables. In order to control for the effect of grade, grade level was kept as a constant variable. Similarly, in the next step, analysis was done keeping reading comprehension as dependent variable and all other variables as independent variables. In the subsequent step, writing was the dependent variable and all other variables were independent variables. Tables 4.6.2 and 4.6.3 show a summary of results for stepwise regression analysis for listening, rapid verbal naming, phonological awareness, reading and writing tasks to predict reading and writing in Kannada and English respectively.

Table 4.6.2: *Summary of stepwise multiple regression analysis for skills in Kannada*

Model	Dependent Variable	Predictors	R	R^2	Adjusted R^2	β co-efficient	t	Sig.
1.	RK	WSK	0.471	0.222	0.204	0.205	2.137	0.035
2.	RCK	WSK	0.635	0.403	0.389	0.542	6.443	0.004
3.	WDK	RCK	0.586	0.343	0.336	0.436	4.721	0.000
		RK	0.624	0.389	0.375	0229	2.579	0.012
		PAK	0.652	0.425	0.405	0.198	2.299	0.024
4.	WSK	RVNK	0.604	0.364	0.357	0.459	6.079	0.000

Note: LCK=Listening comprehension in Kannada, PAK=Phonological awareness in Kannada, RVNK=Rapid verbal naming in Kannada, RK= Reading words-nonwords in Kannada, RCK=Reading comprehension in Kannada, WSK=Spontaneous writing in Kannada, WDK= Writing to dictation in Kannada.

Results of regression analyses on measures of Kannada (Table 4.6.2) revealed that reading words and nonwords in Kannada (RK) was a potential predictor for expository writing in Kannada (WSK) (R^2=0.222, $p<0.05$), that predicted 22.2% of the time. Reading comprehension in Kannada (RCK) was a potential predictor for WSK (R^2=0.403, $p<0.01$), that predicted 40.3% of the time. Writing to dictation in Kannada (WDK) was a potential predictor for RCK (R^2=0.343, $p<0.001$), RK (R^2=0.389, $p<0.05$) and PAK (R^2=0.425, $p<0.05$), that predicted for 34.3% of the time, 38.9% and 42.5% in that order. Analysis of results for expository writing indicated that WSK was a potential predictors for RVNK (R^2=0.364, $p<0.001$) that was a strong predictor for 36.4% of the time. See Figures 4.6.8 and 4.6.9 for scatter plots of reading and written language in Kannada.

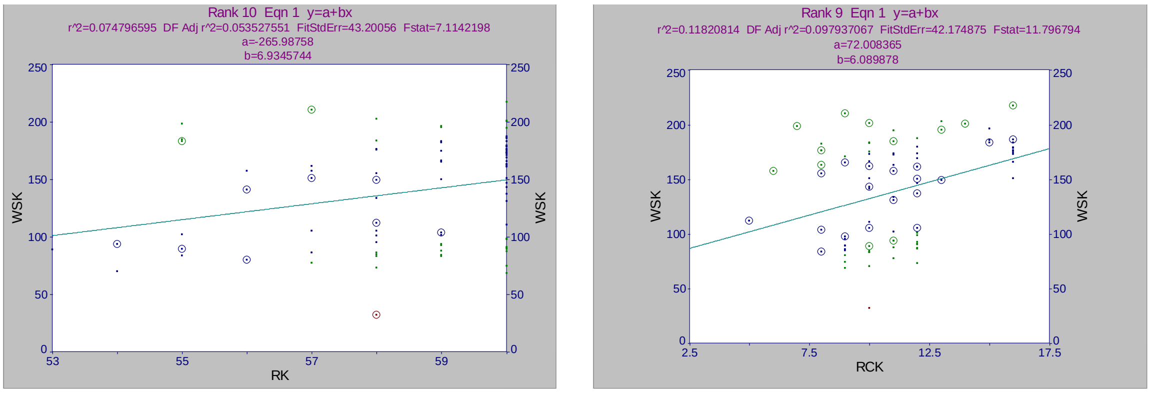


Figure 4.6.8: Scatter plots of reading (RK and RCK) in Kannada

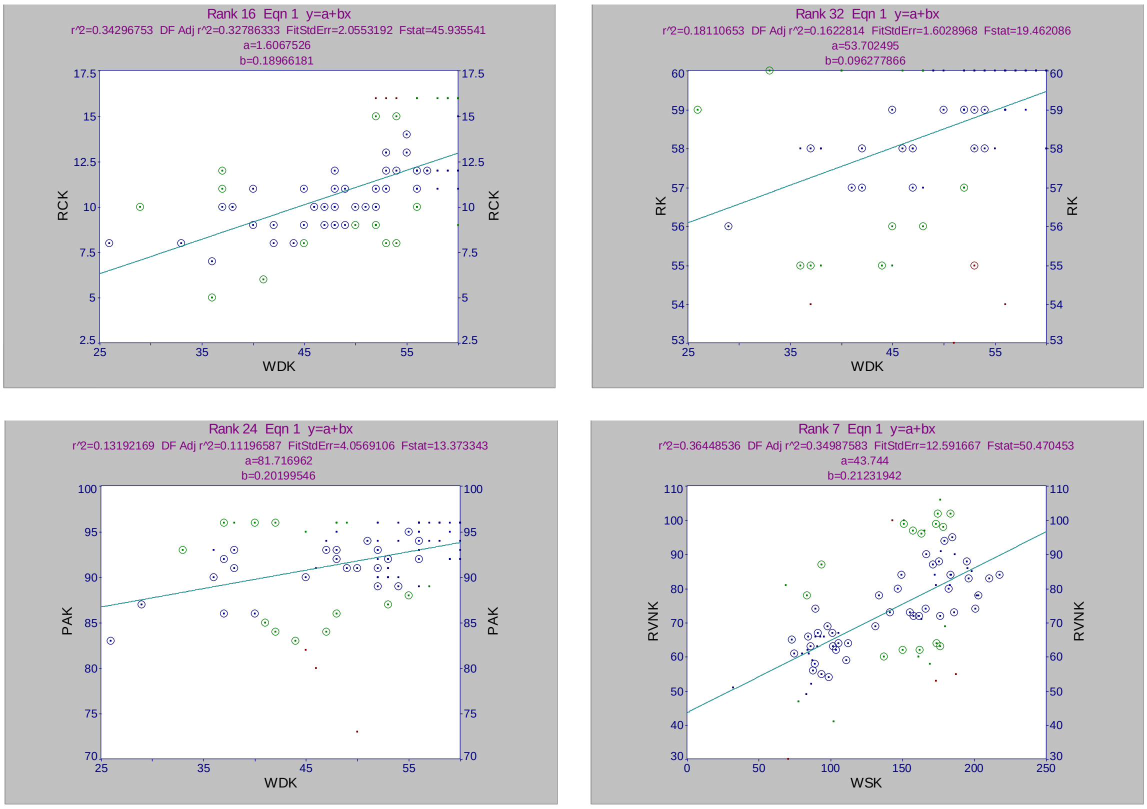


Figure 4.6.9: Scatter plots of written language (WDK and WSK) in Kannada

Table 4.6.3 shows a summary of results for stepwise regression analysis for listening, rapid verbal naming, phonological awareness, reading and writing tasks to predict reading and writing in English. See Figures 4.6.10 and 4.6.11 for scatter plots of reading and written language in English. Results of regression analyses in English revealed that writing to dictation in English (WDE) (R^2=0.283, p<0.001) and expository writing in English (WSE) (R^2=0.349, p<0.001) were predicted by reading words and nonwords in English (RE). While, WDE was predicted by RE for 28.3%, WSE was predicted by RE for 34.9% of the time for. WDE was predicted by Reading comprehension in English (RCE) (R^2=0.181, p<0.01) for 18.1% of the time. Writing to dictation in English (WDE) was predicted by LCE (R^2=0.332, p<0.001) for 33.2% of the time, RE (R^2=0.452, p<0.001) for 45.2%, PAE (R^2=0.490, p<0.05) for 49.0% for, and predicted by RVNE (R^2=0.527, p<0.05) for 52.7% of the time. When expository writing in English (WSE) was analyzed as dependent variable, a significant level of prediction was observed by RVNE (R^2=0.218, p<0.001), RE (R^2=0.282, p<0.001) and PAE (R^2=0.352, p<0.01). WSE was predicted by RVNE, RE and PAE for 21.8%, 28.2% and 21.8% of variance in that order.

Table 4.6.3: *Summary of stepwise multiple regression analysis for skills in English*

Model	Dependent Variable	Predictors	R	R^2	Adjusted R^2	β co-efficient	t	Sig.
1.	RE	WDE	0.532	0.283	0.275	0.484	5.474	0.000
		WSE	0.590	0.349	0.333	0.261	2.944	0.004
2.	RCE	WDE	0.425	0.181	0.172	0.450	9.19	0.000
3.	WDE	LCE	0.576	0.332	0.324	1.661	5.090	0.000
		RE	0.672	0.452	0.439	0.698	3.357	0.001
		PAE	0.700	0.490	0.472	0.275	2.587	0.011
		RVNE	0.726	0.527	0.505	0.181	2.562	0.012
4.	WSE	RVNE	0.467	0.218	0.209	1.218	4.437	0.000
		RE	0.531	0.282	0.266	2.717	3.504	0.001
		PAE	0.593	0.352	0.329	1.245	3.020	0.003

Note: LCE=Listening comprehension in English, PAE=Phonological awareness in English, RVNE=Rapid verbal naming in English, RE=Reading words-nonwords in English, RCE=Reading comprehension in English, WSE= Spontaneous writing in English, WDE= Writing to dictation in English.

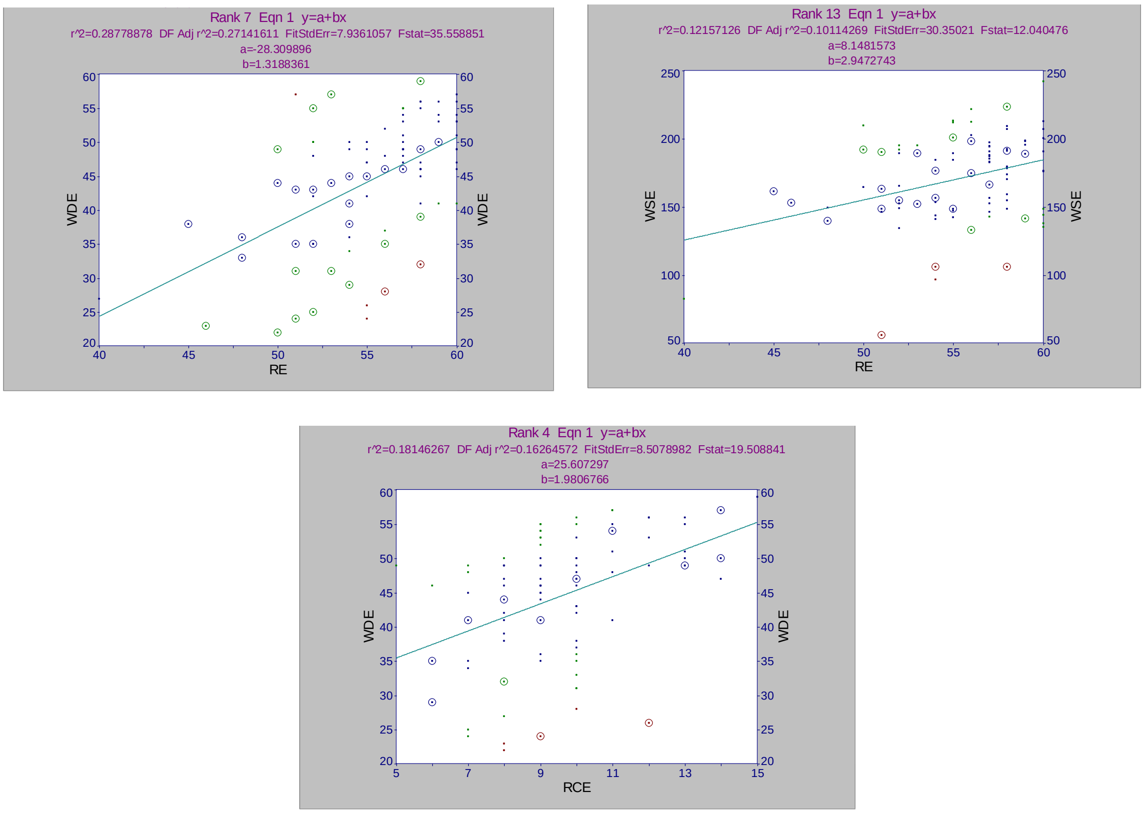


Figure 4.6.10: Scatter plots of reading performance (RE and RCE) in English

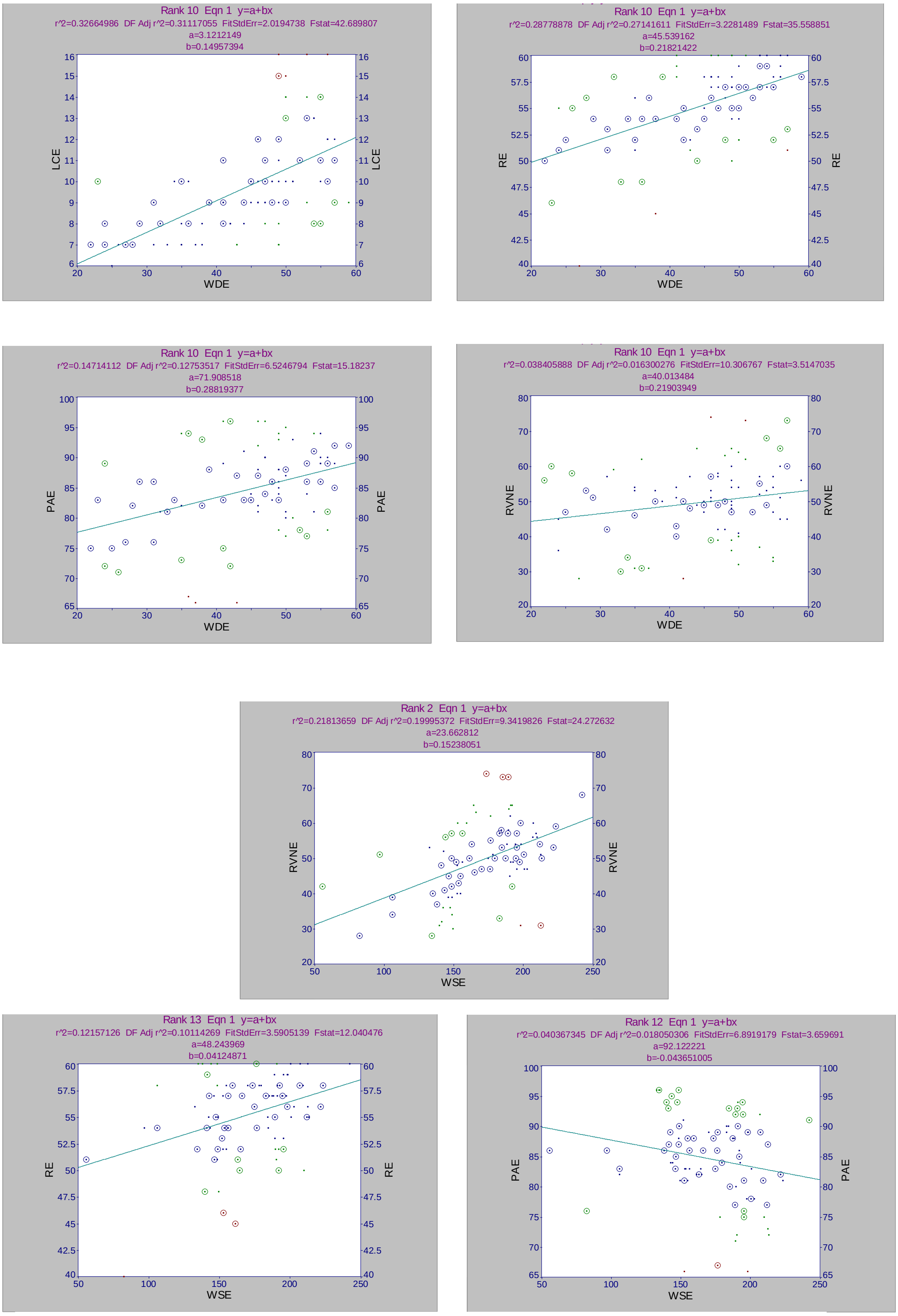


Figure 4.6.11: Scatter plots of written language (WDE and WSE) in English

4.6.3 Discrminant Function Analysis (DFA)

Discrminant function analysis (DFA) is used to predict group membership of a set of predictors. The characteristics of predictors are related to form groups based upon similarities of distribution of dimensional space which are then compared to groups. This enables to test the validity of groups based on actual data, to test groups which have been created, or to put objects into groups. The data in both the languages, Kannada and English was subjected to Discrminant function analysis separately in order to derive functions in both the languages. From the analysis two Discrminant functions were obtained. While analysis in Kannada revealed that first Discrminant function (DF1) accounted for 99.1% of the total among groups variability and second Discrminant function (DF2) for the remaining 0.9%, that in English DF1 accounted for 95.5% of the total among groups variability and DF2 for the remaining 4.5% (Table 4.6.4).

Table 4.6.4: Eigenvalues for skills in Kannada and English

	Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
Kannada	1	4.607	99.1	99.1	.906
	2	.041	.9	100.0	.199
English	1	3.640	95.5	95.5	.886
	2	.170	4.5	100.0	.381

a First 2 canonical discriminant functions were used in the analysis.

Table 4.6.5: Wilks' Lambda for skills in Kannada and English

Test of Function(s)		Wilks' Lambda	Chi-square	df	Sig.
Kannada	1 through 2	.171	148.217	14	.000
	2	.960	3.404	6	.757
English	1 through 2	.184	140.420	14	.000
	2	.855	13.038	6	.042

Table 4.6.6: Standardized Canonical Discrminant Function Coefficients for Kannada

	Function	
	1	2
WSK	-.280	-.157
PAK	.401	.356
RDK	.224	.454
RCK	.399	-.462
LCK	.690	-.268
RANK	.102	.754
WDK	.765	.002

Table 4.6.7: Standardized Canonical Discrminant Function Coefficients for English

	Function	
	1	2
WSE	.309	.165
PAE	.340	.494
RDE	.191	.493
RCE	.380	-.507
LCE	.562	-.428
RANE	-.224	-.067
WDE	.586	.155

Table 4.6.8: Structure Matrix for Kannada

	Function	
	1	2
WSK	.597*	.108
PAK	.383*	-.219
RDK	.083	.678*
RCK	.258	.444*
LCK	.266	.354*
RANK	.337	-.353*
WDK	.053	.220*

Table 4.6.9: Structure Matrix for English

	Function	
	1	2
WDE	.664*	.262
LCE	.542*	-.424
RDE	.336	.528*
RCE	.351	-.527*
PAE	.265	.460*
WSE	.078	.212*
RANE	.023	.168*

Pooled within-groups correlations between discriminating variables and standardized canonical Discrminant functions variables ordered by absolute size of correlation within function.

Largest absolute correlation between each variable and any Discrminant function

Table 4.6.10: Functions at Group Centroids for Kannada

	Function	
Grades	1	2
V	-2.706	-.119
VI	.264	.282
VII	2.442	-.162

Table 4.6.11: Functions at Group Centroids for English

	Function	
Grades	1	2
V	-2.311	-.272
VI	5.560	.583
VII	2.257	-.292

Unstandardized canonical Discrminant functions evaluated at group means

Table 4.6.12: Classification Results for Kannada

		Predicted Group Membership			Total
	Grades	V	VI	VII	
Original Count	V	27	3	0	30
	VI	1	27	2	30
	VII	0	2	28	30
%	V	90.0	10.0	.0	100.0
	VI	3.3	90.0	6.7	100.0
	VII	.0	6.7	93.3	100.0

a 91.1% of original grouped cases correctly classified.

Table 4.6.13: Classification Results for English

		Predicted Group Membership			Total
	Grades	V	VI	VII	
Original Count	V	25	5	0	30
	VI	2	26	2	30
	VII	0	4	26	30
%	V	83.3	16.7	.0	100.0
	VI	6.9	89.7	3.4	100.0
	VII	.0	13.3	86.7	100.0

a 86.5% of original grouped cases correctly classified.

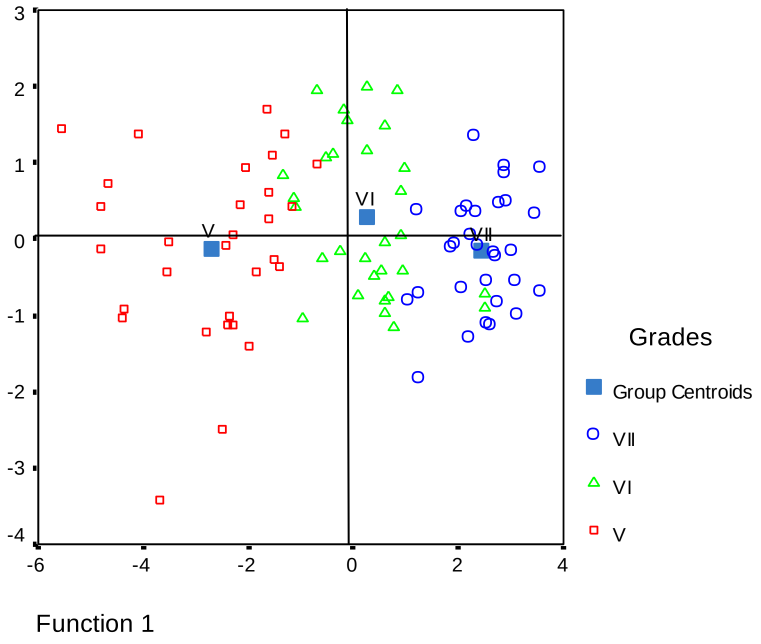


Figure 4.6.12: Combined group plot for canonical Discrminant functions in Kannada

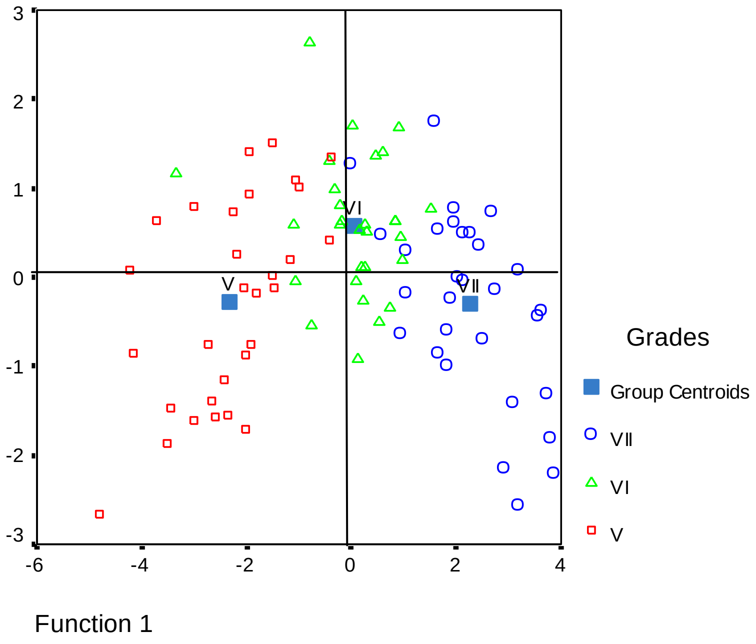


Figure 4.6.13: Combined group plot for canonical Discrminant functions in English

In Kannada, for DF1, Wilk's Lambda λ showed significance in the functions of the data analyzed across the skills at 0.171, χ^2 (14) = 148.217, p< 0.001. Hence, DF_1 is significant. However, DF2 was not found to be statistically significant (Table 4.6.5). In English, for DF1, Wilk's Lambda λ showed significance in the functions at 0.184, χ^2 (14) = 140.42, p< 0.001. Hence, DF_1 is significant. In English, DF2 was also found to be statistically significant for data and Wilk's λ was 0.855, χ^2 (6) = 13.038, p< 0.05 (Table 4.6.5).

On standardized Discrminant function coefficients in Kannada DF1 was heavily weighted on writing to dictation and reading comprehension in Kannada. And DF_2 was found to be heavily weighted on rapid verbal naming, reading words nonwords, phonological awareness, expository writing, and listening comprehension (Table 4.6.6). In English, DF_1 was found to be heavily weighted on writing to dictation and listening comprehension. And DF_2 was found to be heavily weighted on reading words nonwords, phonological awareness, expository writing, rapid verbal naming and reading comprehension (Table 4.6.7). The results indicate that the reading comprehension and listening comprehension are on opposite dimensions for Kannada and English respectively.

In order to interpret the first Discrminant function DF_1, standardized Discrminant function coefficients were considered. Under Functions at Group centroids**,** group means on each of the Discrminant functions are presented. While, in Kannada, DF_1 separated writing to dictation and listening comprehension (where performance was high by higher grades on this function) from the other two groups, that in English DF1 separated writing to dictation and reading comprehension. For DF2, while in Kannada DF2 separated the reading words-nonwords, reading comprehension, phonological awareness, expository writing and rapid verbal naming among the grades, that in English was reading words nonwords, phonological awareness, expository writing, rapid verbal naming and reading comprehension. The group means indicated a developmental progression in both Kannada and English, the performance of children improved from lower to higher grades (Grades V through VI). Group centroids also indicate that scoring high on DF_2 results in children in the higher grades performing better in comparison to lower grades. Similar results are depicted in Figures 4.6.12 and 4.6.13.

Classification results based on Discrminant functions, revealed that, while in Kannada overall 91.1% of the children were correctly classified (Table 4.6.12), that in English 86.5% of the children were correctly classified (Table 4.6.13). In Kannada, 90.0% of children in Grade V and Grade VI, 93.3% of Grade VII children showed predicted group membership of their respective classes. Similarly, in English 90.0% of children in Grade V, 89.7% of Grade VI and 86.7% of children showed predicted group membership of their respective classes.

Model for acquisition of biliteracy in children

One of the objectives (tertiary objective) of the study was to derive a model of literacy acquisition in biliterate children, which will contribute to the existing models for literacy development. In order to derive a model for biliteracy in children the results of two-way repeated measures ANOVA, correlation, regression analysis and discriminant function analyses were considered. The analyses revealed few potent predictors for reading and writing skills for Kannada and English. Predictors were derived separately for reading (reading single words-nonwords and reading comprehension skill) and written language skill (writing to dictation and expository writing). The results in Tables 4.6.1 to 4.6.13 indicated that the predictors for Kannada and English are not common. The results are schematically depicted in the flowcharts (Figures 4.6.14 to 4.6.17) to derive a model. These models are derived based on the Dugunoglu and Oney's (1999) model (Figure 2.1). Phonological awareness, listening comprehension, rapid verbal naming, reading and writing skills were considered as the components of literacy that are included in the ABC tool. The other components such as home environment, schooling and basic cognitive skills were not considered in the present study as in the design of the study, they were controlled for these factors through the survey (Section 3.1 for details of the survey). Since, the predictors and correlations between variables were found to be different for Kannada and English, a common model could not be derived. Hence, separate models are proposed for Kannada and English.

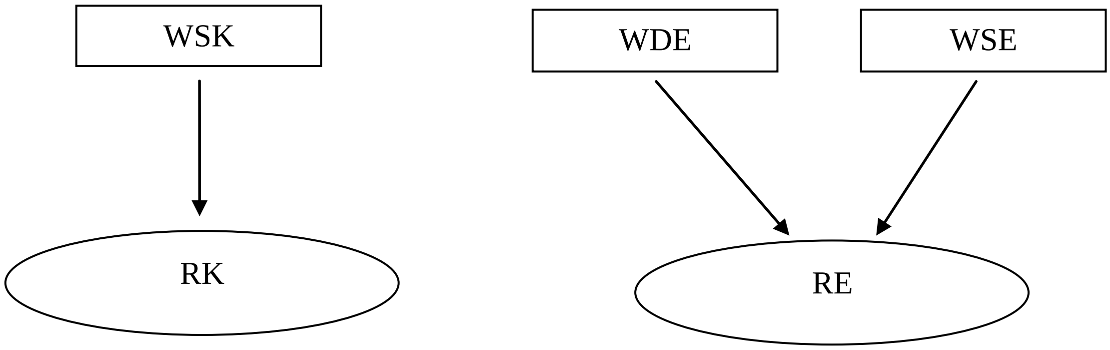


Figure 4.6.14: Predictors for reading single words-nonwords in Kannada and English

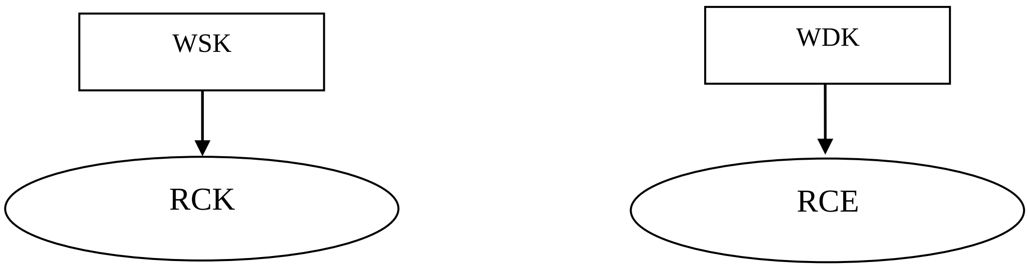


Figure 4.6.15: Predictors for reading comprehension in Kannada and English

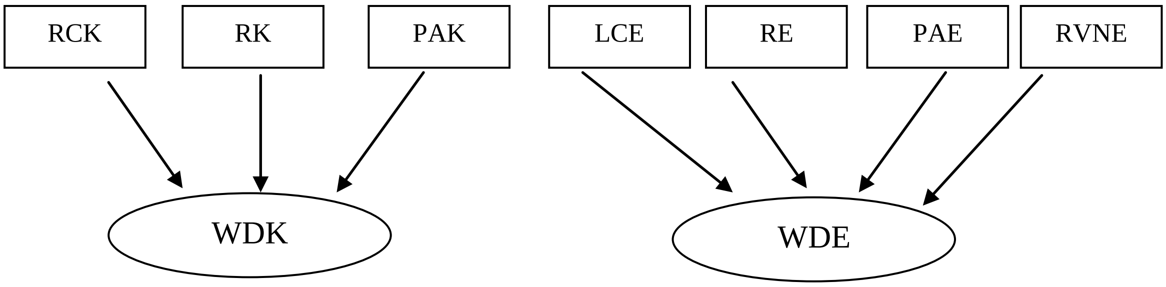


Figure 4.6.16: Predictors for writing to dictation in Kannada and English

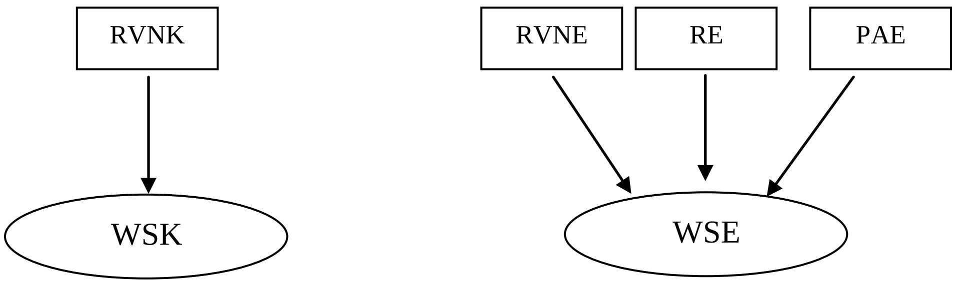


Figure 4.6.17: Predictors for expository writing in Kannada and English

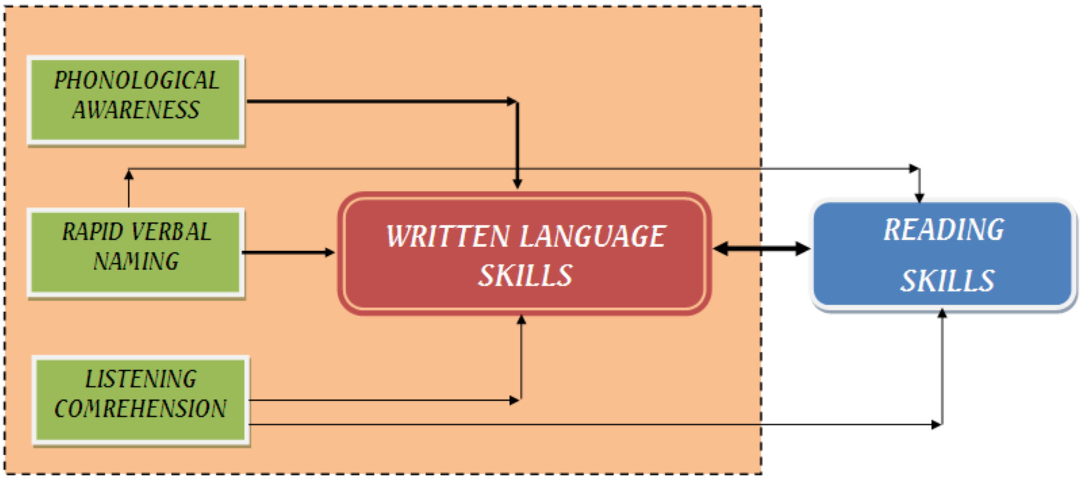


Figure 4.6.18: Model for literacy acquisition in Kannada

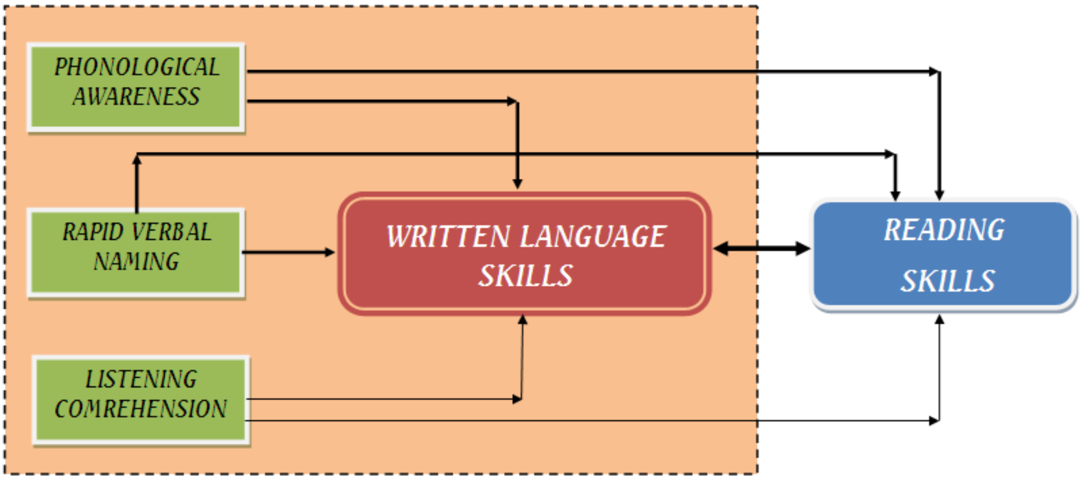


Figure 4.6.19: Model for literacy acquisition in English

The models for acquisition of biliteracy in children are shown in Figures 4.6.18 and 4.6.19 for Kannada and English respectively. The arrows in the model indicate the relationship across literacy skill and do not indicate the causal factor for literacy skills. The bold arrows in the figures indicate that there is a significant relation between the skills and broken or dashed arrows indicate a weak relationship across the skills. Each of the models for Kannada and English are explained separately. Figure 4.6.18 shows a model for literacy acquisition in Kannada. From the model it can be inferred that reading in Kannada is predicted by listening comprehension skills, while written language skill is predicted by phonological awareness skill and rapid verbal naming skill. Further, the model also suggests that reading and writing skills are strongly related to each other (Table 4.6.1). Phonological awareness is weakly related to listening comprehension and rapid verbal naming skills in Kannada. The model also indicated that writing was not strongly predicted by listening comprehension in Kannada. But, reading was strongly predicted by listening comprehension. Figure 4.6.19 shows a model for literacy acquisition in English. From the model it can be inferred that reading in English is related to phonological awareness and listening comprehension skills. Written language skill is related to phonological awareness skill, listening comprehension skill and rapid verbal naming skill. The model suggests that reading and writing skills are related to each other (Table 4.6.1). The model suggested stronger links across skills in English compared to Kannada (see correlation coefficients in Table 4.6.1). A comparison of Figures 4.6.18 and 4.6.19 indicated that predictors for reading and writing in Kannada and English are different. An analysis of the skills indicated that phonological awareness skill was a weaker predictor in Kannada (phonological awareness predicted only written language) compared to English (phonological awareness predicted both reading and written language).

Discussion

The results showed that the predictors for written language in both Kannada and English were reading words-nonwords, rapid verbal naming and phonological awareness. However, the effect of these predictors was not symmetrical for the two languages under study. While, expository writing was a predictor for reading words-nonwords and reading comprehension in Kannada, writing to dictation and expository writing skills were predictors for reading words-nonwords in English and writing to dictation was a predictor for reading comprehension. There were other skills that are subserved on reading and written language in both Kannada and English. Listening comprehension showed significant positive correlation with reading words-nonwords in both Kannada and English. While listening comprehension was a significant function for writing to dictation in English, reading comprehension was found to be important for writing to dictation in Kannada (results on DFA) (Tables 4.6.4 to 4.6.13).

Reading and written language were related to each other in both Kannada and English (Table 4.6.1). This indicates that reading and writing in both Kannada and English were dependent on each other. Reading followed writing in both Kannada and English as evidenced by the regression coefficients (Tables 4.6.2 and 4.6.3). The results suggest that biliterate children learn to read through their writing skills in both Kannada and English. These findings suggest that school curriculum in India is such that children are required to learn to read through writing. The findings of the present study are in support of Karanth (2006) who opined that teaching in India has a strong oral tradition and writing has dominated oral tradition for teaching alphasyllabary languages in India. The children learn to read through the oral mode via listening comprehension and primarily through writing. Education system in the present scenario demands the child to acquire literacy skills through the written mode. In this way children develop their orthographic knowledge via the written mode. Children are taught initially to write by copying the symbols or letters of a script. Then the children learn to join letters or aksharas to form words and then phrases and sentences. The findings of the present study are in support of Prema (1998) who reported that reading and writing are overlapping and mutually facilitating each other in Kannada. In the present study this was found to be applicable to English as well.

Writing skill dominates reading or listening skill in older biliterate children as part of acquisition of literacy skills. Overall, the results revealed that performance of biliterate children was better in Kannada than English. This indicates that though Kannada and English reading was introduced to biliterate children at the same time, the language experience with Kannada may be facilitating better literacy abilities in Kannada than in English. These differences in the pattern of acquisition in biliteracy skills are delineated in further sections. While predictors for writing in Kannada are found to be listening comprehension, rapid verbal naming, phonological awareness and reading, that for writing in English are phonological awareness, reading words-nonwords, reading comprehension, listening comprehension and rapid verbal naming skill. Predictors for reading in Kannada and English are found to be writing to dictation and expository writing. While, there are no predictors for reading comprehension in Kannada that for reading comprehension in English is found to be expository writing in English. Analysis of results also revealed that that phonological awareness predicted written language in Kannada ((R^2=0.425, $p<0.05$)

less significantly than English (R^2=0.352, p<0.001) (Tables 4.6.2 and 4.6.3). However, phonological awareness was related to reading in English and was not related to reading Kannada. The findings also showed that biliterate children read Kannada with higher levels of accuracy than English. This indicates that though, Kannada and English are introduced to biliterate children at the same time, the nature of orthography of Kannada may be facilitating better reading in Kannada than in English.

The present findings support Stuart-Smith and Martin (1997, 1999) who studied Punjabi-English bilingual children. They found differences in Punjabi and English. They believed that phonological awareness is language specific on tasks such as phoneme segmentation which are important in English than Punjabi. Similar differences on phonological awareness tasks were found in Kannada and English. For example, while, syllable segmentation scores in Kannada reached a maximum by Grade V (Maximum=16), that for English continued to develop even after Grade VII. Stuart-Smith and Martin (1997, 1999) found that children showed a different pattern in the development of phonological awareness skill in Punjabi and English. Thus, due to differences in the acquisition pattern of phonological awareness skill, parallel assessment in the two languages with two different scripts like Punjabi and English was recommended. Similar findings were observed in the present study for Kannada and English, with differences in phonological awareness in Kannada and English. Differences in phonological awareness skills may also be due to the differences in sensitivity of children to phonological structure of spoken language. Thus, children appeared to have better sensitivity to phonological structure of Kannada as Kannada is their spoken language and their experience with Kannada further facilitated the sensitivity to phonology in Kannada.

Correlation and regression analyses conducted on the data revealed that phonological awareness in English facilitated reading and writing in English. This finding supports the view of Mishra and Stainthorp (2007), their findings revealed that phonological awareness in English contributed to English word and pseudoword reading in both Oriya medium and English medium children. However, phonological awareness was found to contribute to Oriya Pseudo-word reading and English word reading. They also supported the view that phonological awareness to reading is not symmetrical across languages and may depend both on the characteristics of the different orthographies of the languages being learned. This view supports the *script dependent hypothesis* (Geva & Siegel, 2000) where phonological awareness predicted reading in English (Tables 4.6.2 and 4.6.3), and phonological awareness predicted only writing and not reading in Kannada. The asymmetrical nature of development of phonological awareness in Kannada and English supports findings of Mishra and Stainthorp (2007). For biliterate children in higher grades (like Grades V, VI and VII) phonological awareness may prove as a potential predictor for reading and writing in English only and may not hold good for reading and writing in Kannada. These data add to growing research that phonological awareness is an important facilitator of word reading and writing in English.

Support is also drawn from Ziegler and Goswami (2005) psycholinguistic grain size theory. Comparisons between the written languages here are related to two scripts with different grain sizes. Differences in grain sizes in languages can influence the reading development in children (Ziegler & Goswami, 2005). Kannada and English differ both in terms of granularity and consistency. While, in Kannada which is a semi-syllabic script, syllable is the larger grain size that in English which is an alphabetic script, phoneme is a larger grain size. Also, Kannada and English vary in the consistency with which phonology is represented in orthography. While in Kannada the phonology to orthography is more consistent and hence more transparent, that in English it is less consistent and hence less transparent. Sensitivity to these grain sizes to phonological structures in different languages can result in developmental differences in the grain size of lexical representations and accompanying differences in developing reading strategies in children (Ziegler & Goswami, 2005). This may have led to a better performance in Kannada (Mean ranging from 91.43-92.60) than in English (Mean ranging from 82.50-87.56) across Grades V, VI and VII.

Gough and Tunmer (1986) believed that listening comprehension reflects on the reading skills of children even though they are from different cultural contexts. This suggests that listening comprehension is important to acquisition of reading skills in children from different language or cultural contexts. According to Durgunoglu and Öney (2000) listening comprehension is considered as a building block for acquisition of literacy skills which is more dependent on the language skill that the child possesses and hence it is more reflection of the comprehension of languages under study despite differences in the language contexts. A positive relation between listening and reading comprehension was found in both Kannada and English (Correlation Table 4.6.1). These findings suggest that comprehension is a basic underlying skill to understanding spoken language or written language. This relation between LC and RC also supports the ‘simple model’ for reading as suggested by Hoover and Gough (1990). According to the simple model, reading comprehension is the product of a child’s skill in decoding and his/her skill in listening comprehension. LC and RC are considered as two skills with a common denominator as comprehension (Durgunoglu & Öney, 2000). These skills are essential for acquisition of literacy skills in biliterate children. The findings also suggest that adequate listening skill can facilitate adequate reading comprehension skills. (However developmental differences in LC and RC skills were found between Kannada and English. Contribution of LC to RC has been studied widely with respect to the poor readers. Studies have reported that many children with reading disability have comprehension problems not just when they are reading but also when they are listening (Betjemann, Keenan, Fazendeiro & Olson, 2002; Betjemann, Keenan & Olson, 2003). Results indicated that acquisition of both LC and RC was earlier in Kannada than in English. The mean scores for LC (Mean ranging from 8.73-12.40 in Kannada, 7.83-12.10 in English) and RC (Mean ranging from 9.20-13.10 in Kannada, 8.46-11.16 in English) indicated these developmental differences. These differences can be attributed to the language experience that these biliterate children have in their native language Kannada than the second language English.

Rapid verbal naming contributed to writing in Kannada and English. This indicates that RVN is one such naming speed processing skill which facilitates written language especially where a child needs to recall or retrieve words to produce an expository written text or writing to dictation. This suggests that RVN facilitates retrieving phonologic-orthographic features of a word on writing to dictation task wherein children are expected to listen to the word they hear and write the word. This requires that the child is equipped with phonologic-orthographic features of that language and is able to retrieve it while reproducing it on the text through writing. However, developmental differences was found for RVN in Kannada and English and performance of biliterate children in Kannada was better than English (Table 4.3). While, a direct, regular and well equipped phonologic-orthographic relation in Kannada can facilitate faster and accurate generation of words for a phoneme in Kannada that of English is irregular and requires a longer time for Kannada-English biliterate children to assign the irregular rules and then retrieve from the lexicon.

The results of the study also indicated the relation between reading and written language skills in Kannada and English. The study supports the interdependency of reading and writing skills. The results showed that reading in Kannada or English depended on the writing skills of biliterate children in the present scenario. Biliterate children appear to depend on written language skill in the acquisition of literacy skills, irrespective of the languages in question. The study also emphasizes on the differential influence of the underlying skills like listening comprehension, phonological awareness and rapid verbal naming skills in Kannada and English.

The findings of the study suggest that there may be two different processing mechanisms for reading in Kannada-English biliterate children. One being the bottom-up processing and the other being top-down processing mechanism (see Figure 4.6.20).

In order to acquire literacy skills in Kannada, Kannada-English biliterate children would depend on the underlying factors such as the language experience, knowledge about the word its meaning, thus indicating that children begin learning to read in Kannada (transparent orthography) employing the lexical-semantic route to reading. This route enables children to learn the meaning of the word and then move towards word recognition and letter recognition using the orthographic principles of Kannada. These orthographic rules for Kannada are gradually introduced in the higher grades (Karanth, 2006). So, children depend more on a holistic strategy while reading Kannada and begin from learning to understand the meaning through the lexical-semantic route and then understand the constituents of the word and letters. Traditionally, English in the western context are taught via the analytical approach, when children learn the phonological rules in English and then proceed with letter and words recognition, gradually learn the word meaning and use

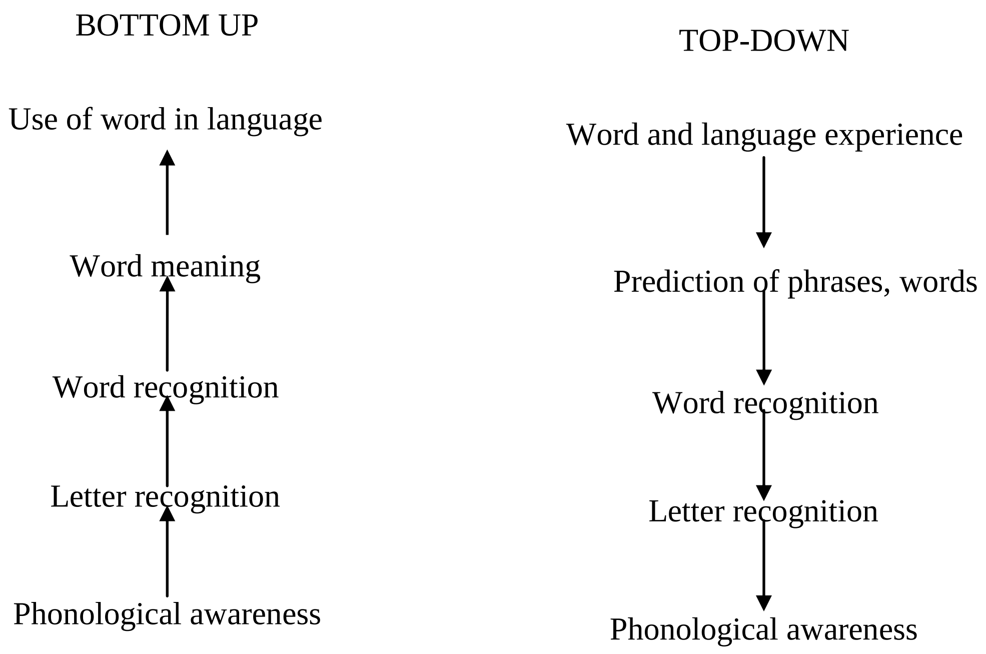


Figure 4.6.20 . Bottom up and top-down models (*Source:* cited in Reid, 2009)

the word in language. Children appear to employ a bottom-up processing to acquire literacy skills in English and an analytic approach to learning to read in English. In the present study, the findings revealed that children employed a wholistic approach to reading English as they did for Kannada. Children appeared to apply the orthographic principles of Kannada to read English. This suggests that children are not only transferring skills for Kannada and English, but transfer strategies from Kannada to English. Support for these findings are taken from Tunmer (1994), Stanovich (1988), Adams (1990) and Liberman and Liberman (1992).

The above findings clearly suggest that the functions for Kannada and English are on two diametrically different planes. Writing in Kannada is governed by the orthographic rules in Kannada and hence facilitate reading in Kannada. The plane in English depicts phonology rather than orthography to facilitate reading in English. A schematic representation of planes for Kannada and English is depicted in Figure 4.6.21.

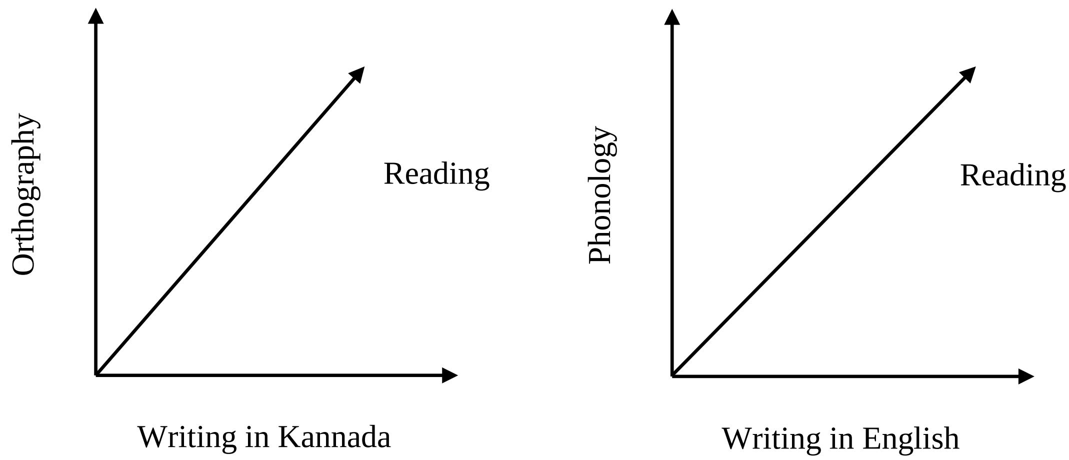


Figure 4.6.21. Schematic representation of planes for Kannada and English

Since, the findings of the study revealed that the potential predictors were different in Kannada and English it suggests that assessment framework should be different for Kannada and English at least to assess a few skills like reading words-nonwords, writing to dictation and expository writing skills. The management strategies should vary accordingly in Kannada and English.

4.7 Performance of children with Learning disability (LD)

An extended objective of the study was to examine the relevance of ABC tool on a small group of clinical population (children with learning disability-LD). The clinical group comprised of ten children with LD. Three children each from Grade V (LD1, LD2, and LD3) and Grade VI (LD4, LD5, and LD6) and four children from Grade VII (LD7, LD8, LD9, and LD10) with learning disability were assessed on the ABC tool (see Table 3.7 of method section for demographic details on LD).

Descriptive statistics was employed for the analysis of LD data. A qualitative analysis of the data revealed that children with LD in Grade V, Grade VI and Grade VII showed a similar pattern, hence for the purpose of comparison across measures, test scores were transformed to mean scores for each group Figure 4.7 shows the performance of typically developing children (TDC[17]) and LD across all the skills in both Kannada and English. However, one child with LD studying in Grade VII (LD9) showed a different pattern hence, the data of LD9 is also described qualitatively in a separate section. Figure 4.7 shows that performance of children LD was poorer compared to typically developing children across Grades V through VII. Analysis of results revealed that children with LD performed poorer than typically developing children across all the skills (listening comprehension, phonological awareness, rapid verbal naming, reading words-nonwords, reading comprehension, writing to dictation and expository writing) in both Kannada and English and across Grades V through VII (see scores in Appendix III).

[17] Typically developing children (TDC) in the present study were those normal Kannada-English biliterate children who were already assessed on the ABC tool (see Pages 85-89 and 104for details).

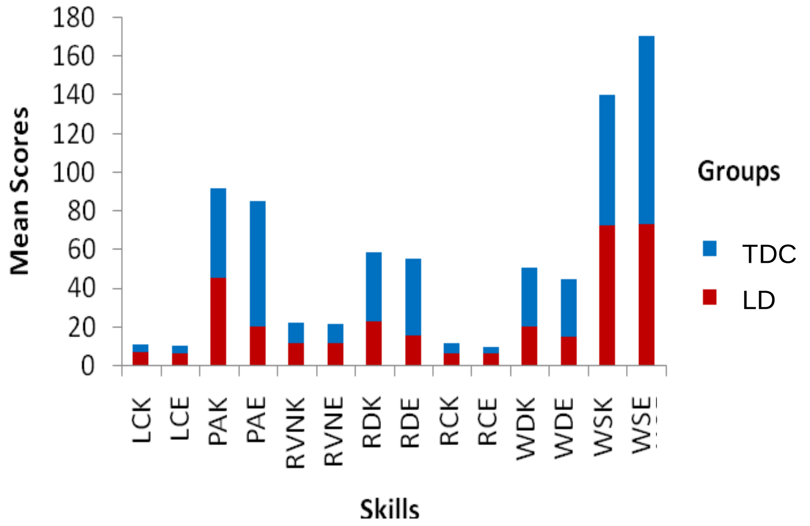


Figure 4.7. Comparison of scores between typically developing children and LD

Note: PAK= Phonological awareness in Kannada, PAE= Phonological awareness in English, RVN=Rapid verbal naming, RVNK= Rapid verbal naming in Kannada, RVNE= Rapid verbal naming in English, RDK=Reading words-nonwords in Kannada, RDE= Reading words-nonwords in English, RCK=Reading comprehension in Kannada, RCE= Reading comprehension in English, WDK= Writing to dictation in Kannada, WDE= Writing to dictation in English, WSK= Expository writing in Kannada, WSE= Expository writing in English.

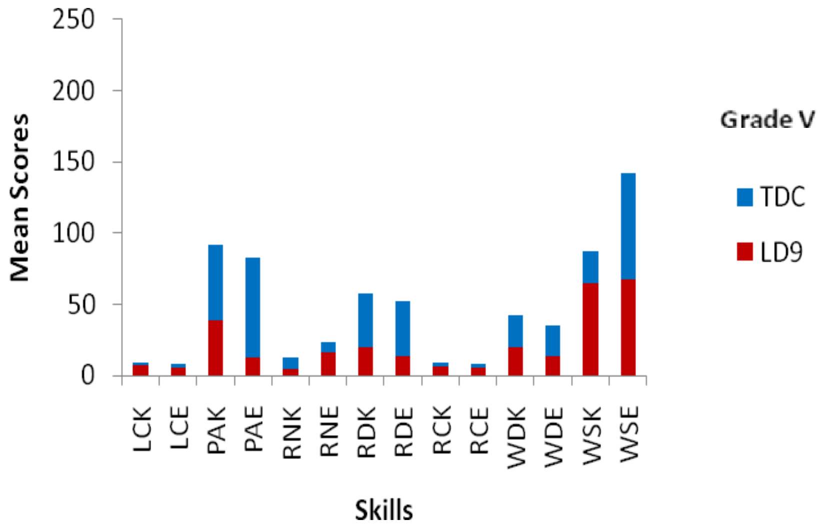


Figure 4.7.1. Comparison of scores between typically developing children and LD in Grade V

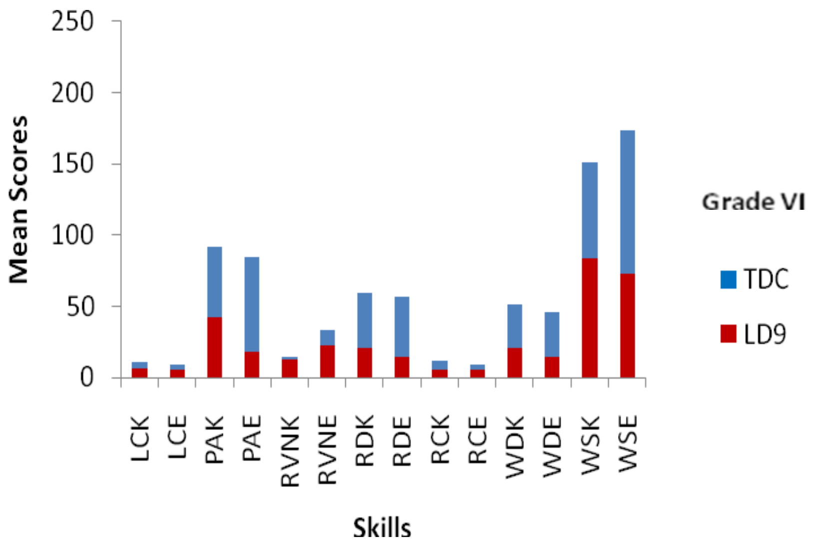


Figure 4.7.2. Comparison of scores between typically developing children and LD in Grade VI

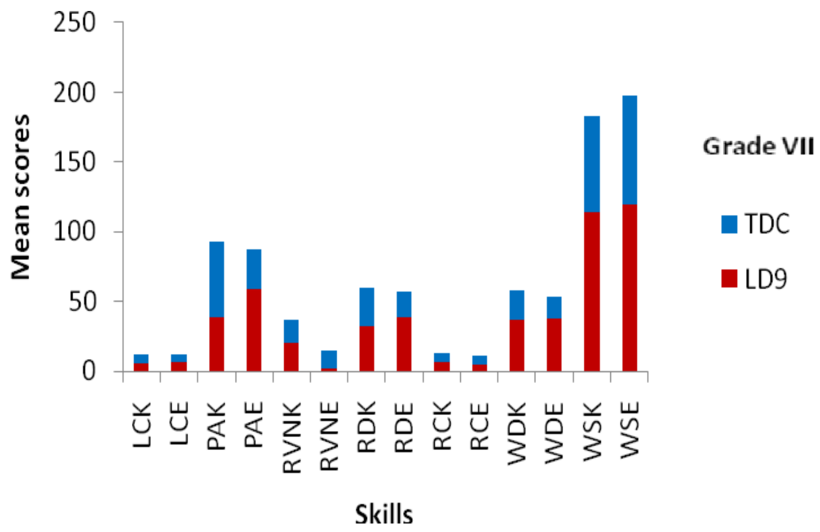


Figure 4.7.3. Comparison of scores between typically developing children and LD in Grade VII

The performance of children with LD was compared to typically developing children by depicting them in figures (see Figures 4.7, 4.7.1 to 4.7.3). The data was presented graphically to show the profile of performance of the children. On the *x*-axis of each graph are the measures (listening comprehension, phonological awareness, rapid verbal naming, reading words nonwords, reading comprehension, spontaneous writing and writing to dictation) used, and on the *y*-axis are the skills acquired on each measure based on the mean scores. Comparison of scores between typically developing children and children with LD is represented in stacked graphs and shown in Figures 4.7.1 to 4.7.3. The figures indicate that the performance of children with LD was poorer than the grade matched typically developing children in Grade V, Grade VI and Grade VII across all the skills.

A qualitative analysis of the overall data revealed that a few children with LD (LD1, LD2, LD3, LD4, LD5, LD6, LD7, LD8 and LD10) in Grade V, Grade VI and Grade VII showed a similar pattern, hence these children were grouped as LD Group 1. LD9 studying in Grade VII showed an atypical pattern hence, this data is described separately as LD Group 2.

4.7.1 Performance of children in LD Group 1

The nine children (LD1, LD2, LD3, LD4, LD5, LD6, LD7, LD8 and LD10) in LD Group1 showed comprehension difficulties in both Kannada and English. These children showed poor performance in both Kannada and English across all the measures. The mean scores revealed that LD Group 1 showed listening comprehension difficulty compared to typically developing children in both Kannada (For e.g., Mean scores of 5.31 and 8.73 in LD Group 1 and typically developing children respectively in Grade V) and English (For e.g., Mean scores of 5.21 and 7.83 in LD Group 1 and typically developing children respectively in Grade V) (see Figures 4.7.1 to 4.7.3). Similarly, mean scores of LD Group 1 revealed that LD Group 1 showed reading comprehension difficulty compared to typically developing children in both Kannada (For e.g., Mean scores of 5.41 and 9.20 in LD Group 1 and typically developing children respectively in Grade V) and English (For e.g., Mean scores of 4.63 and 8.46 in LD Group 1 and typically developing children respectively in Grade V) (see Figures 4.7.1 to 4.7.3). These findings indicated an impaired comprehension to text. It was also found that children in LD Group 1 had difficulty to decode words while reading in Kannada (For e.g., Mean scores for reading single words in LD and typically developing children are 25.36 and 57.40 in Grade V).and English (For e.g., Mean scores for reading single words in LD and typically developing children are 21.31 and 52.36 in Grade V). Children found more difficulty while reading words in English like 'nephew', 'light', 'summer, etc. In Kannada, children showed difficulty in words like /kattalu/, /ka:rmika/, /ba:laka/, etc. Hence, an effort to decode while reading words, nonwords and irregular words could have affected reading comprehension.

This finding indicates that LD Group 1 presented an overall comprehension difficulty in both Kannada and English which was evident on both listening comprehension and reading comprehension. Similar difficulty in rapid verbal naming was observed in both Kannada and English. Similar observations were made for written language, where the written productions were erroneous and the overall output was relatively low compared to typically developing children. Written language sample of a typically developing child and a child in LD Group 1 is shown below in Figures 4.7.4, 4.7.5, 4.7.6 and 4.7.7.

The data of children in LD Group 1 showed that children had deficits in all the underlying processes like phonological awareness, rapid verbal naming and listening comprehension in both Kannada and English and these deficits could have influenced an overall deficit in Kannada and English. Literacy difficulties are observed across skills listening, phonological awareness, rapid verbal naming, reading and written language skills. Children showed literacy difficulties in both languages, indicating that if literacy difficulties occurred in one language (like Kannada), they are likely to occur in the other (English), consistent with the views of the central processing hypothesis. But given that the two languages studied here vary in their orthographic depth (Kannada follows a shallow orthography and English follows deep orthography) a different pattern would be expected, with severe literacy difficulties occurring in English with less transparent orthography than in Kannada with more transparent orthography. However, the occurrence of literacy difficulties seen here seems to be similar along the assessed measures in both Kannada and English. The underlying factors that seem to be related to literacy difficulties in Kannada seem to play a role for English as well. For example, phonological awareness skills, rapid verbal naming, and listening which are basic underlying cognitive-linguistic factors necessary for reading and writing appear to be deficient in Kannada-English biliterate children with LD. The findings of the present study on LD Group 1 are in support of Veii (2006) who reported that a subgroup of children with literacy difficulties who showed persistent difficulties attributed to an overall deficit at the cognitive-linguistic levels. However, further research is warranted to generalize the findings.

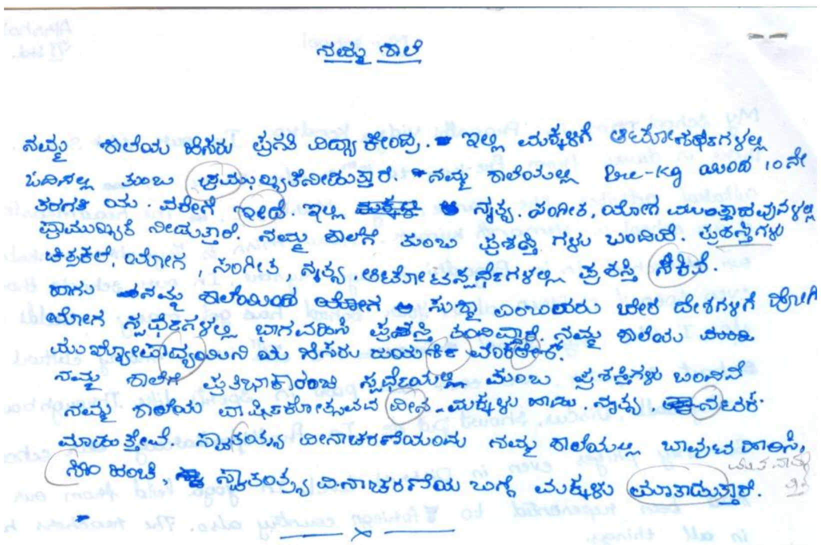
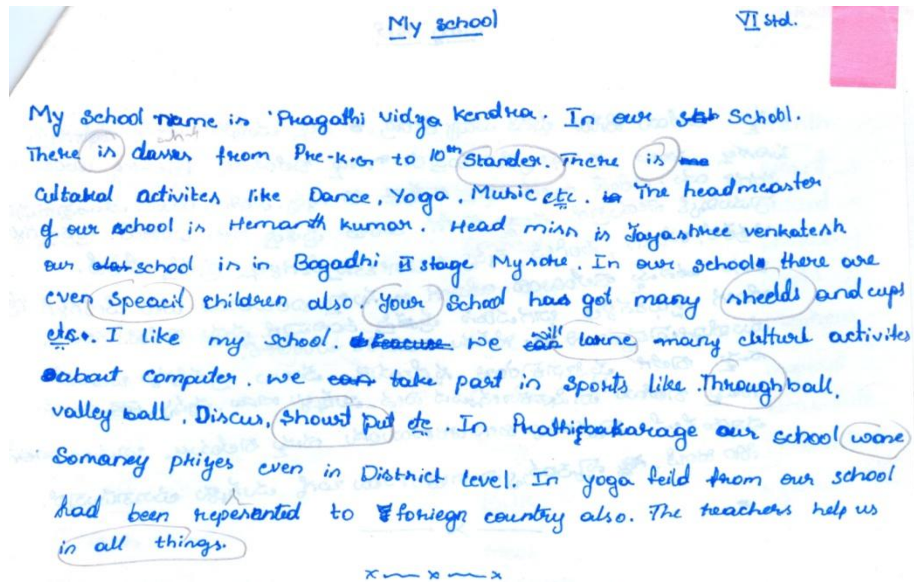


Figure 4.7.4: Writing sample in Kannada of a typically developing child in Grade VI


My school VI std.

My school name is 'Pragathi vidya kendra. In our school. There is classes from Pre-k.g to 10th Stander. There is cultural activites like Dance, Yoga, Music etc. The headmaster of our school is Hemanth kumar. Head miss is Jayashree venkatesh our school is in Bogadhi II stage Mysore. In our schools there are even Speacil children also. Your School has got many sheilds and cups etc. I like my school. we lorne many cultural activites about computer. we take part in sports like Throughball, valley ball, Discus, Shout put etc. In Prathibakarage our school wone somaney prizes even in District level. In yoga feild from our school had been represented to foriegn country also. The teachers help us in all things.

Figure 4.7.5: Writing sample in English of a typically developing child in Grade VI

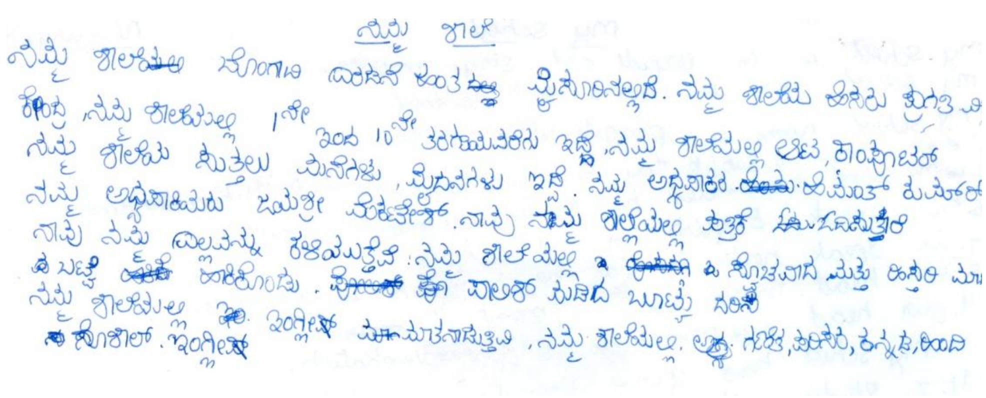


Figure 4.7.6: Writing sample in Kannada of a child in LD Group 1

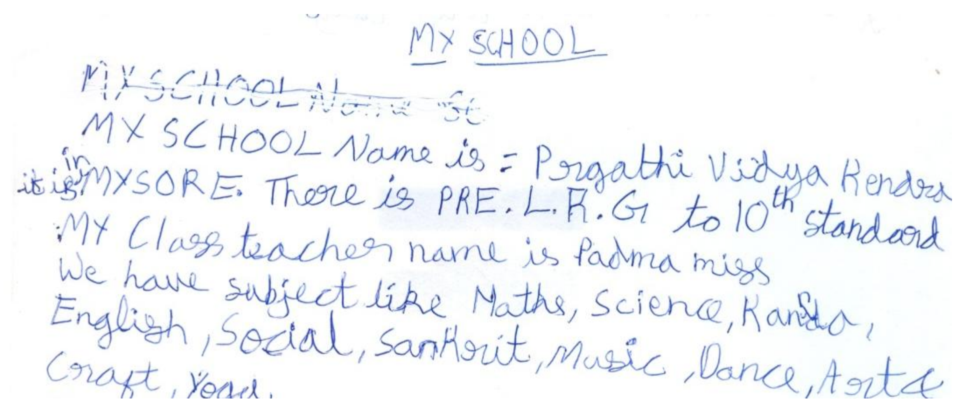


Figure 4.7.7: Writing sample in English of a child in LD Group 1

4.7.2 Performance of child in LD Group 2

Figure 4.7.8 shows comparison of performance of typically developing children and child with LD (LD9). The child in LD Group 2 was the only child that did not fall into the typical pattern described above in LD1.

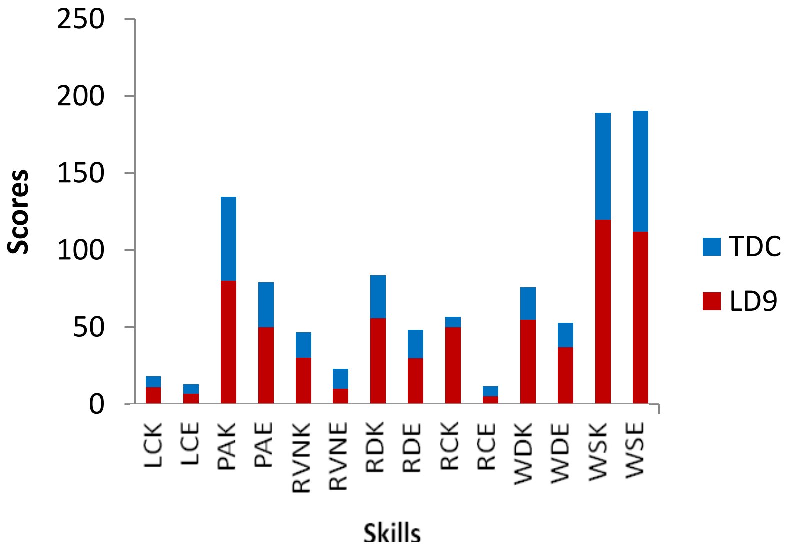


Figure 4.7.8. Comparison of scores between typically developing children and LD9

This child (LD9) showed persistent literacy difficulties in only English but not in Kannada. Listening comprehension skill in Kannada (scored 11/16) was better than in English (7/16) as also performance on all the skills in Kannada than in English. It was found that this child had more difficulty in English than in Kannada. The performance of LD9 was similar to the typically developing children in Grade VII for measures in Kannada but performed poorer than typically developing children in Grade V in English. The performance on some of the skills was found to be on par with their aged typically developing peers, like reading comprehension and listening comprehension and rapid verbal naming in Kannada. However, the child showed difficulty on phonological awareness, decoding words-nonwords and written language in Kannada. As discussed in previous section phonological awareness in Kannada could not have contributed to the difficulty in decoding while reading. Also difficulty in decoding words is not contributing to reading comprehension, as scores of reading comprehension were on par with the typically developing children (see Figure 4.7.8). However, the data on LD Group 2 indicated that the child showed poor performance across all the tasks including phonological awareness, listening comprehension, rapid verbal naming, reading words-nonwords, reading comprehension and written language awareness (see Figure 4.7.8). As mentioned in the earlier sections phonological awareness and rapid verbal naming along with listening comprehension are important contributors to reading and writing in English. A deficient processing of underlying phonological awareness, rapid verbal naming and listening comprehension skills could have contributed to literacy difficulties in English in LD Group 2. A written language sample of child in LD Group 2 is presented in Figure 4.7.9 and 4.7.10.

The data and mean scores for children with Learning disability (LD) indicate the likelihood of existence of two subtypes of learning disability in Kannada-English biliterate children. These include LD who have difficulty in both the languages (i.e., LD Group 1) and children who presented more difficulty in second language (English) compared to first language (Kannada) (LD Group 2).

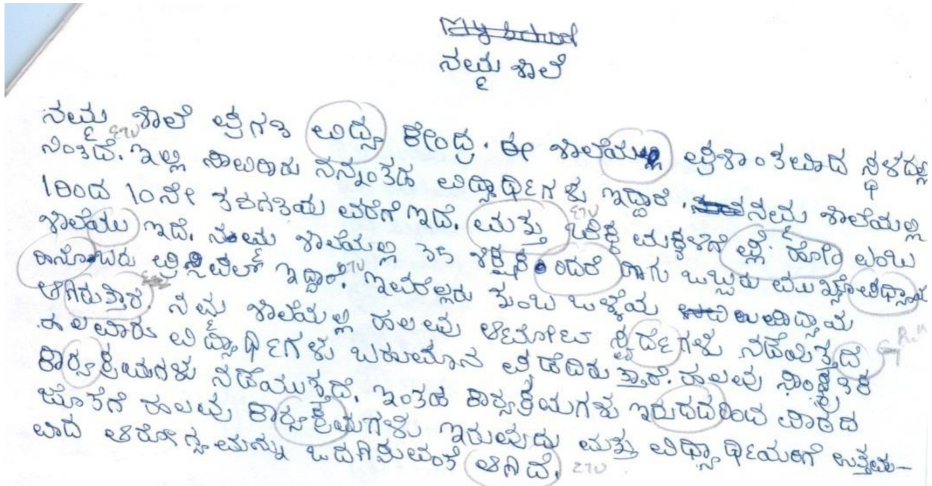


Figure 4.7.9: Writing sample in Kannada of a child in LD Group 2

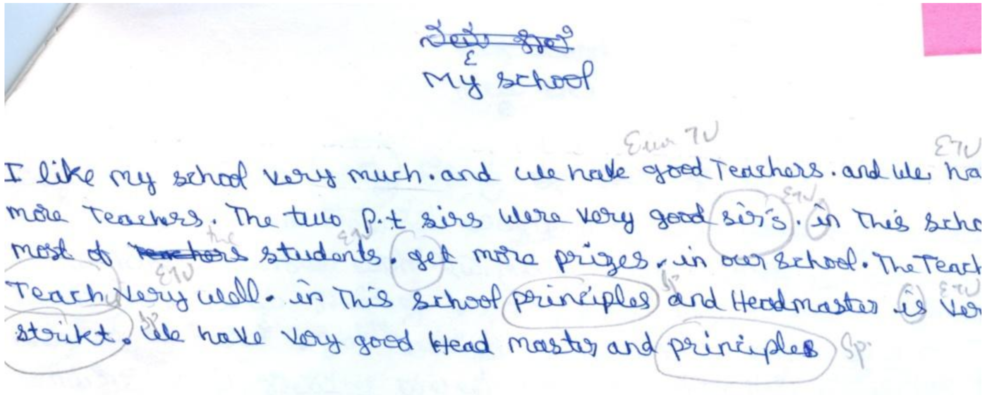


Figure 4.7.10: Writing sample in English of a child in LD Group 2

Discussion

The results of the present study on LD group suggested that children with learning disability showed a developmental lag across all the skills compared to typically developing children across Grades V, VI and VII in both Kannada and English (see Figures 4.7.1 to 4.7.3). This finding was found to be true for a subgroup of children with learning disability LD (Group LD 1). However, the other group with one child with learning disability (Group LD 2) showed a differential developmental pattern across skills between Kannada and English. The analysis of this child revealed that, while, the child showed difficulty in English and showed a developmental lag for English (see Figure 4.7. 8), the performance of the child was similar to typically developing children in Kannada. This is suggestive of subgroup of children with LD in Kannada-English biliterate, alternatively called as differential dyslexia in biliterate children by Smythe and Everatt (2000). Existence of differential dyslexia supports the finding of Smythe and Everatt (2000) in biliterate children.

Out of the ten children with LD, one (Subject LD9) seemed to experience persistent difficulties in L2 literacy i.e., in English. This supports the view of the script-dependent hypothesis (that literacy development in less transparent orthographies is delayed and that literacy difficulties are more pronounced). However, these L2 literacy difficulties may be related to poor L2 language skills, which in turn, may be considered to be still in the early stages of L2 and L2 literacy development. The findings are in support of similar studies (Veii, 2003; Veii & Everatt, 2005; Veii, 2006) which report that literacy difficulties were likely to be more severe in English, the less transparent orthography, than in a highly transparent orthography like Herero. Similar finding was observed in the present study where children with LD 9 seemed to have more difficulty in English, a less transparent orthography than in Kannada, a more transparent orthography. Few other studies which examined differential dyslexia have provided some evidence for presence of differential dyslexia (Everatt, Smythe, Ocampo & Veii, 2002; Kline & Lee, 1972; Leker & Brian, 1999).

However, it is evident that literacy difficulties are present in both Kannada and English in LD Group 1 though the nature and degree varies between children in this group. The other group of children (Group LD 1) presented with literacy difficulties in both languages, indicated that if literacy difficulties occur in one language, they are likely to occur in the other, consistent with the views of the central processing hypothesis. But the two languages considered in the present study vary in their orthographic depth and hence it is expect that the pattern of literacy difficulties also would accordingly, with more severe literacy difficulties occurring in English (less transparent orthography) than in Kannada (more transparent orthography). However, the prevalence of literacy difficulties seen here seems to be similar along the assessed measures in both Kannada and English. For example, difficulty in phonological awareness, rapid naming and written language occur in both Kannada and English. A significant observation is that the same factors seem to be related to literacy difficulties in both languages. Thus, on the basis of this evidence, and despite the differences in their orthographic depth, Kannada and English seem to place more or less the same degree of demands on a few children. In other words, the differences in the orthographic depth of Kannada and English do not seem to contribute to literacy difficulties in this group of children. Hence, it is speculated that assessment is likely to throw light on the underlying cognitive-linguistic deficits of a child.

All the ten children with LD described have difficulties in the key areas associated with the development of literacy skills- phonological awareness, listening comprehension, rapid verbal naming, reading comprehension, reading words, writing to dictation and spontaneous writing skills. As such, these findings seem to provide evidence for the central processing hypothesis that literacy difficulties are a function of deficient central processing skills. However, the findings (LD9) support the script-dependent hypothesis where the child presented more difficulty in English than in Kannada. This finding supports theories which predicted that dyslexia is reduced in consistent languages like German and Italian (Wydell & Butterworth, 1999). In their hypothesis of granularity and transparency, Wydell and Butterworth (1999) recognized that grain size (granularity) and orthographic consistency (transparency) influenced literacy abilities of children with dyslexia. They argued that transparent (i.e., consistent) orthographies show low incidences of developmental dyslexia because print-to-sound translation is one-to-one and orthographies that operate at very coarse grain sizes (i.e., logographies and syllabaries) show low incidences of developmental phonological dyslexia because subsyllabic processing will not be required for reading. Findings from studies that investigated literacy difficulties in bilingual children (Everatt, Smythe, Ocampo, & Veii, 2002; Ocampo, 2002; Veii, 2003) also supported the prevalence of differential dyslexia.

The findings of this study are in support of Gholamain & Geva (1999) and Geva & Siegel’s (2000) who reported that, the script-dependent and central processing hypotheses are complementary rather than being contradictory. These skill areas in which the children in this study show deficiencies constitute various phonological related skills and, weakness in them might be indicative of these children's inability to establish new phonological representations. This indicates that these children have not yet acquired phonological sensitivity to that language. Similarly, the findings suggest that this Biliteracy assessment tool may be used to identify children with learning disability and further differentiate them whether they form the group with a central processing difficulty or the group with "differential dyslexia" as suggested by Smythe and Everatt (2000) or the other subtype governed by script features. Furthermore, utilizing these measures might likely to minimize over-identification and under-identification of literacy disabilities and other learning disabilities among L2 users such as Kannada-English bilingual school children.

All the ten children with LD showed deficient phonological awareness in the L1, L2 or both L1 and the L2. This indicated that phonological processing is more of a central processing skill and hence, affected in both the languages. In general to some extent, memory impairment in children with learning disability can also be attributed to impaired representations of the phonological forms of words, which in turn, may limit the number of verbal items disabled readers can retain in their memory (Snowling, 2000). In this way, their reading may get affected as they are not able to retain information like the typically developing peer group children. This supports the view of Veii (2006) that poor phonological awareness in one language might curtail the development of literacy in another language. Thus, deficient L1 phonological awareness, as is presented in these, may have negatively influenced literacy development in the L2 and vice versa. Also, the rapid verbal naming was found to be affected in children with LD. Scarborough (1998) has found that verbal short-term memory is deficient in many children with learning disability as evident by the inability of disabled readers to remember fewer verbal items than expected for their age.

These findings suggested existence of sub groups of learning disability. A few biliterate children with LD may show difficulty in processing particular script (such as English) than other scripts (such as Kannada). On the other hand, there may be few other children with LD who do not show difficulty in particular scripts as the deficit may be more at a central level of processing. The findings on children with learning disability also emphasize the importance of biliteracy tools which assess two languages (Kannada and English in the present study).

GENERAL DISCUSSION

The acquisition of biliteracy in Kannada-English was studied in the present doctoral research. The results of the study indicated the acquisition pattern in both Kannada (a transparent orthography) and English (opaque orthography) across listening, phonological awareness, rapid verbal naming, reading and written language skills. The study also determined a few important predictors for Kannada and English. While majority of the predictors emerged in the study were found to be different for Kannada and English (Tables 4.6.2 and 4.6.3 and Figures 4.6.1 to 4.6.3), a few common predictors such as listening comprehension also emerged through regression analysis for reading in Kannada and English. For example for reading in Kannada and English, listening comprehension served as the predictor, but for written language skills in Kannada and English, rapid verbal naming and phonological awareness were found to be the predictors, with the predictive power of phonological awareness being relatively low.

Wolf (1999) suggested naming speed (RAN) to be an important factor for reading. But, an important finding in the present study was that naming speed (RVN) was found to be a predictor for written language for both Kannada and English (see Tables 4.6.1 and 4.6.2). This could be because the rapid verbal naming task given to the older children in the present study is likely to involve several cognitive components such as general processing speed (Wolf & Bowers, 1999) and phonological processing (Torgesen, 1997), unlike, in other studies where rapid automatized naming is employed with pictures that requires speed sensitive visual and visual motion processes in addition to the other components (Eden & Zeffiro, 1998). All these componential skills may be relevant to the orthography-to phonology and orthography-to-semantics mappings that may be more crucial in the development of writing for Indian biliterate children. The only difference in differential performance for rapid verbal naming seen is at the level of processing speed from where children are required to retrieve words from the phonological-orthographic- semantic lexicon in order to generate words for the same. Greater number of words generated for Kannada than English is indicative of faster processing speed for naming in Kannada than in English. This can be attributed to the language exposure and experience of these children which is relatively better for Kannada than for English. Findings also suggest that RVN is crucial to both Kannada and English indicative of common underlying linguistic and cognitive processes in the development of reading in biliterates (Geva, 2000) and also transfer of strategy or skills between the two languages. Studies in the clinical population also suggest the importance of rapid naming to literacy in various other languages like Finnish (Korhonen, 1995), Spanish (Escribano, 2007; Jimenez, 2008), German (Frith et al., 1998; Landerl, 2001; Wimmer, Mayringer & Landerl, 2000). These studies indicate that RVN is crucial for literacy in languages with regular scripts.

The findings of the study indicated the unique contribution of phonological awareness to reading as well as written language for English, while only to written language for Kannada. And that phonological awareness develops earlier at a coarse-grained level (as indexed by better scores on syllable related tasks in Kannada) in the early years and later at the fine-grained level (as indexed by the phoneme related tasks). However, neither syllable level nor phoneme level phonological awareness predicted reading in Kannada. This is attributed to the differences in the way spelling to sound consistencies are encoded for Kannada (transparent alphasyllabary) and English (opaque alphabetic). Review reports of such differences across alphabetic and non-alphabetic orthographies (Frost, Katz &

Bentin, 1987) have demonstrated that grapheme-phoneme recoding skills take longer to develop in less transparent orthographies like English compared to more transparent orthographies like Spanish, Greek, Finnish for which word and nonword reading (Seymor, Aro, & Erskine, 2003). The results of study conducted to investigate the relationship between phonological awareness and reading words-nonwords in biliterate children (Shanbal & Prema, 2007) revealed that while, phonological awareness in English significantly predicted reading non-words in English, that in Kannada did not reveal any potential predictors to reading words or non-words. The findings of the present study on correlation, regression and discriminant function analyses revealed that for writing to dictation, reading comprehension was significant in Kannada, while listening comprehension was a significant function in English (see Tables 4.6.6 to 4.6.11).

The findings of the present study are important because it is widely assumed that phonological awareness and its contribution is universal to all languages. Phonological awareness is well known to be highly predictive of children's reading performances in the alphabetic languages such as English. However, this may not be true for all other languages which are non-alphabetic in nature such as Kannada (Karanth, 1998; Prakash, Rekha, Nigam & Karanth, 1993; Prakash & Rekha, 1992; Prakash, 2003; Prema & Karanth, 2003). While reading comprehension, rapid verbal naming and listening comprehension play a major role in acquisition of written language skills in Kannada (see Figure 4.6.18), reading nonwords, rapid verbal naming, listening comprehension, reading comprehension and phonological awareness contribute for acquisition of written language skills in English (see Figure 4.6.19). Therefore two different paths for acquisition of biliteracy in children for Kannada and English may be envisaged. These findings further emphasize use of parallel tools when a biliterate child with literacy difficulties needs assessment. This is because skill like phonological awareness may not be a deciding factor for literacy difficulty in Kannada, whereas, a child who has difficulty in phonological awareness may show difficulties in English. Thus, the findings of the study does not support use of a common tool for either of the languages to assess a biliterate child with literacy difficulty but supports the use of parallel tools in the two languages of biliterates as proposed by Stuart-Smith and Martin (1999). The results suggest that a few skills such as written language, listening comprehension and reading comprehension are achieved in Kannada much earlier than in English.

The study also showed evidences of subgroups of children with literacy difficulties and a few children (Group LD1) who showed difficulty in both Kannada and English (see Figures 4.7, 4.7.1, 4.7.2, 4.7.3 and 4.7.8). However, there was one child who showed difficulty in English than in Kannada. Such children are referred to as children with *differential dyslexia* (Smythe & Everatt, 2000). These children may show difficulty in one language but not in the other language. These findings suggested existence of sub groups of learning disability. A few biliterate children with LD may show difficulty in processing a particular script (like English) which is different from the script of his/her native language (like Kannada). On the other hand, there may be few other children with LD who do not show difficulty in particular scripts as the deficit may be more at a central level of processing. These evidences further support the need for assessment of children with parallel tools in the two languages of Kannada-English biliterate child.

The correlation co-efficient values in Table 4.6.1 indicated a positive correlation between the skills in Kannada and English (LCK-LCE, PAK-PAE, RANK-RANE, RDK-RDE, RCK-RCE, WDK- WDE, and WSK-WSE). For

Kannada-English biliterate children, the findings suggest common underlying skills for the task and the likelihood of transfer of skills between languages. The findings suggest that there could be transfer of a few skills between languages Kannada and English. However, further studies are warranted to explain the phenomenon of cross-language transfer of skills in Kannada and English. Since, investigating transfer of skills in biliterate children was not within the scope of the study the findings are not elaborated in the present study.

Apart from the primary findings the present study also suggested that transfer of skills may be taking place between Kannada and English. For e.g., For reading single words-nonwords, children appeared to use the same orthographic rules to read irregular words and nonwords in English when they were required to use the grapheme-phoneme correspondence rules for English. This indicated that children may be transferring a few skills like reading words nonwords and writing to dictation from Kannada to English or vice versa. This is a question that needs to be explored with future research to explain the phenomenon of cross-language transfer in biliterate children and children with learning disability. The findings of the present study suggest that listening comprehension is not a script dependent phenomenon and as it emerged as a common predictor for reading in both the languages. Results on children with learning disability (LD) indicated that listening comprehension also aided in identifying subgroups of LD- Group LD 1 and Group LD 2. Though results of typically developing children indicated that listening comprehension was a central language problem, it could subgroup two types of LD, while LD Group 1 showed difficulties of listening comprehension in both Kannada and English, LD Group 2 with one child showed difficulty in English and not in Kannada is referred to as ‘differential dyslexia’. The results indicated that children with differential dyslexia were successful to employ background knowledge and memory in both Kannada and English, however, they failed on text inference and text integration indicating deficits in higher level cognitive processes in both the languages.

The findings of the study on phonological awareness suggest that orthographic sensitivity is the guiding factor for phonological sensitivity in Kannada (refer to review section for phonological sensitivity, page no. 40) and English. Exposure to orthography appears to play a role contributing to phonological awareness as phoneme related skills are achieved by biliterate children only in the later grades (Grade VII in the present study) when children learn the principles through exposure to script. The findings are in support of various other studies (Frost, Katz & Bentin, 1987; Karanth, 2002, 2003, 2006; Patel, 2004; Posner & Kar, personal communication, 2010; Seymour, Aro, & Erskine, 2003) which stated that orthographic sensitivity is a crucial factor in reading and the nature of orthography, its transparency and form of representation is found to influence the pattern of reading development.

The findings are also in support of a series of studies conducted by Karanth (1998), Prakash (2003), Prakash and Rekha (1992), Prakash, Rekha, Nigam and Karanth (1993), Prema and Karanth (2003) in children and adults (monoliterates- those who learnt to read only alphasyllabary like Kannada or Hindi, biliterates- those who read Kannada and English or Hindi and English and nonliterates), with Kannada or Hindi as the primary language script. They viewed phonological awareness as being more concomitant than a pre-requisite to successful reading. They reported that biliterates outperformed the monoliterates and the nonliterates on phoneme segmentation tasks, while they performed equally well with the other two groups on rhyme recognition and syllable deletion tasks. The results suggest that phoneme related tasks are learnt later by biliterates in India due to exposure of grapheme-phoneme rules which are not formally introduced, however, children somehow learn to employ the strategy at a later stage in school. The results of the present study are in consensus with the above studies that phonological awareness develops as a function of the characteristics of the writing system of a language and the stages at which different levels of awareness appear in alphabetic and nonalphabetic languages and their mastery vary according to the nature of the script. The findings of the present study also suggest a plausible transfer of phonological awareness skills between Kannada and English, due to the fact that Kannada-English biliterate children employed orthographic rules of Kannada rather than grapheme to phoneme (G-P-C) rules in English as evidenced by reading and writing nonwords and irregular words in English. Transfer of phonological awareness skills from L1 to L2 or L2 to L1, if any is yet another area open for investigation on biliteracy in India.

The findings on reading single words-nonwords suggest that performance was better in Kannada than English. Children made fewer errors while reading Kannada than English. In English, the error types that were commonly seen were those of regularizing irregular words. For e.g., ‘shield’ (/ʃi:lɖ/) was read as either /ʃailɖ/ or /ʃilɖ/. These errors were greater for irregular nonwords. For e.g., ‘pight’ (/paiʈ/) was read as /pigʈ/. The error types on irregular nonwords in Kannada were lesser than in English. These findings suggest that for reading nonwords children do not require the language knowledge as the nonwords do not carry any meaning. Children are required to learn the orthographic principles of a language. In the present study the phonological errors [For e.g., /ʃailɖ/ for ‘shield’ (/ʃi:lɖ/)] in English indicated that children are familiar with the Kannada orthographic rules by Grade V itself and they appear to employ Kannada orthographic rules to decode English irregular nonwords. Lack of knowledge of G-P-C correspondence in English indicates that children are unable to read irregular nonwords in English. If we can assume that there is transfer of skills from Kannada to English causing errors in irregular nonwords, then transfer of skills from transparent to opaque language in biliterates is likely to have negative effect. This indicates that while teaching biliterates one should teach in a context in order to nullify the decontextualized reading effects.

While reading comprehension provides contextual knowledge through the text, reading single words-nonwords are more decontextualized. Unlike reading comprehension where context supports understanding a text with the contextual cues, reading or decoding words require mastery of phonological and orthographic rules of language. As mentioned earlier, inadequate mastery of grapheme-phoneme correspondence rule in English and influence of Kannada orthographic rules on English suggests difficulty in reading or decoding in English compared to Kannada.

The findings on writing to dictation suggested that the nature of reading strategies used for reading and writing is different for Kannada and English. Children in the lower grades were dependent and more sensitive to the orthographic rules in Kannada and children attempted to use similar orthographic rules in English as they did for Kannada (For e.g., word ‘night’ was written as ‘nit’ by a few children in Grade V. The findings suggest that strategies for reading and writing in Kannada and English are different and this needs attention for teaching Indian biliterate children. In spite of being biliterates, children have not acquired the P-G-C rules required for English and still adhere to orthographic rules of Kannada to English.

Hence, transfer of skills could be taking place from Kannada to English which seem to cause interference in English, similar to the findings reported for reading words-nonwords in the present study. However, further studies are warranted to strengthen this observation on transfer of skills in Kannada and English. The findings on expository writing revealed that difference in the structure of languages calls for specific measures for expository writing.

SUMMARY AND CONCLUSIONS

In the recent years, acquisition of biliteracy in Indian children has received much attention by researchers and educationists. But, a realistic estimate of the prevalence of literacy failures in school children is yet to be made. Majority of literacy failures in school children may be due to factors such as language and cultural factors (Prema, Shanbal & Khurana, 2010) but need not necessarily be the disability in the real sense. Of late, the number of children with literacy failures who avail consultation from Speech-Language Pathologists in India is increasing possibly due to the most prevalent language and cultural diversity in India. Among those who report, not everybody manifests typical literacy failures with disability. There are many children who are behind/slow in reading and writing due to factors not directly related to literacy. Majority of these children are from monolingual community, a few others from bi/multilingual community learning to become biliterate. Research studies investigating biliteracy acquisition in other languages have documented that structures of languages play a major role in the differential pattern of biliteracy acquisition. This necessitates the need to understand acquisition of biliteracy in children particularly to identify those factors within the languages that may affect the acquisition of biliteracy leading to literacy failures or reading or learning disability in such children.

There were four research questions put forth for the present study.

7. Is there a developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII?

- The primary objective was to study the developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII.

8. Is there a need to develop an assessment battery for biliterate Children?

- In order to achieve the primary objective of the study, the secondary objective of the study taken up was to develop a tool to assess biliterate children (ABC).

9. Do the existing models of literacy acquisition hold good for biliterate children?

- The data obtained on ABC tool would be examined for patterns of responses in order to compare with the existing models of literacy acquisition. Hence, the tertiary objective of the study was to derive a model of literacy acquisition in biliterate children, which will contribute to the existing models for literacy development.

6. If a differential pattern of literacy acquisition exists in biliterate children, what is its relevance to biliterate children with learning disability (LD)?

- An extended objective of the study was to examine a small group of clinical population (children with learning disability-LD) in order to check for the relevance of ABC tool as a clinical tool.

A cross-sectional population of ninety Kannada-English biliterate children (Male=45; Female=45) from Grades V through VII studying in schools with English as medium of instruction were selected from three different schools of Mysore city (30 children from each school; 30 from each grade). All the children were assessed on the tool for acquisition of biliteracy in children (ABC tool) after suitable pilot testing. The ABC tool comprised of various subtests for listening comprehension, phonological awareness, rapid verbal naming, reading and written language skill. The ABC tool was also administered on a small group of children with Learning disability (N=10; 3 children from Grades V and VI; 4 children from Grade VII) in order to check for its relevance.

The data obtained on 90 children was subjected to various statistical analyses such as two-way repeated measures ANOVA, correlation, regression and discriminant function analyses.

Developmental pattern in the acquisition of biliteracy

The results indicated a clear developmental pattern across listening comprehension, phonological awareness, rapid verbal naming, reading and written language skill both Kannada and English. A few common predictors and a few differential predictors were found for Kannada and English. The common predictors were listening comprehension which significantly correlated with reading in both Kannada and English. Rapid verbal naming was yet another skill which predicted written language in both Kannada and English. Written language in both Kannada and English was in turn predicted by phonological awareness that served as a stronger predictor of written language in English than for Kannada. These predictors indicated the need for deriving two separate models for acquisition of biliteracy in children. Two separate models were derived for Kannada and English (Figures 4.6.18 and 4.6.19).

Importance of underlying skills to literacy acquisition in biliterate children

While in the monolingual/monoliterate studies in Kannada, it is suggested that phonological awareness is not so crucial for literacy acquisition in Kannada (Karanth, 1998; Prakash, Rekha, Nigam & Karanth, 1993; Prakash & Rekha, 1992; Prakash, 2003; Prema & Karanth, 2003). The findings of the present study and the derived models (Figures 4.6.18 and 4.6.19) suggest that phonological awareness is significant for written language in Kannada-English biliterate children, though at different degrees in Kannada and in English (see Tables 4.6.2 and 4.6.3). Phonological awareness was found to be a predictor for reading in English but not for reading in Kannada. But, phonological awareness that was found to be an important contributor for written language in Kannada also contributed to written language and reading in English along with other skills such as rapid verbal naming and listening comprehension skills (see Figures 4.6.18 and 4.6.19). Therefore, Kannada-English biliterate children are equipped with skills (such as phonological awareness, rapid verbal naming and listening comprehension skills) or strategies that would become advantageous for learning to read and write English. Kannada-English biliterate children appear to transfer strategies to read and write in either of the languages with the common underlying processing skills such as phonological awareness, rapid verbal naming and listening comprehension. Their cumulative contribution to written language and reading in Kannada and English seem to be advantageous to strengthen cross-language transfer in biliterate children.

Cross-language transfer of literacy skills in biliterate children

The findings of the study also show the direction of cross-language language transfer of skills in learning literacy in Kannada and English. Transfer of a few skills such as reading and writing irregular nonwords of first language appeared to interfere with literacy in second language or at times, facilitated second language learning.

For reading nonwords in English, children are required to employ the grapheme-phoneme correspondence rules of English. But, the errors while reading irregular nonwords in English (opaque orthography) may be due to the orthographic principles that are employed for Kannada (transparent orthography) is being transferred to reading irregular nonwords in English.

The transfer of skills from transparent (Kannada) to opaque (English) language is likely to show a disadvantage to decode second language (English) in the present study. On the other hand children are better on reading comprehension in English than in Kannada, suggesting that the Kannada-English biliterate children are not entirely dependent on decoding words but derive clues from the context as it is done while reading Kannada. Therefore, while teaching biliterate children one should teach words in a context so that decontextualized reading effects may be nullified. Facilitating reading comprehension for biliterate children is recommended so that they have a context to learn words in the classroom situation. Depending on these issues there is a need to orient educators as well as Speech-Language Pathologists on planning remedial programs for biliterate children.

Processing mechanisms in biliteracy acquisition

Results on biliterate children revealed that, while phonological awareness, nonword reading and nonword writing were found to be script dependent, listening comprehension and reading comprehension appeared to be dependent on central processing. These findings suggested that though the two processing mechanisms, are complementary to each other as suggested by Geva and Siegel (2000), learning two different types of scripts such as Kannada and English involve central processing mechanism which is subserved by script specificity and hence, differential results on Kannada and English tasks indicated that even though they are developed as parallel tasks for ABC tool, they need to be viewed from two different ways for Kannada and English. An understanding of the model for literacy acquisition in Kannada-English biliterate children suggested how differently, few skills such as listening comprehension and writing to dictation are crucial for literacy acquisition in English and reading comprehension and writing are crucial for Kannada. This model is inferred and designed based on results obtained from a host of statistical analyses. Better accuracy for listening comprehension, reading comprehension, expository writing, nonword reading and writing in Kannada, and 'phonological sensitivity' in Kannada, suggest that children follow a lexical semantic route for reading and writing in Kannada; poor accuracy for nonword reading and writing in English (regularization of irregular nonwords), listening comprehension, reading comprehension, expository writing and 'phonological awareness' suggest that the lexical semantic route fails to facilitate reading and writing in English in Kannada-English biliterate children. Therefore they may neither employ phonological route to read and write English (as is the case in the majority of monoliterate children learning to read and write English) nor able to employ lexical-semantic route owing to the nature of English script (alphabetic). Therefore, the acquisition of reading and writing skills is slower but gets facilitated by transfer of strategies and skills over a period of time in higher grades. The study contributed to the existing models of biliteracy acquisition and disorders from the perspective of language and script structures. A further empirical testing of the model could reveal the units or the levels that may be disintegrated in a biliterate child with learning disability.

ABC tool for screening and diagnostic purposes

The results of the present study strengthen the need for an assessment tool for acquisition of biliteracy in the Indian context. The significant functions derived from discriminant function analysis indicated that, while in Kannada writing to dictation was predicted by reading comprehension, in English writing to dictation is predicted by listening comprehension. Writing to dictation in Kannada and English may be used as a screening tool to identify literacy difficulties in Kannada-English biliterate children. The other tasks that may be included in the screening tool could be rapid verbal naming and reading single words and nonwords in both Kannada and English. Rapid verbal naming task would approximately take 10 minutes and reading words-nonwords would take 10-15 minutes to complete the respective tasks. Phonological awareness can be included as part of the diagnostic tool itself as the assessment takes longer time for administration. From the 90 children selected for the study with strict inclusion criteria (refer to page nos. 88-89) and assessed using the ABC tool, two children (a child from Grade V and Grade VII) appeared to perform below their peer group. Around 2.2% of children from the data emerged as children with literacy difficulties in the group of biliterate children. Prema (1998) reported that around 4% of Kannada monoliterate children were found to show literacy difficulties. In support of this premise, reports of a retrospective study by Prema and Jayaram (2002) revealed that around 13% (22 children out of 165) of children from the clinical population who were diagnosed as biliterate children with learning disability were over identified. Their study indicated that children with learning disability may have different causation factors. The present study exercised strict criteria for inclusion, and therefore identified 2.2. % children with literacy difficulties, as against those studies mentioned in monoliterates (around 10%, Ramaa, 2000). So, ABC tool provides a multidimensional database to a Speech-Language Pathologist and gives a strong foundation for selecting skills for management of children with learning difficulties between languages like Kannada and English. The ABC tool and the screening tool can be used effectively after a systematic validation of the tools. Hence, as a product of this doctoral research, ABC tool for screening and diagnostic purposes emerged.

Literacy breakdown in biliterate children with Learning disability

The derived models also helped in understanding the breakdown of skills in a sample of children with learning disability (LD). Based on the results of the ABC tool, the clinical group could be sub typed in two groups-LD Group 1 and LD Group 2. Children in LD Group 1 showed difficulty in both Kannada and English and one child in LD Group 2 showed difficulty in English than in Kannada, which was referred to as 'differential dyslexia'. While, the literacy difficulties in LD Group 1 suggested that these children had breakdown of a central language processing domain that in LD Group 2 (differential dyslexia) is of a script dependent domain. This suggests that when a child learns more than one script, there is the potential phenomenon for uneven literacy acquisition. This idea of 'differential dyslexia' that is where the child may be dyslexic in one language but apparently not in another, is in support of various (Kline & Lee, 1972; Leker & Brian, 1999; Miller-Guron & Lundberg, 2000; Veii, 2006; Wydell &Butterworth, 1999). The results are not necessarily due to a function of language exposure but the way dyslexia manifests itself in different languages, demonstrating that a given underlying weakness may cause difficulties in one language but not another (Smythe & Everatt, 2000). The findings are in support of Smythe and Everatt (2000) who believed that research on existence of *differential dyslexia*, challenges the notion that an individual with dyslexia individual who experiences difficulties in one language will have difficulties in all languages.

Hence, the findings of the present study answers all the four research questions posed for the present study.

1. Is there a developmental pattern of acquisition of literacy skills in biliterate children from Grade V to Grade VII?

- There is a developmental pattern of acquisition for listening comprehension, phonological awareness, rapid verbal naming, reading words-nonwords, reading comprehension and written language skill in both Kannada and English from Grades V through VII. Thus, the primary objective of the study is achieved.

2. Is there a need to develop an assessment battery for Biliterate Children?

- Yes, there is a need to develop an assessment battery for biliterate children. The present study not only provided norms for literacy skills in biliterate children under study but also suggested that part of the ABC tool can also be used by Speech-Language Pathologists for screening biliterate children for literacy difficulties. However, validation for the screening tool is necessary before it is used for screening purposes. Hence, the secondary objective of the study is achieved and the mean and SD scores are provided in the Appendix IIIa for further clinical use.

3. Do the existing models of literacy acquisition hold good for biliterate children?

- The data obtained on ABC tool were examined and a host of statistical analyses revealed common and different predictors for Kannada and English. Based on the inferential data, two separate models were derived for Kannada and English. The models were derived on the basis of Durgunoglu and Öney (2000) model of literacy acquisition (see Figure 2.1 in the review section in page no. 40). Hence, the tertiary objective of the study was achieved and models of literacy acquisition in biliterate children were derived.

4. If a differential pattern of literacy acquisition exists in biliterate children, what is its relevance to biliterate children with learning disability (CLD)?

- The relevance of ABC tool was checked by examining the ABC tool on a small group of clinical population (children with learning disability-LD). The ABC tool was successful in identifying two subtypes of learning disability within the clinical group. While one subtype of children with LD exhibited difficulty in both Kannada and English, other subtype was that of differential dyslexia with difficulty in English than in Kannada. Hence, the extended objective of the study was achieved for the small group of clinical population (children with LD).

The findings of the study suggest that ‘biliterate children’ are a unique group of children who manifest multidimensional skills that often transfer from one language to the other. Despite the commonalities, script features of a given language would require specific skills that are governed by the processing mechanisms. Therefore, it is necessary to identify and assess literacy in biliterate children in all the prerequisite skills.

IMPLICATIONS OF THE STUDY

The preliminary and extensive study offers evidence to understand the pattern of acquisition of biliteracy in children in the Indian context as children in India are exposed to two or more languages in schools. The findings suggest a developmental pattern in the acquisition of literacy skills in Kannada and English. The study succeeded in identifying potential predictors for Kannada and English and suggested differential predictors in both. The common predictors were listening comprehension which significantly correlated with reading in both Kannada and English. Rapid verbal naming was yet another skill which predicted written language in both Kannada and English. Written language in both Kannada and English was in turn predicted by phonological awareness that served as a stronger predictor of written language in English than for Kannada.

Given, the importance of literacy in today's world, the ABC tool developed is a useful tool that can be used for screening Kannada-English biliterate children in the Grades V to VII and also for clinical purposes. The ABC tool also helps in the assessment of biliterate children in schools who show difficulty in learning literacy skills. The ABC tool provides a multidimensional database to a Speech-Language Pathologist and gives a strong foundation for selecting skills for management of children with learning difficulties between languages like Kannada and English. However, further research is necessary to increase the confidence and applicability of the ABC tool.

The findings of the study support both the central processing hypothesis and the script dependent hypothesis suggested by Geva and Siegel (2000) and others. Given the differential pattern of literacy acquisition in Kannada and English, there is a need to assess children with learning disability in both the languages in a clinical set up. These findings further implicate the emphasis of parallel tools when a biliterate child with literacy difficulties needs assessment. This could differentiate and aid in identification of a more general learning disability or 'differential dyslexia. The findings suggest that when a child learns more than one script, there is the potential for uneven literacy acquisition. This idea of "differential dyslexia" that is where the child may be dyslexic in one language but apparently not in another, is in support of various (Kline & Lee, 1972; Leker & Brian, 1999; Miller-Guron & Lundberg, 2000; Veii, 2006; Wydell &Butterworth, 1999). The results are not necessarily due to a function of language exposure but the way dyslexia manifests itself in different languages, demonstrating that a given underlying weakness may cause difficulties in one language but not another (Smythe & Everatt, 2000). The findings are in support of Smythe and Everatt (2000) who believed that research on existence of *differential dyslexia,* challenges the notion that an individual with dyslexia individual who experiences difficulties in one language will have difficulties in all languages.

An understanding of this model in the Indian context suggested how differently, few skills such as listening comprehension and writing to dictation are crucial for literacy acquisition in English and reading comprehension and writing are crucial for Kannada. This model is inferred and designed based on results obtained from a host of statistical analyses. A further empirical testing of the model could reveal the units or the levels that may be disintegrated in a biliterate child with learning disability. The study contributed to the existing models of biliteracy acquisition and disorders from the perspective of different language and script structures.

Few tasks such as writing to dictation serves as screening tasks to obtain information on the risk of a child becoming learning disability in Kannada or English or both. The findings of the study suggest that children should be assessed in both Kannada and English. Assessing a child only in English will not give a true picture of the child's literacy difficulty.

The findings of the study suggest that remedial or management strategies for children with learning disability who have different type of difficulties in the two languages may require different approaches and techniques. For example, while phonological awareness training may not help in improving the reading ability in Kannada, that in English can improve reading ability in children. Children are required to be trained for adequate phonological sensitivity to improve their reading in Kannada. Listening comprehension which is usually the most neglected area needs attention and should be employed in Kannada and English as part of Speech-language therapy program to enhance the listening skills and improve the reading ability of children.

The findings on phonological awareness suggest that, phonological sensitivity seems to be more crucial for reading Kannada and children seem to transfer these skills to alphabetic language such as English in the present study. Encouraging the inclusion of phonological awareness activities in the school curriculum can facilitate transfer of skills or strategies which support using both languages rather than teaching strategies separately in Kannada and English. Nag (2007) studied children from 5-10 years of age and reported that in Kannada children achieve phonological sensitivity by later than Grade 4 compared to available reports which suggest that they achieve at a much younger age in alphabetic languages (English). Nag (2007) reported that in Kannada while phoneme awareness is slow to emerge (Grades 3-4), syllable awareness is achieved much earlier (Grades 1-3). Further research is warranted to understand how well the strategies can be used for two languages and how those strategies support phonological sensitivity in both the languages.

While findings on phonological awareness warrant common strategies for teaching Kannada and English, that in reading single words and nonwords suggested that if we can assume there is transfer of skills from Kannada to English causing errors in irregular nonwords of English, then transfer of skills from transparent to opaque languages in biliterates is likely to have negative effect or a disadvantage. This indicates that while teaching biliterate children one should teach words in a context so that decontextualized reading effects may be nullified. Teaching biliterate children through reading comprehension is recommended so that biliterate children always have a context to learn words in the classroom situation. Findings on writing to dictation suggested similar failure to transfer of skills for Kannada and English. Hence, teaching strategies should be more context dependent to teach reading and writing in Kannada and English.

The findings of the present study suggested that there is a transfer of strategy (in terms of bottom-up and top-down processing) along with transfer of skills for a transparent orthography (Kannada) and an opaque orthography (English) in Kannada-English biliterate children. Children appeared to transfer top-down strategy of Kannada to English. This paves way for using analytical (bottom-up processing) v/s wholistic approach (top-down processing) to reading and writing in biliterate children. This calls for attention during remediation to strengthen underlying skills such as listening comprehension, phonological awareness and rapid verbal naming while teaching alphabetic languages; strengthen language knowledge, meaning, etc. while teaching alphasyllabary.

The findings of the study suggest that ‘biliterate children’ are a unique group of children and it is essential to identify difficulty at each and every level of literacy skills and use the strategies accordingly. Strategies for these children need to be developed to strengthen those skills which facilitate transfer of skills and reduce (inhibit) those which cause interference. For example, listening comprehension, phonological awareness and reading comprehension should be encouraged in both the languages; reading single words-nonwords and writing to dictation should be taught in a contextualized manner so that it aids children to learn new words to read and write in the classroom situation.

Issues on cross-language transfer between two different languages such as Kannada and English would highlight on the transfer of skills in biliterate children and its influence on literacy acquisition. Further research is warranted to study the transfer of skills for L1 and L2.

LIMITATIONS OF THE STUDY

One methodological issue needs to be acknowledged. The present study was a cross-sectional design. Children in the present study were not beginning readers when the study was carried out. There is a need for empirical evidence about the relationship between literacy skills in both the languages at the start of literacy instruction with additional longitudinal evidence, which would help to track the developmental trajectories for biliteracy acquisition.

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