COGNITIVE LINGUISTIC ABILITIES IN SIMULTANEOUS VS. SEQUENTIAL BILINGUAL CHILDREN

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June 2011

CERTIFICATE

This is to certify that this dissertation entitled **"Cognitive linguistic abilities in simultaneous vs. sequential bilingual children"** is a bonafide work submitted in part fulfillment for the Degree of Master of Science (Speech-Language Pathology) of the student with Registration No. 09SLP029. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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This is to certify that the dissertation entitled **"Cognitive linguistic abilities in simultaneous vs. sequential bilingual children"** has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier in any other University for the award of any Diploma or Degree.

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DECLARATION

This is to certify that this Master's dissertation entitled **"Cognitive linguistic abilities in simultaneous vs. sequential bilingual children"** is the result of my own study and has not been submitted in any other University for the award of any Diploma or Degree.

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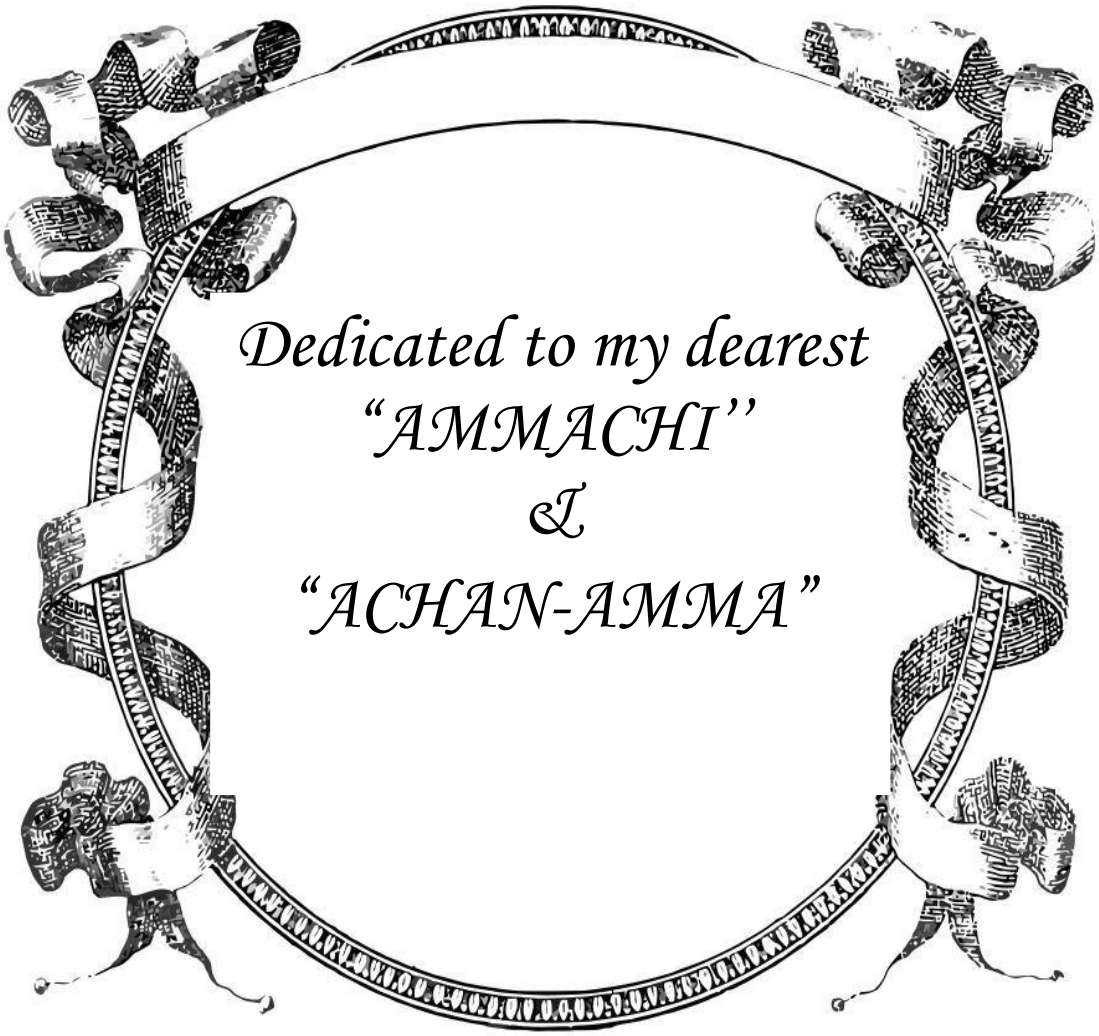
June 2011 Register No. **09SLP029**


Dedicated to my dearest
"AMMACHI''
&
"ACHAN-AMMA"

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CHAPTER 1
INTRODUCTION

Language primarily functions as the 'vehicle of cognitive growth'. Cognition and language are closely related and there are connections between cognitive development and language development. Language is a tool for thinking as proposed by Vygotsky (1986). According to him, there are basic thought processes that do not require language, and there are higher mental processes that do require language. Some kinds of thinking are possible only by those who have language and therefore, there are some kinds of thinking that only humans can do (Cole, John-Steiner, Scribner, & Souberman, 1978). The view that language one acquires becomes a tool used in thinking has received support from studies of several domains of cognition.

Cognition involves a wide range of mental processes such as attention, pattern recognition, memory, organization of knowledge, language, reasoning, problem solving, classification, concept and categorization (Best, 1999). These cognitive processes are interrelated with one another rather than existing in isolation. The development of cognitive processes is influenced by several internal and external factors. One such factor is the learning of one or more languages. There is a close interaction between children's cognitive capacity and the influence of language specific input from the very beginning of linguistic development. Children who have the ability to communicate in two languages i.e., bilingual children are different from monolingual children in many ways. The differences are evident in the way they acquire language, age of acquisition, proficiency in the language etc. All of us are born into a language, more appropriately, into a linguistic condition which might be a *monolingual* one for many, and a *bilingual* one for others.

The term *bilingual*, on the surface means knowledge of two languages. Weinreich (1953) defined bilingualism as the alternate use of two languages. The phenomenon of bilingualism is so widely prevalent and multifaceted that to date a complete definition of bilingualism in a manner covering all aspects is not available. Deciding whether or not a person is bilingual is further complicated when the person is a child who is in the process of language acquisition. Children can acquire languages in a variety of ways at different points of time in their life. The extent of exposure to a particular language and its use also varies. Accordingly, researchers have classified bilinguals on the basis of age of acquisition, proficiency level of the languages, context in which learning takes place etc.

Consideration of the age of acquisition as a basis for categorization of bilinguals has given rise to several classifications from a developmental perspective. One such classification is **simultaneous** and **successive bilingualism** (Genesee, Hamers, Lambert, Mononen, Seitz, & Starck, 1978). If a child learns two languages at the same time, that is termed simultaneous acquisition. The simultaneous acquisition occurs early in childhood, before the linguistic foundations of language are in place. They are considered to be learning a second language prior to the full grammatical development of the first, and therefore the two developing systems will interact more actively. If a child acquires one language, and having mastered that language, learns a second language that is termed successive or sequential acquisition. In this case, the child has acquired basic command of the first language and then established grammar in the second language. One problem in speaking of the simultaneous acquisition of two languages is defining a cutoff point at which one language can be said to have been established. McLaughlin (1978) set the cutoff

point at three years of age. The child who is introduced a second language before three years will be regarded as acquiring the two languages simultaneously; the child introduced to a second language after three will be considered to have had one language established and to acquire the second successively, as a second language. The same criterion has been adopted for the current study to classify simultaneous and sequential bilinguals.

In the early 1900s, there were claims that teaching a child a second language could suppress intellectual function and cause emotional problems (Hakuta, 1986). The period where research accented detrimental effects on bilingualism lasted from approximately the 1920's to the 1960's. While the dominant result was that bilinguals were inferior to monolinguals particularly on verbal Intelligence Quotient (IQ), these early studies share various limitations and methodological flaws and hence, the conclusions cannot be accepted (Grosjean, 1998). Modern research suggests that the bilinguals have no cognitive disadvantages compared to the monolinguals. Further, there are ample number of studies which were carried out subsequently that supported the view that speaking two languages does not tax either the cognitive or the linguistic system; rather bilingualism confers advantages upon children with respect to various cognitive and linguistic abilities.

A major turning point in the history of relationship between bilingualism and cognition was reached in Canadian research by Peal and Lambert (1962). They concluded that bilingualism provides greater mental flexibility: the ability to think more abstractly, more independently of words, providing superiority in concept formation; that a more enriched bilingual and bicultural environment benefits the

development of IQ, and there is a positive transfer between bilinguals' two languages, facilitating the development of verbal IQ. Their research broke new territory in the area of bilingualism and provided a stimulus for future research.

Following Peal and Lambert's study several studies published reported that bilinguals were better in cognitive linguistic tasks such as memory, divergent thinking, problem solving, visual memory etc. compared to monolinguals (Cummins & Gulutsan, 1974; Ben-Zeev, 1977a, 1977b; Bialystok, 1999). Research on the effects of bilingualism on metalinguistic awareness has associated bilingualism with a higher ability to reflect on language and to manipulate it (Ianco-Worrall, 1972; Ben-Zeev, 1977a, 1977b; Cummins, 1978; Bialystok, 1991, 2001). Research over the past several decades effectively dispelled the notion that the effects of bilingualism on cognition and on cognitive development are deleterious.

Several investigations also tried to assess the cognitive linguistic abilities of children acquiring languages simultaneously and sequentially. Simultaneous bilingual children acquire structure shared by both languages at approximately the same rate and in the same sequence (Kessler, 1971). They initially develop a single mental system for the two or more languages they acquire. As these children develop, they gradually begin to differentiate between the two language systems. The precise age at which this may occur varies as input conditions, language balance and other linguistic and social variables interact. Sequential bilingual children utilize their knowledge of the structures of the first language as the foundation for the second language.

Lenneberg's critical period hypothesis and the results of studies using hemodynamic as well as electrophysiological methods (Meisel, 2004) confirm the importance of age of acquisition in second language learning. Following the critical period hypothesis, addition of one language or more after the optimal age, as in adult second language acquisition, implies that the human language making faculty is no longer available to the learner, at least not in the same way as during early childhood. This doesn't mean that language acquisition is not possible any more. Rather, it suggests that children who acquire languages sequentially have to resort to other cognitive capacities in order to develop a knowledge system about the language. In this case, the language making capacity of an individual has already been activated at least once, subsequent to language acquisition might, in principle, draw on this previously acquired knowledge and could thus proceed as in those instances which happen during the critical age period. Functional neuronal imaging experiments e.g., fMRI, suggests a common anatomical substrate and common pattern of activation for both languages acquired during early infancy; late bilinguals, on the other hand, exhibit spatial separation of the languages in the brain (Meisel, 2004). Interestingly, it has been suggested that an increasing activation of the right hemisphere can be observed if onset of acquisition of a language happens after the age of four (Meisel, 2004).

Individual case studies by Leopold (1947) concluded that early bilingualism was advantageous to children's cognitive and linguistic development. Several positive effects of bilingualism were reported for children who had become bilinguals before the age of four (Balkan, 1970). They have some advantages in thinking, ranging from creative thinking to measures of cognitive flexibility,

creativity or divergent thought to faster progress in early cognitive development and greater sensitivity in communication. Research by Bain and Yu (1980) on cognitive consequences of raising children one person one language principle showed that at about age 4, children raised bilingually in one person- one language environment was better able to use both overt and covert language as a guide and control their cognitive functioning. The data favored younger bilingual children though it did not reach statistical significance.

Kharkhurin (2008) reported bilinguals who acquired their second language earlier, those with high proficiency in both the languages and with longer exposure to the new cultural settings tended to outperform their counterparts who acquired second language later in life, and with less proficiency on the measures of fluency and flexibility in divergent thinking. The study proposed that age of second language acquisition, linguistic proficiency, and length of exposure to a new cultural environment might have an influence on bilinguals' performance.

Need for the study:

Lenneberg's critical period hypothesis, neuroimaging studies and various cognitive linguistic studies on bilingualism revealed that bilinguals have advantages over monolinguals in various aspects of language and cognition. There are some studies which also indicate that the individuals acquiring both languages simultaneously from birth have more cognitive advantages than those acquiring after three years of age. However, studies comparing two varieties of bilinguals on these aspects are scarce, more so, in the Indian context. The questions remain about exactly why and under what conditions bilingualism enhances cognitive function i.e. the

amount of exposure to each language, the age of introduction of the language, type of bilingualism - whether simultaneous acquisition or successive acquisition of two languages in children have greater cognitive linguistic advantages remains controversial. Such studies would provide insight into the interaction between cognitive and linguistic mechanisms in both the groups of children. These studies also would have implications in the assessment and intervention of children with communication disorders. Research on these aspects would help us to find answer to questions such as should we consider these two as two different groups while carrying out the assessment and would the interpretation vary accordingly. Keeping this in view, this study was planned.

Aim of the study:

The main aim of the study was to compare the cognitive linguistic abilities of Kannada-English bilingual children who have acquired these two languages simultaneously vs. sequentially.

CHAPTER 2

REVIEW OF LITERATURE

Language is the systematic and conventional use of sounds (or signs or written symbols) for the purpose of communication or self expression (Crystal, 1995). Language preexists the birth of an individual and continues to be in existence even after the individual dies; just as the society itself preexists and continues even after the individual.

Language primarily functions as the 'vehicle of cognitive growth'. Cognition and language are closely related, and there are connections between cognitive development and language development (Vygotsky, 1986). A wide range of relations have been proposed, including the following:

(1) Language and thought are unrelated; language merely expresses the thoughts that are already there.

(2) Language shapes thought; speakers of different languages think differently as a result of their different languages.

(3) Language and thought develop together; children learn words for concepts as they acquire the concepts.

(4) Language influences how we think for the purpose of speaking; for example, a language that has only gender specific personal pronouns will cause speakers to encode gender in a way that a language with a gender-neutral personal pronoun does not.

(5) Language is a tool of thought; we think in the language or languages we have acquired.

(6) Language is a source of cognition advancing information; much of what we know we acquire through language.

Language is a tool for thinking as proposed by Vygotsky (1986). According to him, there are basic thought processes that do not require language, and there are higher mental processes that do require language. Some kinds of thinking are possible only by those who have language and therefore, there are some kinds of thinking that only humans can do (Cole, John-Steiner, Scribner, & Souberman, 1978). The view that language one acquires becomes a tool used in thinking has received support from studies of several domains of cognition. Cognition involves a wide range of mental processes such as attention, pattern recognition, memory, organization of knowledge, language, reasoning, problem solving, classification, concept and categorization (Best, 1999). These cognitive processes are interrelated with one another rather than existing in isolation.

There is a close interaction between children's cognitive capacity and the influence of language specific input from the very beginning of linguistic development as cognition is affected by the process of learning one or more languages. In the current scenario, everyone is bilingual or multilingual. That is, there could hardly be anyone in this world who does not know at least a few words in languages other than the maternal variety. The term *bilingual*, on the surface means knowledge of two languages. If a speaker is fluent in two languages, then he or she is said to be bilingual. Weinreich (1953) defined bilingualism as the alternate use of two

languages. In the same year, Haugen suggested that bilingualism began with the ability to produce complete meaningful utterances in the second language. Researchers have proposed certain key variables to be considered in defining a bilingual person which include age and manner of acquisition, proficiency level in specific languages, domains of language usage and self identification and attitude.

Researchers have classified bilinguals in different ways. One type of classification is based on the following variables (Weinreich, 1953).

- ✓ Age of acquisition
- ✓ Proficiency
- ✓ Context of development

Age of acquisition: Based on the age of acquisition, the bilinguals can be classified into

- Early bilinguals: Early bilingual refers to people who have learnt two languages early in childhood before the age of six.
- Late bilinguals: Late bilingual refers to people who have become bilingual later in their childhood or in the adolescent period i.e after the age of twelve.

Early bilinguals can be further divided into **simultaneous** and **sequential** bilinguals.

If a child learns two languages at the same time early in life, that is termed **simultaneous** acquisition. If he or she acquires one language, and having mastered that language, learns a second language that is termed **successive** or **sequential** acquisition. McLaughlin (1978) set the cutoff point at which one language has been established as three years of age. The child who is introduced to a second language

before three years will be regarded as acquiring the two languages simultaneously; the child introduced to a second language after three will be considered to have had one language established and to acquire the second successively, as a second language.

Proficiency: Based on the level of proficiency in the two languages, the bilinguals can be further classified into the following categories:

- Balanced bilingual: Balanced bilingual refers to people whose mastery of two languages is roughly equivalent.
- Dominant bilingual: Dominant bilingual refers to people with greater proficiency in one of his or her languages and uses it significantly higher than the other language.
- Passive bilingual: Passive bilingual refers to someone who understands a second language, in either its spoken or its written form, or both, but does not necessarily speak or write it.

Context of development: Based on the context of development, the bilinguals can be classified into:

- Coordinate bilingual: Coordinate bilingual refers to people who have learnt two languages in separate contexts. They have two semantic systems and two linguistic codes. An example would be a person whose first language is English, who then learned French later in school. Because the two languages were associated with different contexts, it was believed that different conceptual systems would be developed and maintained for the two languages. This would mean that the French term ‘livre’ would have its own meaning, and the English word ‘book’ has its own meaning.

- Compound bilingual: Compound bilingual refers to people who have learnt two languages at the same time in the same context. They have one semantic system but two linguistic codes. That is, they have a fused representation of the languages in the brain. Thus, a child, for example, who acquired both French and German, in the home would know both German Buch-'book' and French 'livre', but would have one common meaning for them both. Both words would be tied to the same mental representation. A single concept would have two different verbal labels attached to it.
- Subordinate bilingual: Subordinate bilingual refers to people who exhibit interference in his or her language by reducing the patterns of the second language to those of the first. Subordinate bilinguals interpret words of their weaker language through the words of their stronger language. Thus, the dominant language acts as the filter for the other. If English is the weaker language of an Urdu/English bilingual, the English word 'book' will evoke the Urdu word 'kitab'.

There are literally as many definitions and varieties of bilingualism as researchers in the field. Different researchers have sought to examine the questions and issues related to bilingualism from their own theoretical and methodological perspectives with specific problems and contexts. The phenomenon of bilingualism is so widely prevalent and multifaceted that to date a complete definition of bilingualism in a manner covering all aspects is not available. Deciding whether or not a person is bilingual is further complicated when the person is a child who is in the language acquisition period of development.

The bilingual children are different from monolingual children in many ways. The differences are evident in the way they acquire language, age of acquisition, proficiency in the language etc. Bilinguals are different from monolinguals in terms of language storage in their brain. Vaid and Hull (2002) found left hemisphere dominance for language processing in monolinguals whereas bilateral involvement was pronounced in early fluent bilinguals. Thus, bilinguals appeared to be less left lateralized than monolinguals suggested that learning a second language increases the density of grey matter (Mechelli et al., 2004).

Bilingualism is not a static and unitary phenomenon. It is shaped in different ways, and it changes depending on a variety of historical, cultural, political, economic, environmental, linguistic, psychological and other factors. It is a historically common view that one's personality grows with the extra languages-particularly among those who are already bilingual and, more particularly still, among the social elite for whom an additional language or two was always an integral part of life. Apart from the influence on personality, the knowledge of extra languages also affects other domains such as cognition and academics.

Bilingualism and cognitive development

There is a growing body of literature on how bilingualism affects an individual's cognitive and academic performance. The study of bilingualism is a useful tool for examining cognitive processes. Research on the effects of bilingualism on cognition goes at least as far as the early 1900's. Since the beginning of the century, a number of studies have compared the performance of bilinguals and

monolinguals on variety of tasks measuring intelligence, creativity, flexibility and other skills related to school performance. It seems that the school performance of the bilinguals was a dominant concern of the early researchers in bilingualism, and as a result, intelligence and creativity were the most favored variables in the early studies since these were thought to be highly correlated with scholastic success.

In the early 1900's, there were claims that teaching a child a second language could suppress intellectual function and cause emotional problems (Hakuta, 1986). The typical view of a bilingual child prior to 1960's was that bilingualism was a disease and that it was a mental burden causing intellectual fatigue. Jensen (1962a, b) reviewed over 200 studies and found evidence of negative intellectual and academic consequences of bilingualism. Other reviews up to 1960 have also showed negative consequences of bilingualism on development of intelligence, cognition and personality.

In a review of research on bilingualism and possible links to personality problems, Diebold (1968) concluded that bilingualism could cause schizophrenia in the most severe cases and lesser adjustment problems in many cases. Reduced vocabulary has also been found to be an accompaniment of bilingualism, whether the bilinguals show quite high levels of language processing (Ben-Zeev, 1972; Rosenblum & Pinker, 1983) or lower levels (Ben-Zeev, 1975). Other research suggested that bilingual children, because they appeared to have limited linguistic abilities, were retarded in verbal intelligence, if not in overall intelligence. Tsushima and Hogan (1975) found the performance of Japanese-English bilinguals in grades four and five in verbal and academic skills lower compared to their monolingual

counterparts matched on nonverbal ability. The findings of the early studies also showed that bilingualism can adversely affect, to different degrees, cognitive skills particularly in the areas of verbal intelligence and scholastic achievement.

On the other hand, a few studies found no differences between monolingual and bilingual groups in cognitive-linguistic abilities (Rosenblum & Pinker, 1983). Toukomma and Skutnabb-Kangas (1977) found that children with native competency in one language only, normally their mother tongue but with a much less command of the other language, showed neither positive nor negative cognitive effects i.e. their performance did not differ from that of monolingual children.

It is a well known fact that factors such as socioeconomic class and dominant versus nondominant language, proficiency level of each language, the context in which the language was learned are critically important variables in research that compares such groups of children. In many of these studies mentioned above, some of these factors were not controlled which could have probably contributed to the poor performance of bilingual subjects (Paradis, 1986; Grosjean, 1998). The bilingual subjects were children from low socioeconomic background than those of monolingual children with whom they were being compared i.e. the variable socioeconomic status was not controlled. In addition, the bilingual children were often tested in their nondominant language, giving the impression that their language skills and their cognitive skills were lower than they actually were. Another possible reason for the poor performance of the bilinguals was their fluency in each language, the context in each which the language was learned etc. was not assessed. Most of the time, little was said about children's proficiency in each of their languages and the

amount of time the parents/caregivers/teachers spent using the languages with the children (Redlinger & Park, 1980; Vihman, 1985).

There are evidences which support the fact that the benefits of bilingualism accrues to an individual only beyond a certain level of proficiency in both languages, i.e. there is a threshold level of bilingual proficiency beyond which the positive consequences of bilingualism on cognitive growth are available to the individual. The threshold hypothesis was developed by Cummins (1976, 1979, 1981, and 1984) and Toukomaa and Skutnabb-Kangas (1977) to explain this aspect. The threshold hypothesis assumes that those aspects of bilingualism that might positively influence cognitive growth are unlikely to come into effect until children have attained a certain minimum or threshold level of proficiency in the second language. The hypothesis proposes two thresholds; 'the lower threshold level of bilingual proficiency would be sufficient to avoid any negative effect, but the attainment of a second, higher level of bilingual proficiency might be necessary to lead to accelerated cognitive growth. In support of the threshold hypothesis, studies showed that proficient bilinguals performed better on a variety of cognitive tasks compared to partial and limited bilinguals. The threshold hypothesis showed that a set of socio-cultural and educational conditions gives rise to different forms of bilingualism which in turn lead to different levels of cognitive performance.

Subsequently, in the late 1900's, there were ample studies that supported the view that speaking two languages does not tax either the cognitive or the linguistic system; rather bilingualism confers advantages upon children with respect to various cognitive and linguistic abilities. A major turning point in the area of bilingualism

came in the early 1960's, when findings showed a positive relationship between intelligence and bilingualism. The result obtained by Peal and Lambert (1962) was a landmark in bilingualism research and the study suggested that there were no detrimental effects of bilingualism and there may even be some cognitive advantages. In their study, 10 year old French-Canadian balanced bilinguals were compared with their English or French counterparts. All the subjects were matched for age, socioeconomic level and gender. The subjects were tested on measures of nonverbal and verbal intelligence. Besides using intelligence measures, which were standardized in each of the two languages, the study also included measures of attitude towards each linguistic community. The results revealed that on both the intelligence measures, the bilingual group performed better than the monolingual group. The bilinguals were also rated better than the monolinguals in general school achievement. They concluded that bilingualism provides greater mental flexibility: the ability to think more abstractly, more independently of words, providing superiority in concept formation; that a more enriched bilingual and bicultural environment benefits the development of IQ, and there is a positive transfer between bilinguals' two languages, facilitating the development of verbal IQ.

Peal and Lambert's study set a pattern for future research mainly in various aspects. First, it overcame many of the methodological deficiencies of the period of detrimental effects. Second, it found evidence that bilingualism need not have any detrimental or even neutral consequences. Rather, there is the possibility that bilingualism leads to cognitive advantages over monolingualism. Third, their research moved towards a broader look at cognition (e.g., thinking styles and strategies).

In addition, Peal and Lambert's study had a major impact on at least two aspects of childhood bilingualism. First it sparked a new interest in the study of childhood bilingualism among psychologists and educators. Second it provided one of the major justifications for the establishment of bilingual education programs during the late 1960's and early 1970's. The number of studies dealing with childhood bilingualism increased dramatically throughout the rest of 1960's and 1970's. Most of this research concentrated on cognitive development.

Following Peal and Lambert's study many other studies appeared which supported a positive linkage between bilingualism and intelligence. Carefully controlled studies suggested that bilingualism does not adversely affect cognitive development but, in fact, strengthens it. Bilingual children performed better than monolingual children on a number of cognitive tasks, including selective attention, forming concepts, and reasoning analytically. In addition, children who spoke two or more languages were more cognitively agile or flexible than children who spoke just one language (Hakuta, Ferdman, & Diaz, 1989; Bialystok, 1999).

Cummins and Gulutsan (1974) replicated the study of Peal and Lambert (1962) in Western Canada in which balanced bilingual group matched with a monolingual control group on socioeconomic status, gender and age performed better than the controls on verbal and nonverbal ability measures and on verbal originality measure of divergent thinking. Ben-Zeev (1977a) studied Hebrew-English and Spanish-English bilingual children and concluded that bilinguals process the semantic information more deeply than monolinguals and the bilinguals showed greater

cognitive flexibility and was capable of more complex analytical strategies in their approach to language operations.

Ben-Zeev (1977b) compared two groups of 5-8 year old middle class Hebrew-English bilinguals, Hebrew monolinguals and English monolinguals respectively on the IQ subtests of Wechsler Intelligence Scale for Children (WISC) such as similarities, digit span, picture completion and picture arrangement tasks. In spite of lower vocabulary level, bilinguals showed more advanced processing of verbal material, more discriminating perceptual distinctions, more propensities to search for structure in perceptual situations, and more capacity to reorganize their perceptions in response to feedback. She concluded that exposure to two languages causes children to develop a mental facility for seeking out the rules and for determining which are required by the circumstances.

Kessler and Quinn (1987) reported that bilingual children outperformed the monolinguals in the ability to form scientific hypothesis in a problem solving setting and on semantic and syntactic measures. This was perceived as an indication of enhanced linguistic and cognitive creativity related to their bilingual proficiency. Bilingualism created advantages in terms of cognitive abilities. It extended the individuals' capabilities and promotes mental processing (problem solving, thinking, flexibility and creativity) (Kormi-Nouri, Moniri, & Nilsson, 2003). Bialystok (2001) found that bilingual children were superior to monolingual children in terms of cognitive control of linguistic process.

Bialystok (1988) conducted three studies each involving around 120 children from age five to nine. In the experiments children were asked to judge or correct sentences for their syntactic acceptability irrespective of meaningfulness. Sentences could be meaningfully grammatical, meaningful but not grammatical, anomalous and grammatical, or anomalous and ungrammatical. These sentences tested the level of analysis of a child's linguistic knowledge. The findings revealed that the bilingual children in all the three studies consistently judged grammatically more accurately than did monolingual children at all the ages tested.

Stephens, Advisor, Esquivel, and Giselle (1997) investigated the effects of bilingualism on the creativity and social problem-solving skills on a group of Spanish-English bilinguals and Spanish monolinguals. The Torrance Test of Creative Thinking was administered as a measure of creativity, and the Preschool Interpersonal Problem Solving Scale was used to measure social problem-solving abilities. The results indicated that the bilingual children outperformed their monolingual counterparts in the area of social problem solving, but not in the area of creativity.

Bialystok (1999) assessed the cognitive complexity and attentional control in bilingual children. In order to assess cognitive complexity and control, the dimensional change card sort task and the moving word task was administered on a group of bilingual and monolingual children. The results revealed that the bilingual children were more advanced than the monolinguals in the solving of experimental problems requiring high levels of control.

Kormi-Nouri, Moniri, and Nilsson (2003) assessed the episodic and semantic memory in a group of bilingual and monolingual children. Episodic memory was assessed using the subject-performed tasks (with real or imaginary objects) and verbal tasks, with retrieval by both free recall and cued recall. Semantic memory was assessed by word fluency tests. The positive effect of bilingualism was found on both episodic memory and semantic memory**.** It was suggested that bilingual children could integrate and/or organize the information of two languages and so bilingualism creates advantages in terms of cognitive abilities (including memory).

Bialystok (2009) investigated whether bilingual children showed an advantage in working memory. A group of seven year old monolinguals and bilinguals were compared on tasks such as sequencing span test, frog matrix task to assess temporal memory, faces and pictures task, and digit span tasks. In all the tasks, the bilinguals outperformed their monolingual peers which indicated bilingual children enjoy more advanced levels of working memory.

Few studies have been carried out in the Indian context too. A research project was undertaken by Southworth in 1980 in Trivandrum with a sample of 1300 children including monolingual Malayalam speakers and other language mother tongue group (e.g., Tamil, Konkani speakers). They investigated the academic performance of monolinguals vs. bilinguals. The study was balanced on the basis of detailed interviews and household surveys for parental education and socioeconomic status, history of language use, language use at home and language attitude etc. The results indicated that classroom performance of bilinguals was slightly better than

monolinguals on the whole across all grades (1 to 9) and all five levels of socioeconomic categories.

Srivastava and Khatoon (1980) examined the role of medium of instruction on children whose home language was same, cognate or non-cognate. They compared Kannada mother tongue students from English medium and Kannada medium schools on Raven's Progressive Matrices and creativity measures. The English medium was found to be better. However, with differences in intelligence and school variables controlled, there was no difference between mother tongue medium of instruction same and mother tongue medium of instruction different groups.

Mohanty and Babu (1983) administered a metalinguistic ability test and a measure of nonverbal intelligence on 180 monolingual and balanced bilingual Kond children from the same grades. 30 monolinguals and 30 bilinguals were included in each grade. The socioeconomic status was controlled by taking all the subjects from lowest socioeconomic status families. The findings of the study showed that even when the difference between the bilinguals and monolinguals in nonverbal intelligence was not significant, the two groups differed in the metalinguistic scores, i.e., bilinguals showed an advantage in their metalinguistic task performance.

Patnaik and Mohanty (1984) studied the relationship between bilingualism and cognitive and metalinguistic development. Their sample consisted of 120 children including 60 bilinguals and 60 monolinguals in the age groups of 6+, 8+, and 10+ years from grades one, three and five respectively. Within age level there were 20 bilingual and 20 monolingual children. The children were administered a

metalinguistic test, piagetian conservation tasks and Raven's progressive matrices as nonverbal measure of intelligence. The metalinguistic ability test included items involving recognition of rhymes at the word level, judgement of appropriateness of utterances in different social contexts, correction of grammatically anomalous sentences, tasks of substitution of linguistic symbols in context of sentences. The piagetian conservation test included six conservation tasks from Goldsmid-Bentler's concept assessment kit and children's judgment and explanation of judgment were scored for accuracy in case of each of the conservation measures and the scores were added up for the total conservation score. The results revealed that in each of the grade levels, except for grade 3 groups, the bilinguals scored better than their monolingual counterparts. The effects of bilingualism and grade 10 bilingualism interaction were not significant for Ravens progressive matrices scores nor for conservation. Further, metalinguistic test scores did not correlate significantly with the conservation and progressive matrices scores in the different grade and language groups with the single exception of the significant correlations with progressive matrices scores in case of grade one bilingual. The significance of the findings indicated superiority of bilinguals over monolinguals in metalinguistic awareness in the absence of any difference in intelligence and cognitive operations task. The primacy of metalinguistic awareness in accounting for bilinguals is further substantiated by the observation that the metalinguistic test scores were unrelated to the general cognitive and intellectual skills.

Stephen, Sindhupriya, Mathur and Swapna (2010) compared the cognitive linguistic performance in twelve bilingual and twelve monolingual children in the age group of 7-8 years. These two groups of children were tested on three domains such

as attention/discrimination, memory and problem solving using the Cognitive Linguistic Assessment Protocol for children (CLAP-C) developed by Anuroopa and Chengappa (2008). The results revealed that bilingual children performed superior to the monolingual children on all the three cognitive linguistic domains.

In summary, although the findings are not unequivocal, it seems quite clear that bilingualism has a positive effect on cognitive development. Bilinguals can extend the range of meanings, associations and images, and think more fluently, flexibly, elaborately and creatively. Studies also showed that the bilinguals exhibit better memory, divergent thinking, problem solving and metalinguistic awareness. Bilingualism has two possible cognitive outcomes. One is that the very knowledge and use of two languages affects cognition, regardless of the languages involved, for e.g., increased metalinguistic awareness (Bialystok, 2001). Another outcome is that the learning of two languages affects cognition because of the characteristics of the language involved, age at which the languages are acquired, the context in which the language was acquired, and how the languages code a given aspect of the world.

Simultaneous vs. sequential bilingualism and cognition

Becoming bilingual whether in infancy or in later childhood is a formidable task for children and is further compounded for children by the timing of the acquisition of two languages. For some children, the process begins at or nearly at the onset of language, in infancy, as a result of dual language input from parents or caretakers. The result is first-language bilingualism (Swain, 1972), a process of simultaneously acquiring two languages with an acquisition of two languages before the age of three. When the process of acquiring another language begins after a

particular point i.e. after three years of age, acquisition pattern is referred to as sequential bilingualism.

Simultaneous acquisition of two or more languages can indeed be qualified as an instance of multiple first language acquisition. The development of each of the bilingual's languages proceeds in the same way and leads to the same kind of grammatical competence as in the respective monolingual children. Bilingual development is not qualitatively different from monolingual acquisition whereas the qualitative similarities and differences are in terms of grammatical development. Simultaneous bilingual children acquire structure shared by both languages at approximately the same rate and in the same sequence (Kessler, 1971). They initially develop a single mental system for the two or more languages they acquire; such a fusion of grammatical systems might be difficult to disentangle. These bilinguals might encounter difficulties, at least initially, in separating the lexicons and the grammatical systems of the languages which they are learning that their language use normally exhibits a certain amount of mixing. However, as early as the 1970's, some researchers agreed that children growing up with more than one language eventually succeed in separating their languages, without much effort or specific pedagogical support.

In connection with dual language development in children, the theory of *Unitary Language System Hypothesis* was developed by Volterra and Taeschner (1978). The Unitary Language System Hypothesis divides the early development into three stages:

- Stage One - First language and second language comprise one language system until approximately 3 years of age.
- Stage Two - First language vocabulary separates from second language but the grammar remains as one language.
- Stage Three - The language systems become differentiated. The child is fully bilingual.

In contrast to this theory, another more recent theory is the *Dual Language System Hypothesis* proposed by Genesse (2003) which holds that simultaneous learners separate L1 from L2 from the onset. Findings of subsequent research on the vocabulary development support this theory. In early language development, monolingual children develop vocabulary with one to one correspondence; that is they only develop one term for each concept. The development of multiple terms for a concept (e.g., synonyms) does not emerge until much later. A simultaneous bilingual child also develops vocabulary with one to one correspondence; however, he does so in *each* language. In turn, a bilingual child's use of words that have the same meaning in both languages (*translation equivalents),* is considered evidence that the languages have been separated into two systems. For example, if a bilingual child learns that both "shoe" and "zapato" represent the same one concept. Translational equivalents are found at the early stages of development, before a vocabulary of the first 50 words (Pearson, Fernandez, & Oller, 1995; Nicoladis & Genesee, 1996). Evidence of separate grammatical system, some from the beginning of first word combinations also lend support for the Dual Language System Hypothesis (Paradis, 2001).

The role of age and maturation in simultaneous vs. sequential bilingual development are questioned by researchers. Simultaneous acquisition of the two or more languages can be characterized as an instance of first language development in each of the child's languages. The question, however, as to whether the same is also true for children acquiring two languages successively is more controversial i.e., it addresses the issue of age and maturation in language development. The crucial issue on which this controversy hinges is whether the language making capacity is available indefinitely or whether it becomes accessible as a result of neuronal maturation and remains accessible only during a limited age period. If the latter view is correct, it follows that, if the onset of acquisition of another language occurs after such a critical period, the prediction is that there will be qualitative differences in the course of acquisition as well as in the grammatical knowledge ultimately attained, as compared to simultaneously acquired languages or monolingual first language acquisition. Importantly, the existence of a critical period for language development has significant implications not only for the acquisition of bilingualism but also for situations in which children do not have access to the appropriate linguistic environment from birth onwards. Lenneberg (1967) in his critical period hypothesis claimed that the native competence cannot be attained by mere exposure if the onset of acquisition happens after a certain age. But the hypothesis does not specify a point of development at which the optimal age for language acquisition ends. According to typology of bilingualism based on critical period hypothesis, successive acquisition of bilingualism during early childhood, i.e. when a child is exposed to one or more languages within the critical period, should be qualified in the same way as that of simultaneous bilinguals. In other words, multiple first language competence should be attainable if the child is exposed to more than one language before the beginning of

the offset phase of the critical period. Some authors, however, have claimed, in contradiction to this prediction, that successive acquisition of bilingualism will necessarily result in substantial differences as compared to those cases in which children are exposed to their languages from birth. More linguistic and neuropsychological research is required to verify the role of age and maturation in bilingual development.

Following the critical period hypothesis, addition of one language or more after the optimal age, as in adult second language acquisition, implies that the human language making faculty is no longer available to the learner, at least not in the same way as during early childhood. This doesn't mean that language acquisition is not possible any more. Rather, it suggests that children who acquire languages sequentially have to resort to other cognitive capacities in order to develop a knowledge system about the language. The human language making faculty is not available to the learner in the same way as on during early childhood. In cases of successive acquisition of bilingualism, the language making capacity of an individual has already been activated at least once, subsequent language acquisition might, in principle, draw on this previously acquired knowledge and could thus proceed as in those instances which happen during the critical age period. By comparing simultaneous with successive acquisition of bilingualism, it becomes plausible that the differences are caused by factors related to the age of the learners. It can be suggested that successive acquisition of bilingualism results in qualitative differences as compared to monolingual as well as bilingual first language development, if the onset of acquisition falls into an age period after the optimal age for language learning. As successive acquisition of bilingualism in childhood, exposure to another

language during later childhood, i.e. approximately between ages five and ten, can indeed be considered as child's second language, resembling more adult second language than bilingual first language development. If however, bilingual acquisition begins during early childhood, e.g., before the age of five, it seems to be essentially identical to simultaneous acquisition of two first language from since birth (Jia, Kohnert, Collado, & Aquino-Garcia, 2006). There is no unanimous agreement among researchers about the exact line of age demarcation between the simultaneous and sequential bilinguals. McLaughlin (1984a) proposed the third birthday as a cutoff point to distinguish between the simultaneous and successive acquisition of two languages. Padilla and Lindholm (1984) rejected this arbitrary criterion and favored birth as the determining point for the distinction between simultaneous and successive language acquisition.

Results of studies using hemodynamic as well as electrophysiological methods confirm the importance of age of acquisition for the functional specialization of language in the brain. Functional neuronal imaging experiments e.g., fMRI, suggests a common anatomical substrate and common pattern of activation for both languages acquired during early infancy; late bilinguals, on the other hand, exhibit spatial separation of the languages in the brain. Interestingly, it has been suggested that an increasing activation of the right hemisphere can be observed if onset of acquisition of a language happens after the age of four (cited in Bhatia & Ritchie, 2004). Also the findings by Kim, Relkin, Lee, & Hirsch (1997) using fMRI on early and late bilinguals revealed that in early bilinguals, the two languages are found distinct, but in adjacent sites in Broca's area. This suggests that similar or identical areas of the brain

serve both languages. In comparison, among late bilinguals, the native and second languages were stored more separately.

As observed, bilingualism enhances cognitive and linguistic functions. Children who acquire two languages simultaneously i.e. simultaneous bilinguals and children who acquire two languages successively i.e. sequential bilinguals could be cognitively and linguistically different. A few studies have been carried out in this regard.

The earliest detailed study of childhood bilingualism was by Ronjat (1913). He reported that his son, who was exposed to both French and German from birth, learned both the languages equally well and that his bilingualism had no deleterious effect on his intellectual development. Individual case studies by linguists (Ronjat, 1913; Leopold 1947) had concluded that early bilingualism i.e. simultaneous acquisition of two languages was advantageous to children's cognitive and linguistic development. Leopold (1961), based on observations of his bilingually raised daughter, suggested that bilingualism promoted an early separation of the word sound from the meaning (a noticeable looseness of the link between the phonetic word and its meaning).

Ianco-Worrall (1972) tested Leopold's observations in a group of English-Afrikaan bilingual children who had been raised in one person one language environment vs. two comparable English monolingual and Afrikaan monolinguals. Results revealed that bilinguals outranked monolinguals in choosing words along a semantic rather than a phonetic dimension. Bilingual children who had been raised in

one person one language environment reached a stage of semantic development 2-3 years earlier than monolingual children.

One of the most frequently cited studies of bilinguals cognitive flexibility was conducted in Switzerland by Balkan (1970). He measured cognitive flexibility on several tests of nonverbal abilities on bilingual and monolingual groups. The positive effects of bilingualism on these measures were much stronger for children who had become bilinguals before the age of four. Balkan's study suggested that bilingualism might have the most beneficial cognitive effects for those children who learned their languages simultaneously, because balanced bilinguals have two different words for most referents compared to monolinguals.

Bain and Yu (1980) investigated the cognitive consequences of raising children according to Ronjat's (1913) one person one language principle on German-French, English-French, and Chinese-English bilinguals with monolinguals from the respective languages on the use of language as a self directive tool in cognitive tasks. Results showed that, at about age four, children raised bilingually in one person- one language environment were better able to use both overt and covert language as a guide and control in their cognitive functioning. The data favored younger bilingual children though it did not reach statistical significance.

Bialystok and Craik (2008) assessed working memory, lexical retrieval, and executive control on younger (20yrs) and older (68yrs) bilinguals and monolinguals. Younger bilinguals performed better on most of the tasks than the older participants, confirming the effect of aging on these processes. The effect of language group was

different for each type of task: monolinguals and bilinguals performed similarly on working memory tasks, monolinguals performed better on lexical retrieval tasks, and bilinguals performed better on executive control tasks, with some evidence for larger language group differences in older participants on the executive control tasks.

Carlson and Meltzoff (2008) assessed the executive functioning in a group of native Spanish-English bilinguals, English monolinguals and English speakers enrolled in second-language immersion kindergarten. It was found that the native bilingual children performed significantly better on the executive function battery than both other groups. Importantly, relative advantage was significant for tasks that appear to call for managing conflicting attentional demands.

Kharkhurin (2008) evaluated the performance of Russian-English bilinguals and English monolinguals on divergent thinking tasks. Results revealed that the bilinguals who acquired their second language earlier, those with high proficiency in both the languages and with longer exposure to the new cultural settings tended to outperform their counterparts who acquired second language later in life, and with less proficiency on the measures of fluency and flexibility in divergent thinking. The study proposed that age of second language acquisition, linguistic proficiency, and length of exposure to a new cultural environment might have an influence on performance of bilinguals.

In sum, although much more research is needed, especially with the bilinguals who acquired their languages simultaneously since birth or successively during early childhood, evidence compiled by behavioral as well as by neurophysiological

investigations emphasize the role of maturation and age for the successive acquisition of bilingualism. Only if the second language is acquired during early infancy is it likely to result in a native like competence, much as in the simultaneous acquisition of bilingualism since birth. The studies also emphasize that early acquisition of two languages i.e (simultaneous acquisition of two languages) is more beneficial to children's cognitive development. They function at a higher level in thinking, ranging from creative thinking to measures of cognitive flexibility, creativity or divergent thought. They progress faster in early cognitive development and exhibit greater sensitivity in communication.

In general, a look into literature reveals that bilinguals have advantages over monolinguals in various aspects of language and cognition. There are some studies which also indicate that the individuals acquiring both languages simultaneously from birth have more cognitive linguistic advantages than those acquiring after three years of age. However, studies comparing two varieties of bilinguals on these aspects are scarce especially in the Indian context. The questions remain about exactly why and under what conditions bilingualism enhances cognitive function i.e the amount of exposure to each language on bilingual language acquisition, the age of introduction, the proficiency in the language, type of bilingualism etc. Keeping this in view, the present study was planned with the aim of comparing the cognitive linguistic abilities of bilingual children who have acquired two languages simultaneously vs. sequentially thereby assessing the role of age of language acquisition in determining cognitive linguistic abilities.

CHAPTER 3
METHOD

The current study aimed at evaluating the cognitive linguistic abilities of children who acquired languages simultaneously and who acquired sequentially and to make a comparison between the two groups on these aspects.

Participants: Twenty typically developing Kannada-English bilingual children in the age range of 7 - 8 years were selected for the study. They were native speakers of Kannada and were divided into two groups depending on the age of acquisition of their second language.

The Group 1 comprised of 10 Kannada-English simultaneous bilingual children (those who had acquired both Kannada and English simultaneously before 3yrs of age). There were 7 male and 3 female children in the group.

The Group II comprised of 10 Kannada-English sequential bilingual children (those who had acquired Kannada first and learned English once they entered school after 3 years of age). There were 3 male and 7 female children in this group.

The participants were selected from various schools in the city of Mysore. Second grade students who were studying in CBSE schools with greater exposure to English were selected. All ethical standards were met for subject selection and their participation.

Participant selection criteria

The criteria considered for the selection of simultaneous and sequential bilingual subjects were:

1. No history of language, speech, hearing, neurological, developmental, academic and intellectual disorders, which was ensured using the 'WHO ten question disability screening checklist' (Singhi, Kumar, Malhi, & Kumar, 2007)
2. Participants belonging to middle and high socioeconomic status which was ensured using the NIMH socioeconomic status scale developed by Venkatesan (2009). The scale has sections such as occupation and education of the parents, annual family income, property, and percapita income to assess the socioeconomic status of the participants. Participants who belonged to the grade one to three in the various sections of the scale were only considered for the study.
3. A score of 3 in terms of proficiency in English in ISLPR. The International Second Language Proficiency Rating (ISLPR) scale developed by Ingram (1985) was used to check the language proficiency in the second language English. ISLPR describes language performance at eight points along the continuum from zero to native like proficiency in each of the four macro skills (speaking, listening, reading and writing). The scale is divided into primary (speaking and listening) and secondary skills (reading and writing). It has 8 ratings which includes 0, 0+, 1, 1, 2, 3, 4, 5 as rated from a continuum zero proficiency to native like proficiency. However, only few aspects relevant for the children were utilized from the scale. The parents and teachers handling these children were also consulted while rating them for their language proficiency.

Procedure: A modified version of the questionnaire developed by Harini and Chengappa (2010) was administered on teachers and parents to identify acquisition pattern of the selected children i.e. simultaneous or sequential bilinguals (Appendix A). Children who were exposed to both Kannada and English languages since birth were considered as simultaneous bilinguals and those children who were exposed to only Kannada from birth and learned English once they entered school i.e. after three years of age were considered as sequential bilinguals.

A rapport was built with the child before the assessment. Consequent to this, the Cognitive Linguistic Assessment Protocol for children (CLAP-C) developed by Anuroopa and Chengappa (2008) was administered on the selected participants. It is a test developed to assess the cognitive linguistic abilities of Kannada speaking children in the age range of 4-8 years. It consists of three domains attention/discrimination, memory and problem solving and each domain consists of three auditory and three visual tasks. A total of 5 or 10 levels are included in each subtask and these are arranged in a hypothetical order from simple to complex. The description of the auditory and visual tasks under each domain has been provided in Appendix B.

The selected participants were seated comfortably and were tested in a room with minimum external noise and distractions. Instructions specific to the task were given in Kannada. The testing was carried out in one session which lasted approximately for one hour and was done in both auditory and visual sensory modalities. The participants were given reinforcement after the completion of the tasks. The tasks were scored as per the scoring procedure provided in the test for each item. Every correct response was given a score of '1' and every wrong response was given a score of '0'. Subsequently, the total score of each of the domain was

tabulated, averaged for all the subjects and the data obtained were subjected to appropriate statistical analysis. Descriptive statistics was used to obtain mean and standard deviation in the two groups. Statistical procedures such as independent samples t- test and MANOVA were used to compare the performance of the two groups on various domains of CLAP-C. The results obtained have been presented and discussed in the next chapter.

CHAPTER 4
RESULTS AND DISCUSSION

The aim of the present study was to compare cognitive linguistic abilities of bilingual children who had acquired two languages simultaneously with those children who had acquired languages sequentially thereby assessing the role of age of language acquisition in determining cognitive linguistic abilities. The Cognitive Linguistic Assessment Protocol for children (CLAP-C) developed by Anuroopa and Chengappa (2008) which consists of three domains viz. attention/discrimination, memory and problem solving was administered on the selected simultaneous and sequential bilingual children.

The data obtained on the various domains was appropriately tabulated, averaged across all the participants and subjected to statistical analysis in a commercially available SPSS package (version 17.0). The following statistical procedures were carried out across the two groups of subjects:

- Descriptive statistics to obtain mean and standard deviation in the two groups.

- An independent samples t-test to check for significant difference, if any on the grand total of the three domains between the two groups.

- MANOVA to check for significant difference if any, on the total of each domain across the two groups, on the performance on the auditory and visual modalities within the three domains across the two groups and to compare the performance within the three major domains across the two modalities for both the groups.

The results obtained on the cognitive linguistic abilities in simultaneous and sequential bilingual subjects have been presented and discussed under the following sections:

1) Comparison between the two groups across the domains of CLAP-C
2) Comparison between the two groups on the auditory and visual modalities within the domains
3) Comparison between the two groups across modalities within three tasks in each domain

1) Comparison between the two groups across the three domains of CLAP-C

The performance of simultaneous and sequential bilingual children was compared across the three domains of CLAP-C i.e. attention/discrimination, memory and problem solving. The mean and Standard Deviation (SD) was calculated which has been depicted in Table 1. A comparison of the mean scores revealed that the simultaneous bilingual children performed better than the sequential bilingual children on all the three domains. The mean scores obtained for the various domains were subjected to MANOVA to check for any significant differences between the groups. The results revealed that there was a significant difference between the simultaneous and sequential bilingual children only in problem solving at 0.05 level. There was no significant difference between the two groups in attention and memory domains. The F values of both the groups have been depicted in Table 1. The performance of the two groups across the three domains has been depicted in Figure 1. The total mean and standard deviation scores for the two groups were also

calculated (Table 1) and subjected to independent samples t-test. The results revealed that there was a significant difference between the two groups ($t=2.19$, $p<0.05$).

Table 1

Mean, Standard Deviation (SD) and F values of CLAP-C domains for simultaneous and sequential bilingual children

Groups	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values**
Domains	**Mean**	**SD**	**Mean**	**SD**	(1,18)
Attention/Discrimination	38.80	1.22	38.60	1.26	0.12
Memory	22.60	2.50	20.80	2.14	2.97
Problem solving	41.30	4.08	37.50	3.77	4.66*
Grand total	102.70	6.53	96.90	5.21	-

*p<0.05

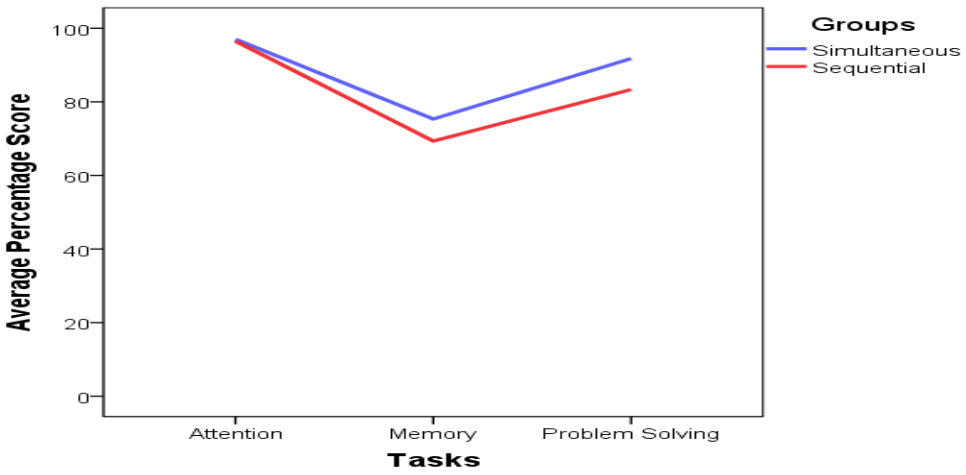

Figure 1. Performance of simultaneous and sequential bilingual children across CLAP-C domains.

The results of the present study revealed that the simultaneous bilingual group outperformed the sequential bilingual group on all cognitive linguistic tasks. Similar results were obtained by Ronjat (1913), Leopold (1939-1949), Balkan (1970), Ianco-Worrall (1972), Bain and Yu (1980), Bialystok and Craik (2008), Carlson and Meltzoff (2008), and Kharkhurin (2008). Support for the results can be drawn from the critical period hypothesis by Lenneberg (1967). The hypothesis claimed that native competence cannot be attained by mere exposure if the onset of acquisition happens after a certain age. The sequential bilinguals are predominantly exposed to the second language only after 3 years of age. In case of sequential bilinguals the human language faculty is not available in the same way as that of simultaneous bilinguals who were exposed to both languages since birth. Sequential bilinguals have to resort to other cognitive capacities in order to develop knowledge about the language. In other words we can say that children who are exposed to both languages develop more flexible cognitive system due to their early exposure within the critical period.

There are also neurophysiological and neuropsychological studies which emphasizes the role of age of acquisition of second language in bilingual children's performance. Weber-Fox and Neville (1996) studied Chinese/ English bilinguals who were all native speakers of Chinese and who began acquiring English at different ages. When they recorded the electrical activity of the brain, using evoked response potentials (ERPs), it was found that the age at which English was acquired affected the brain activity associated with performing tasks in the language. Furthermore, the brain activity associated with syntactic processing was more affected by age of acquisition than the brain activity associated with semantic processing. Also the

functional neuronal imaging experiments reported differences in brain activation when the second language is acquired early i.e. from birth compared to second language acquired at a later stage. It was suggested that a common anatomical substrate and common pattern of activation exists, if both languages are acquired during early infancy. On the other hand, the late bilinguals exhibit spatial separation of the languages in the brain. Also, an increasing activation of the right hemisphere can be observed if the onset of acquisition of a language happens after the age of four. In early bilinguals, the two languages are found distinct, but in adjacent sites in Broca's area, whereas in late bilinguals, the native and second languages were stored more separately.

If we extrapolate the results of the previous studies, it can be said that superior performance of simultaneous bilinguals was due to age of acquisition of second language effects i.e. early exposure to both languages facilitated cognitive flexibility in them.

Outcomes on cognitive performance are also dependent on the proficiency level i.e. the extent to which an individual is bilingual. While conversing with the bilingual children during rapport building before the test administration, it was observed that, the simultaneous bilinguals spoke with more native like proficiency in the second language, and the vocabulary, word order etc. used by them was at a higher level compared to sequential bilinguals, although both the groups had the same second language proficiency on ISLPR. Bialystok and Majumder (1998) found that advantages on metalinguistic tasks depended on the degree of bilingualism in a linear fashion, with children who were fully bilingual performing best after controlling for

age and language proficiency. Thus, the pattern of findings suggests that bilingualism must be of a sufficiently high level to confer detectable advantages in cognitive tasks. Since simultaneous bilinguals are exposed to both the languages from birth, they have native like competence in both languages which in turn helps them for better cognitive adaptations in various cognitive linguistic tasks, while the sequential bilinguals limited and late exposure to second language can be accounted for the less cognitive adaptations compared to simultaneous bilinguals.

The superior performance of simultaneous bilingual children in problem solving domain can be attributed to the fact that early exposure to more than one language could have fostered the inhibition and working memory skills necessary for cognitive flexibility in problem-solving situations. Both the groups performed nearly at par on the attention and memory domains since these tasks are the prerequisite cognitive linguistic tasks which form the foundation for other cognitive domains such as problem solving. So the phenomenon of bilingualism itself was sufficient enough for the equal performance of the simultaneous and sequential groups in attention/discrimination and memory domain. Bialystok (2001) reported that attentional resources develop more rapidly in children with extensive bilingual exposure. The age of acquisition of the second language did not influence performance on the attention and memory tasks to a larger extent.

2) Comparison between the two groups on the auditory and visual modalities within the domains

The CLAP-C consisted of three domains i.e. attention/discrimination, memory and problem solving in two main sections i.e. auditory and visual modalities.

a) *Comparison between the groups on the auditory tasks within the three domains*

The mean scores obtained for the auditory based tasks under attention/discrimination, memory and problem solving were compared between the two groups. The mean scores for the auditory based problem solving domain for the simultaneous bilingual group was higher than the sequential bilingual group. Both the groups performed similarly on the auditory based tasks of attention/discrimination and memory domain. The mean scores obtained for the auditory tasks of the three domains were subjected to MANOVA which revealed that there was a significant difference between the two groups only in problem solving at 0.05 level. There was no significant difference in attention/discrimination and memory between the two groups. The mean, Standard Deviation (SD), and F values for the auditory based tasks on the three for the two groups have been depicted in Table 2.

There are qualitative differences between simultaneous and sequential bilingualism. Since simultaneous bilinguals are exposed to two languages from birth, the processing in the brain occurs in a different manner compared to the sequential bilingual group. The auditory based problem solving task consisted of predicting the outcome, predicting the cause, and compare and contrast tasks. The simultaneous bilingual children are exposed to these tasks through their auditory mode in daily life situations i.e. they received the linguistic exposure mainly through auditory mode. This could have contributed to the better performance in auditory based problem solving tasks, specifically 'predicting the outcome' and 'predicting the cause'.

Since simultaneous bilingual children are exposed to two languages right from birth, they separate the lexicon and grammatical system for the two languages that

they learn. They listen to the words and assign them into appropriate categories under both languages. This requires them to compare and contrast each word until they assign them to the right category in a particular language. They are involved in this kind of a task right from early childhood which could have facilitated their better performance in compare and contrast task. Moreover, these children have to differentiate the two language systems according to the environmental needs. This creates an additional cognitive load for the brain and in order to compensate for it, greater number of synapses develops in the nervous system. As a result, the neural plasticity improves with extensive bilingual exposure which in turn facilitates the ability to control attention to conflicting perceptual or representational features of a problem. Further, the problem solving requires good working memory and there are reports in literature which reveal better working memory in bilinguals. The simultaneous acquisition of two languages right from birth could have facilitated better problem solving.

b) *Comparison between the groups on the visual tasks within the three domains*

The mean scores obtained for the visual based tasks under attention/discrimination, memory and problem solving were compared between the two groups. The mean scores for the simultaneous bilingual group were higher for all the visual based tasks on the three domains. The mean scores obtained for the three domains in visual modality were subjected to MANOVA which revealed that there was a significant difference between the two groups only in memory domain at 0.01 level. There was no significant difference in attention/discrimination and problem solving between the two groups. The mean, Standard Deviation (SD) and F values

for the visual based tasks on the three domains between the two groups have been depicted in Table 2.

The significant difference in visual based memory visual domain can be attributed to the better performance of simultaneous bilinguals in picture counting and story sequencing task. These two tasks require a strong ability to recall and associate things. Children have to use various rehearsal strategies for a better recall. The rehearsal strategies used by the simultaneous bilinguals can be different due to their early exposure and better linguistic representation in the brain. This in turn could have attributed to the better performance of simultaneous bilinguals in visual based memory domains.

Table 2

Mean, Standard Deviation (SD) scores and F values of CLAP-C tasks for simultaneous and sequential bilingual children in auditory and visual based tasks under each domain

Domain	**Scores**				
Auditory tasks	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values** (1,18)
	Mean	**SD**	**Mean**	**SD**	
Attention/Discrimination	19.50	0.70	19.60	0.69	0.10
Memory	8.90	1.72	8.90	1.85	-
Problem solving	27.50	2.55	24.40	3.62	6.21*
Visual tasks					
Attention/Discrimination	19.30	0.67	19.0	0.81	0.80
Memory	13.70	1.05	11.90	1.28	11.66 **
Problem solving	13.40	1.77	13.10	1.10	0.20

*p<0.05, **p<0.01, '-'indicates both are equal

For the comparison of the two groups on tasks between auditory vs. visual modalities, the total mean scores obtained for each task in the respective domains were converted into percentage scores. When the data was compared for both the groups across the two modalities on the whole, it was found that both simultaneous and sequential bilingual group performed better in visual tasks compared to auditory tasks. The percentage scores have been depicted in Table 3 and it has also been depicted in Figure 2.

Table 3

Percentage scores, Standard Deviation (SD) scores and F values of CLAP-C tasks for simultaneous and sequential bilingual children in auditory and visual based tasks under each domain

Domain	**Percentage scores**				
Auditory tasks	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values** (1,18)
	Mean	**SD**	**Mean**	**SD**	
Attention/Discrimination	97.5	0.70	98	0.69	0.10
Memory	59.3	1.72	59.3	1.85	-
Problem solving	91.6	2.55	81.3	3.62	6.21*
Visual tasks					
Attention/Discrimination	96.5	0.67	95	0.81	0.80
Memory	91.3	1.05	79.3	1.28	11.66**
Problem solving	89.3	1.77	87.3	1.10	0.20

*p<0.05, **p<0.01, '-'indicates both are equal.

The better performance of the simultaneous and sequential bilingual group in visual tasks compared to auditory tasks could be attributed to the following phenomenon. Visual learning creates a more vivid mental representation compared to auditory learning. This advantage could have helped the bilinguals for better understanding and performance on the visual tasks. Moreover, during data collection it was observed that, the visual subtasks in all the three domains were comparatively easier for the children to comprehend compared to auditory subtasks in all the three

domains. This also could have contributed to the better performance of bilinguals on visual tasks over auditory tasks.

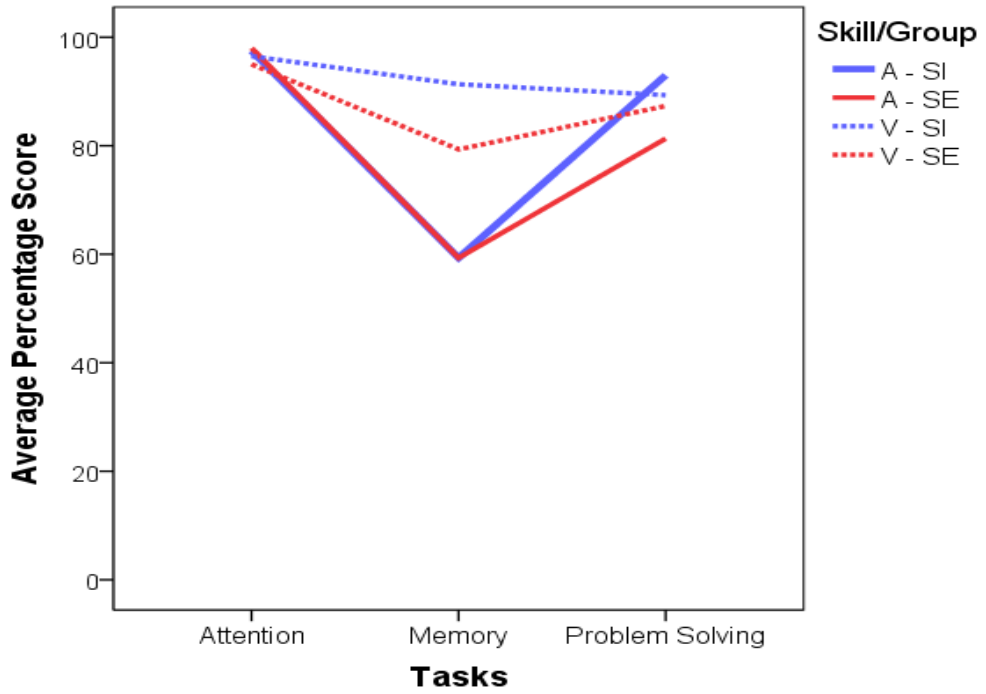

Figure 2. Performance of simultaneous and sequential bilingual children in CLAP-C domains across auditory and visual tasks.

Auditory Simultaneous (A-SI); Auditory Sequential (A-SE);
Visual Simultaneous (V-SI); Visual Sequential (V-SI)

The poor performance in memory tasks in both auditory and visual domains can be attributed to the fact that they are not exposed to such tasks in their daily life compared to the other attention and problem solving tasks.

3) Comparison between the two groups across modalities within three tasks in each domain

a) Attention/ discrimination:

The attention/discrimination domain consisted of tasks based on auditory and visual modality. The auditory based task included three subtasks viz.:

- Auditory Digit Count Test
- Auditory Sound Count Test
- Auditory Word Discrimination Test

The visual based task included three subtasks viz.:

- Visual Odd One Out
- Visual Letter cancellation
- Visual Word Discrimination Test

The mean scores obtained for each of the subtasks in auditory and visual based attention domains were compared. The mean scores were almost equal for both the groups on all the tasks except the 'odd one out' in which the simultaneous bilingual group performed slightly better compared to the sequential bilingual group. This could be as a result of their early exposure to two languages and the creation of the separate grammatical systems and lexicons for the two languages. According to Genesse (2003), the simultaneous bilingual individuals can separate first language from second language right from birth. They have words that have the same meaning in both languages (translational equivalents). They can use the two languages differentially to two different speakers belonging to these languages. They are adept in changing the words based on languages and this could have facilitated the children's performance on the 'odd one out' which involved them to find out a

different picture from a set of similar pictures. MANOVA administered revealed that there was no significant difference between the simultaneous and sequential bilingual group among the subtasks in auditory and visual based attention domain. The mean, standard deviation scores and F values obtained for the two groups for each of the subtasks in the auditory and visual based attention domain have been depicted in Table 4.

Table 4

Mean, Standard Deviation (SD) scores and F values of the subtasks in the auditory and visual based attention domain for the two groups

	Auditory tasks	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values** (1,18)
		Mean	**SD**	**Mean**	**SD**	
Attention	Digit count test	4.70	0.48	4.70	0.67	-
	Sound count test	5.0	0.0	4.90	0.31	1.0
	Auditory word discrimination	9.80	0.36	10.0	0.0	1.0
	Visual tasks					
	Odd one out	4.40	0.51	4.0	0.81	1.71
	Letter cancellation	5.0	0.0	5.0	0.0	-
	Visual word discrimination	9.90	0.31	10.0	0.0	1.0

'-' indicates both are equal

Since attention is one of the prerequisite for higher cognitive linguistic tasks, the simultaneous and sequential bilingual children could perform almost similarly in

all the attention domains. Moreover, the children found it very easy to follow the instructions and perform all the subtasks in attention domain.

b) **Memory**

The memory domain consisted of tasks based on auditory and visual modality. The auditory based task included three subtasks viz.:

- Auditory Digit Forward Span
- Auditory Word Recall
- Auditory Digit Backward Span

The visual based task included three subtasks viz.:

- Visual Alternate Sequence
- Visual Picture Counting
- Visual Story Sequencing

The mean scores obtained for each of the subtasks in auditory and visual based memory domains were compared. The auditory based memory domain scores for the subtasks were almost equal for both the groups. The visual based memory domains scores for all the subtasks were higher for the simultaneous bilingual group. The mean scores obtained for each subtask on both the domains for the two groups were later subjected to MANOVA. The results revealed that there was no significant difference between the simultaneous and sequential bilingual group for the three subtasks in auditory based memory domain whereas, a significant difference between the simultaneous and sequential bilingual group on the story sequencing subtask in the visual domain was observed at 0.05 level. The mean, standard deviation scores and F

values obtained for the two groups for each of the subtasks in the auditory and visual based memory domain have been depicted in Table 5.

Table 5

Mean, Standard Deviation (SD) scores and F values of the subtasks in the auditory and visual based memory domain for the two groups

	Auditory tasks	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values** (1,18)
		Mean	**SD**	**Mean**	**SD**	
Memory	Digit forward span	3.50	0.70	3.50	0.70	-
	Word recall	3.40	0.96	3.20	0.78	0.25
	Digit backward span	2.0	0.81	2.20	1.03	0.23
	Visual tasks					
	Alternate sequence	4.90	0.31	4.40	0.96	2.41
	Picture counting	4.20	0.63	3.70	0.82	2.32
	Story sequencing	4.60	0.69	3.80	0.91	4.80*

*$p<0.05$, '-' indicates both are equal.

In the auditory based memory domain tasks, both the groups performed equally on digit forward span. The simultaneous bilingual group performed slightly better on the word recall task, and on the digit backward span, their performance was slightly poorer compared to the sequential bilingual group. The poor performance of digit tests over word recall tests can be due to the poor digit memory compared to

word representation. In general it was observed that the digit backward span subtask was most difficult for both the groups.

There was a significant difference between the groups on the story sequencing task. As observed, the simultaneous bilinguals were faster in comprehending the stories when it was narrated to them and to arrange the cards in sequence. This could be attributed to their better linguistic representation of various concepts in the brain due to the dual language experience. They have two words to represent the same concept for which they need to focus on the semantic aspect right from an early age compared to the sequential bilingual group. This could have facilitated their easier and fast comprehension of the story in this task. Further, the better rehearsal strategies and recall abilities due to early language exposure and representation could have contributed to their better performance in story sequencing task. The simultaneous bilingual group also performed better on the alternate sequence subtask and picture counting subtask. On the whole, their performance on the visual based memory domain was much better compared to the sequential bilingual group.

c) **Problem solving**

The problem solving domain consisted of tasks based on auditory and visual modality.

The auditory based task included three subtasks viz.:

- Auditory Predicting the outcome
- Auditory Predicting the Cause
- Auditory Compare and Contrast

The visual based task included three subtasks viz.:

- Visual Association Task
- Visual Overlapping Task
- Visual Mazes

The mean scores obtained for each of the subtasks in auditory and visual based problem solving domains were compared which indicated that the mean scores for the simultaneous bilingual group was higher for all the subtasks in the auditory domain. On the visual based domain subtask, scores were almost equal. The simultaneous bilingual group scored higher on the association and the overlapping task compared to the sequential bilingual group. However, the performance on the maze task was slightly low. The mean scores obtained for each subtasks on both the domains for the two groups were subjected to MANOVA which revealed that there were significant differences between the simultaneous and sequential bilingual group for the predicting the outcome subtask and, compare and contrast subtask in the problem solving auditory based domain at 0.05 level, whereas no significant difference was found between the two bilingual group for the three visual subtasks. The mean, Standard Deviation (SD) scores and F values obtained for the two groups for each of the subtasks in the auditory and visual based problem solving domain have been depicted in Table 6.

Table 6

Mean, Standard Deviation (SD) scores and F values of the subtasks in the auditory and visual based problem solving domain for the two groups

	Auditory tasks	**Simultaneous bilingual group**		**Sequential bilingual group**		**F values** (1,18)
		Mean	**SD**	**Mean**	**SD**	
Problem solving	Predicting the outcome	9.80	0.42	8.60	1.35	7.20*
	Predicting the cause	9.0	1.15	8.40	1.07	1.44
	Compare and contrast	9.10	1.19	7.40	1.77	6.29*
	Visual tasks					
	Association task	4.88	0.42	4.50	0.70	1.32
	Overlapping task	4.10	0.73	3.80	0.42	1.24
	Mazes	4.50	0.97	4.80	0.42	0.80

*$p<0.05$

The task predicting the outcome requires the child to think logically and creatively to arrive at an outcome for the situation, which is a higher cognitive aspect. The compare and contrast subtask required critical or logical thinking to arrive at a conclusion. Therefore, both of the above mentioned tasks required good cognitive linguistic flexibility. Simultaneous bilinguals are reported to have flexibility in cognitive tasks due to early exposure and native like competence in both the languages (Balkan, 1970; Bialystok, 2001; Kharkurin, 2008) and this could have contributed to their higher performance in these tasks compared to sequential bilingual group.

Thus to summarize, the simultaneous bilingual children performed better than sequential bilingual children on all the cognitive linguistic tasks, however a significant difference was found only in the problem solving task. When the performance on the auditory based domains was compared, a significant difference was found only in problem solving domain between the two groups. The superior performance of simultaneous bilingual children in problem solving domain could be attributed to the early exposure to more than one language which would have fostered the inhibition and working memory skills necessary for cognitive flexibility in problem-solving situations. The performance on the visual based domains was also compared across the two groups and a significant difference was found only in the memory domain. When the subtasks in each of the domain across modality were compared, there was no significant difference in attention domain across the modalities between the two groups. A significant difference was found only in the subsections of memory i.e. on the story sequencing subtask in visual modality. Further, a significant difference was found in subtasks of problem solving, i.e. predicting the outcome and compare and contrast section in the auditory modality. In general, the performance of the simultaneous bilingual group was superior to that of the sequential bilingual group. The difference in performance could be attributed to the age of acquisition of the second language and the extent to which an individual is bilingual.

CHAPTER 5
SUMMARY AND CONCLUSIONS

Language is the primary medium for expressing our thoughts to another person. It also influences the way we perceive and think. Human cognitive processes are heavily dependent on linguistic abilities and these two skills are closely related. There are connections between cognitive development and language development. Further, there is a close interaction between children's cognitive capacity and the influence of language specific input from the very beginning of linguistic development, i.e. cognition is affected by the process of learning one or more languages. Children who have the ability to communicate in two languages i.e., bilingual children are different from monolingual children in many ways.

Bilingualism is the ability to produce complete and meaningful utterances in other language. Researchers have classified bilinguals on the basis of age of acquisition, proficiency level of the languages, context in which learning takes place etc. **Simultaneous** and **successive bilingualism** is a type of classification on the basis of age of acquisition. If a child learns two languages at the same time, that is termed simultaneous acquisition. If he/she acquires one language, and having mastered that language, learns a second language that is termed successive or sequential acquisition. McLaughlin (1978) set the cutoff point at 3 years of age. The child who is introduced a second language before three years will be regarded as acquiring the two languages simultaneously; the child introduced to a second language after three will be considered to have had one language established and to acquire the second

successively, as a second language. The same criterion was adopted for the current study to classify simultaneous and sequential bilinguals.

Researchers have studied the effects of bilingualism on intelligence, linguistic abilities, cognitive functioning etc. Early studies tended to associate bilingualism with low intellectual functions, emotional adjustment problems etc. However, the result obtained by Peal and Lambert (1962) was a landmark in the area of bilingualism and suggested that there are no detrimental effects of bilingualism and there may even be some cognitive advantages. Subsequently, several studies reported that bilinguals are better in cognitive linguistic tasks such as memory, divergent thinking, problem solving, visual memory etc compared to monolinguals. There are some studies which also indicate that the individuals acquiring both languages simultaneously from birth have more advantages than those acquiring after three years of age. However, studies comparing two varieties of bilinguals on these aspects are scarce especially in the Indian context. The questions remain about exactly why and under what conditions bilingualism enhances cognitive function i.e. the amount of exposure to each language on bilingual language acquisition, the age of introduction, type of bilingualism etc. The issue of whether simultaneous acquisition or successive acquisition of two languages in children has greater cognitive linguistic advantages remains controversial. Yet another question remains with respect to assessment i.e. should we consider these two as two different groups while carrying out the assessment and would the interpretation vary accordingly. Thus the present study was taken up to compare the cognitive linguistic abilities of bilingual children who had acquired two languages simultaneously vs. a group of bilingual children who had acquired

languages sequentially thereby assessing the role of age of language acquisition in determining cognitive linguistic abilities.

A total of 10 simultaneous Kannada-English bilingual and 10 sequential Kannada-English bilingual children in the age group of 7-8 years participated in the study. The simultaneous bilingual children were those who had acquired both Kannada and English simultaneously before 3yrs of age and the sequential bilingual children were those who had acquired Kannada first and learned English once they entered school after 3 years of age. The questionnaire developed by Harini and Chengappa (2010) which was further modified was used to classify them into these categories. They were matched on the socioeconomic status and language proficiency.

The Cognitive Linguistic Assessment Protocol for children (CLAP-C) developed by Anuroopa and Chengappa (2008) was administered on the selected participants. It is a test developed to assess the cognitive linguistic abilities of Kannada speaking children in the age range of 4-8 years. It consists of three domains attention/discrimination, memory and problem solving and each domain consists of three auditory and three visual tasks. The raw data obtained from three domains and subtasks were averaged for all the subjects and subjected to statistical analysis using SPSS software. Descriptive statistics, independent samples t- test and MANOVA were the statistical procedures used.

The important findings drawn from the study were that the simultaneous bilingual children performed better than sequential bilingual children on all the cognitive linguistic tasks. However, a significant difference was found only on the

problem solving task. The superior performance of simultaneous bilingual children in problem solving domain can be attributed to early exposure to more than one language which fostered the inhibition and working memory skills necessary for cognitive flexibility in problem solving situations. The performance on auditory and visual based tasks domains were also compared across the two groups and a significant difference was found in problem solving in auditory based tasks and memory in visual based tasks. When the subtasks in each of the domain across modality were compared, there was no significant difference in attention domain across the modalities between the two groups. A significant difference was found only on the story sequencing subtask in the visual based memory domain. Further, a significant difference was found on the predicting the outcome and compare and contrast subtask in the auditory based problem solving domain. The superior performance of simultaneous bilinguals could be due to the age of acquisition of the second language and the extent to which an individual is bilingual.

Clinical implications of the study:

The results support the advantage of simultaneous bilingual children in cognitive linguistic tasks over sequential bilingual children. However, caution must be taken while generalizing the results to other bilingual population given the number of participants considered for the study. Nevertheless, the study has important implications. The outcome of the study provided an insight into which type of bilingualism (based on age) leads to greater cognitive linguistic advantage in children, which could be suggestive of the appropriate age at which second language can be introduced in children. This in turn could have an effect on cognitive linguistic tasks and scholastic performance of the child. Further, these results have implications on

assessment of children with communication disorders. The bilingual children who acquire two languages simultaneously and those bilingual children who acquire sequentially will have to be considered as separate groups during the assessment and the interpretation also should vary accordingly because these simultaneous bilingual children have a definite cognitive linguistic advantage over the sequential bilingual children. The advantage can also be seen during the intervention for such children and hence, a careful planning of the goals and activities should be taken up. The results of this study help us to refine our understanding of these two categories of bilingual children and may contribute towards wiping away the notion in people's mind that bilingualism hampers the development of the child in all domains. The findings of such research might contribute to theories of language development and processing in bilingual children.

Future directions:

There is a need for more comparative and cross linguistic studies on various types of bilinguals. A longitudinal study of such children also could throw light into the pattern of cognitive linguistic changes that occur with respect to time and the correspondence with various developmental stages. Future research can focus on the study of other cognitive linguistic domains. It would also be interesting to study such issues in the communication disordered population. Further, there is a need to develop an appropriate tool to differentiate simultaneous and sequential bilingual population.

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APPENDIX A

Modified Version of the Questionnaire Developed by Harini & Chengappa (2010)

I. Demographic data

Date of administration:
Child's name:
Age:
Date of birth:
Gender:
School/grade:
Medium of instruction:
Mother tongue:
Siblings if any:
Parent's education and occupation:

	Name	Education	Occupation
Father			
Mother			
Guardian			

Contact address and phone number:

II. History of language exposure

1. List all the languages the child knows stating with the language he/she learnt first

   L1 (mother tongue/language learnt first):
   L2 (second language that the child learnt):
   L3 (third language that the child learnt):
2. Mention the languages each of the persons mentioned below, use to speak to the child

Significant people in the environment	Mother tongue	Languages used to speak to the child	Age of the child at the time of exposure	Time spent with the child (waking hours)	Total duration (in years/months) of exposure
Mother					
Father					
Guardian					
Siblings					
Grandparents					
Relatives					
Neighbors					
Friends					
Classmates					
Teachers					

3. When was the child exposed to two or more languages? (Tick the right option)

- Right from birth
- Before the age of three (specify the year)
- After the age of three (specify the year)
- Others (specify)

4. Which were the languages the child was exposed to?

- Right from birth:
- Before the age of three:
- After the age of three:

5. How was the child exposed to these languages? (Tick the right option/s)

   By parents/caretaker/relatives/neighbours/friends/teachers

6. Was the child spoken to in two or more languages to the same extent?

7. If not, which language was the child exposed to predominantly?

8. On what occasions was the child spoken to in the 2nd language (less frequently used language)? Please tick the correct option-you may tick more than one option

- Only to name nouns
- To name nouns and a few verbs
- For both the above and along with some common commands/ requests
- To narrate stories and rhymes
- For day to day conversation
- For teaching academic/literacy skills

9. What are the languages taught as subjects at school:

10. How is the performance of the child in language at school (For e.g., does he/she perform better in language subjects like English than Kannada, if yes, please specify):

11. Which language did the child learn first for:

Domains	**Age at which the child learnt to use that language**
Understanding	
Speaking	
Reading	
Writing	

III Child's language competency:

1. Languages known (understood) by the child currently (specify it in the order of proficiency, eg: most to least proficient)

i.
ii.

2. How many languages did the child know before joining nursery? (specify it in the order of proficiency, eg: most to least proficient)

i.

ii.

3. Languages spoken by the child currently (specify it in the order of proficiency, eg: most to least proficient)

i.
ii.

4. How many languages did the child speak before joining nursery? (specify it in the order of proficiency, eg: most to least proficient)

i.
ii.

5. Does the child speak in both the languages to the same extent?

6. If not, in which language/s does he/she speak most often?To Mother:

- To father:
- To guardian:
- To siblings:
- To grandparents:
- To relatives:
- To neighbours:
- To friends:
- To classmates:
- To teachers:

12. Does the child speak in sentences using 2nd or 3rd language to fulfill his/her needs and for day to day conversation?

APPENDIX B

The description of the domains included in the Cognitive Linguistic Assessment Protocol for children (CLAP-C) by Anuroopa and Chengappa (2008) are given below:

Sl.No.	Domains	Subtasks	Test description	Score
1	**Attention/Discrimination**			
i.	Auditory tasks	a. Digit count test	Count mentally the number of times a target number is read out in the list. e.g., you have to listen carefully and tell me the number of times you hear the digit '9' in the sequence: 21, 19, 9, 10, 7, 9.	5
		b. Sound count test	Count mentally the number of times a target sound is read out in the list. e.g., you have to listen carefully and tell me the number of times you hear the sound 'ba' in the sequence: /sa/, /la/,/ba/,/ra/,/sa/.	5
		c. Auditory word discrimination	Discriminate between pair of words presented auditorily. e.g., you have to listen carefully and tell me whether the words in the word pair {/kalu/ vs. /karu/} are same or different.	10
ii.	Visual tasks	a. Odd one out test	Point to the odd/different stimulus among the set of 4-5 pictures	5
		b. Letter cancellation	A specified letter appears repeatedly. Scan the page and mark each instance of the letter. e.g., I will show some letters in a sequence and you have to point out to the letter 'i' from that sequence.	5
		c. Visual word discrimination	Discriminate between pair of words presented visually. e.g., I will show you few word pairs and you have to tell me if these word pairs appear same or different to you {/ni:nu/ vs. /ni:vu/}	10
2	**Memory**			
i.	Auditory tasks	a. Digit forward span	Recall in correct sequential order, the digit sequence presented auditorily. e.g., you have to repeat the sequence of digits { 5-8-1-2} after I finish	5
		b. Word recall	Recall the words presented in the same sequence. e.g., you have to repeat the words { /hakki/, /pusthaka/, /soppu/} after I finish. No matter whatever is the sequence.	5
		c. Digit backward span	Repeat the backward sequence of the digit sequence presented. e.g., you have to repeat the digits {2-5-7} in a reverse order.	5

ii.	Visual tasks	a. Alternate sequence	Fill the gaps in the sequence of items presented and complete the sequence. e.g., I will be showing you some pictures/ shapes you have to tell what will come next in the blank.	5
		b. Picture counting	Recall the names of all the pictures presented, once the stimulus is removed. e.g., I will show you some pictures in sequence {cat, dog, cow} after I remove them, you have to recall and name them back.	5
		c. Story sequencing	Arrange the story cards in a sequence. e.g., I will show you some story pictures {The thirsty crow}, these cards are all jumbled; you have to arrange these cards according to the story.	5
3	**Problem solving**			
i.	Auditory tasks	a. Predicting the outcome	Reason out and tell the possible outcomes of the situation. e.g., what will you do if you get locked inside a room?	10
		b. Predicting the cause	Predict the possible cause for the given situation. e.g., tell me the reason why the vehicle is not getting started?	10
		c. Compare and contrast	Compare and contrast between the two items presented. e.g., I will tell you two word pairs {milk vs. coffee}. You have to tell me the similarities and differences between the two.	10
ii.	Visual tasks	a. Association task	Select and match the most associated items from the picture array. e.g., I will show you few pictures, you have to associate any two pictures.	5
		b. Overlapping task	Solve the overlap and name the pictures depicted. e.g., a group of pictures will be presented in an overlapped form, you have to identify each item in the form.	5
		c. Mazes	Solve the maze and reach destination point	5