

# **Development and field testing of protocol to profile language skills in children with stuttering in Kannada**

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University of Mysore, Mysuru



ALL INDIA INSTITUTE OF SPEECH AND HEARING

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MAY, 2016

## **CERTIFICATE**

This is to certify that this dissertation entitled “ **Development and field testing of protocol to profile language skills in children with stuttering in Kannada**” is a bonafide work submitted in part fulfilment for degree of Master of Science (Speech-Language Pathology) of the student (Registration Number: 14SLP007). 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.

Mysuru  
May, 2016

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## DECLARATION

This is to certify that this dissertation entitled “**Development and field testing of protocol to profile language skills in children with stuttering in Kannada**” is the result of my own study under the guidance of Dr. Y. V. Geetha, Professor of Speech Sciences, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysuru, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysuru  
May,2016

**Registration No. 14SLP007**

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*Dedicated to,*  
*My Beloved Parents*  
*And*  
*All children with stuttering*



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## CHAPTER I

### INTRODUCTION

Stuttering is a fluency disorder, seen in about 1% of the general population and is more predominant in children below the age of six years in about 5% of the individuals. It is the interruptions in the forward flow of speech which is often manifested during early childhood years after a period of fluent speech production. The typical characteristics include disfluent utterances like sound or syllable/monosyllable, word repetitions, prolongations, dysrhythmic utterances and blocks or articulatory fixations. Sometimes these individuals also exhibit secondary behaviors or physical concomitants like facial grimaces, abnormal jerky movements of head or extremities during the moments of stuttering.

Stuttering is difficult to define, explain and treat. Many of the researchers have tried to define stuttering and one of the recent definitions is by Yairi and Ambrose (2005) According to them “Stuttering is characterized by involuntary disruptions in the flow and rhythm of speaking even though the individual knows exactly what he/she wants to say. These uncontrolled interruptions in producing speech, commonly perceived as prolongations, syllable repetitions, and silent blocks, can be brief or last for many seconds”.

Stuttering has been described as a heterogenic disorder involving one or more of several associated speech and non-speech behaviors. Since the onset of stuttering in more than 90% of children is during the preschool period, during the peak of speech and language development, and many children have associated speech and language

disorders, a strong relationship between language and stuttering could be speculated to be present, especially for the phonological skills. It is reported by researchers that there is a critical period in the child's development during which there is some interaction of these factors to precipitate stuttering. Whether the stuttering persists or recovers is determined by the maturation of the neuromuscular skills within this critical period. Van Lieshout & Namasivayam (2004) viewed stuttering as a speech motor deficit that results from disturbances in the timing and coordination among the respiratory, laryngeal, and vocal tract symptoms of speech.

Several authors have reported that children with stuttering (CWS) show some degree of retardation in the use and learning of linguistic skills (Bloodstein, 1975; Van Riper 1971). Language component is related to have an impact on the frequency of stuttering, variation in the language formulation demands which involve negative impact on the fluency and language complexity with changes in syntactic complexity and increased length (Gaines, Runyan, & Meyers, 1991; Howell & Au Yeung, 1995; Logan & Conture, 1995; Ratner & Sih, 1987; Wall, Starkweather, & Cairns, 1981; Watson et al., 1993) and changes in the narrative demands (Scott, Healey, Norris, 1995; Trautman, Healey, & Norris, 2001; Weiss & Zebrowski, 1993).

Approximately one third children who stuttered were reported to have delay in language acquisition (Van riper, 1981). Muma (1971) reported use of less complex sentences by highly nonfluent preschool children compared to their fluent speaking peers. According to Westby (1979), more grammatical errors and poor PPVT scores were seen in CWS compared to their fluent peer group.

As reported by Hall, Wagovich, and Ratner (2007), researchers have found that CWS score poorer on various aspects of expressive and receptive language, when compared to children with no stuttering (CWNS) (Anderson & Conture, 2000; Bajaj, Hodson & Schommer-Aiken, 2004; Murray & Reed, 1977; Ryan, 1992; Westby, 1974), CWS stutter more on syntactically complex or lengthier utterances (Logan & Conture, 1995; Melnick & Conture, 2000; Yaruss, 1999), beyond the child's mean length of utterance (MLU) (Zackheim & Conture, 2003) and difficult sentences (Richels, Buhr, Conture, & Ntourou, 2009).

The intricate association between stuttering and phonology, has been of interest to researchers since many years. This research led to findings of CWS having either different or delayed phonological development. Such findings hinted at the fact that phonological difficulties are the most commonly occurring disorder in comparison to other speech and language problems that are associated with stuttering (Bloodstein, 1987; Cantwell & Baker, 1985; Louko, Edwards, & Conture, 1990; St. Louis & Hinzman, 1988; Paden, 2004; Wolk, Edwards, & Conture, 1993). Hakim and Ratner (2004) also noted that CWS show more phonological errors.

Wolk et al. (1993) reported that, 30-40% of CWS also demonstrate deficits in phonology. Sneha (1994) studied phonological process in young CWS (3 to 7 Years) and found that young CWS had more number of phonological processes than their peers. The 10 phonological processes included stopping, frication, multiple process, lateralization, depalatalization, substitution of glide, epenthesis and changes in place of articulation were more specific to CWS.

The nonword repetition task has been preferred by many authors to investigate the role of phonological encoding and phonological working memory in CWS, (Anderson et al. 2006, Hakim and Ratner 2004, Smith, Goffman, & Sasisekaran, 2012). The nonword repetition task includes several processes such as, auditory processing, encoding the acoustic information into phonological representations, holding the representation in working memory, motor planning and execution of the response (Gathercole, 2006). A greater difficulty in repeating non words which did not resemble words in comparison to word-like non-words in younger group was a significant finding in a study conducted by Munson (2001). A decrease in such dissimilarities with age signified that prior lexical knowledge could be a factor in influencing the performance (Munson, 2001).

Hakim and Ratner (2004) compared eight CWS (4.3 to 8.4 years) with CWNS of their age using the Children's Test of Non word Repetition (Gathercole, Willis, Baddeley, & Emslie, 1994). Phonemic errors produced by CWS were more in number in comparison to CWNS in monosyllable, bisyllable, and trisyllable non words but a significant group difference was noticed only at trisyllable non-words level. The higher percentage of phonemic errors in the two groups was evident as the syllable length increased up to five syllables.

Hakim and Ratner (2012) tested phonological working memory ability in 4 to 8 year old children using children non-word repetition test. They reported that, as the syllable length increased, CWS showed more phonological errors than their typically developing peers. But, fluency of the non words did not differ, even when the length of non words increased. They observed that CWS were fluent in long non word utterances.

The frequency of phonemic sequences in a language measured as high vs. low phonotactic probability can affect the nonword repetition abilities (Gathercole, Frankish, Pickering, & Peaker, 1999; Storkel, Armbruster, & Hogan, 2006; Storkel, 2001). The problems experienced by CWS in phonemic encoding/working memory abilities can be witnessed through non-word repetition task (Sasisekaran & Byrd, 2013).

Yashaswini and Geetha (2010) compared the meta-phonological skills in 8-12 years old CWS to age matched CWNS on rhyme recognition, phoneme oddity, syllable oddity for non words and words and syllable stripping. The findings revealed significantly poorer performance on all the meta-phonological skills except for rhyme recognition and phoneme oddity in CWS compared to CWNS.

Though performance in phoneme elision is comparatively unfamiliar in persons who stutter (PWS), predominantly in children, it is believed to offer insights into phonological processing abilities. The phoneme elision task has been considered to explore phonological working memory in relation to the verbal rehearsal system, and segmentation skills (Jones et al. 2009). Recently Sasisekaran and Byrd (2013) reported, “CWS might experience difficulties with monitoring phonemes within consonant clusters”. According to them phoneme elision task suggests a complex pattern of age-dependent performance in CWS.

Reading is one of the linguistic components which require the ability in understanding, formulating and use of language, poor knowledge about syntax and semantics and other skills for processing of language will lead to problem in reading skills. Bosshardt and Nandyal (1988) showed differences among oral and silent reading

in CWS. However, Conture, (2001), and Nippold and Schwarz, (1990) found that CWS were similar to their peers in narrative and reading skills.

**Need for the study:**

Stuttering is a multidimensional problem but most of the stuttering assessment procedures involve only the overt characteristic features like the frequency, duration and severity of stuttering. Though not all CWS exhibit other associated speech and language problems, literature suggests such deficits or delays in more than one third of the population. Hence, considering the complex nature of language and linguistic determinants of stuttering, a comprehensive assessment procedure is essential to obtain detailed information focusing towards assessing multiple aspects of the problem. The detailed assessment can provide a profile of skills and deficits of the child which otherwise go unnoticed. This provides direction towards the comprehensive management of CWS.

There is no comprehensive protocol for profiling individuals with stuttering, more so in case of CWS to assess linguistic nature of stuttering. Although it is reported by many authors that there are many concomitant disorders associated with stuttering, there are very few attempts to develop a comprehensive protocol for the profiling of stuttering. There are insufficient resources for the comprehensive assessment of CWS in different languages and so also among Kannada speaking children. Such a tool would provide the SLPs to get very valuable information for the differential diagnosis, management and importantly to build the data base for research on CWS. With this need in mind the the present study was undertaken with the following aims and objectives.



**Aim of the study:**

The main aim of the study was to develop a comprehensive protocol for the assessment of language skills in CWS in Kannada language.

The study was planned with the following specific objectives:

- To develop a comprehensive language assessment protocol for 6-10 year old CWS in Kannada language
- To field test the assessment protocol on 6-10 year old CWS and CWNS as there are no standardized tools covering various aspects of language measure and to compare the language abilities between the 2 groups
- To see if CWS differ from CWNS in various measures of language abilities

## **CHAPTER II**

### **REVIEW OF LITERATURE**

Communication is a complex social behavior, which involves exchange of information between the sender and receiver. Speech and language is the main mode of communication. If the speech flows easily and smoothly in terms of both sound and information it is known as fluent speech. Starkweather (1987) defined fluency as “people who are so skilled in the performance of speech and language behaviors that they don’t need to put much thought or energy”. If there is any disruptions in the flow of message it results in fluency disorder. Stuttering is one of the common types of fluency disorders which interrupt the forward flow of speech causing communication breakdown.

#### **2.1 What is stuttering?**

Stuttering is a fluency disorder in which the flow of speech is interrupted by prolongations, repetitions, or blocks. There may be abnormal facial and body movements along with the effort to talk.

Wingate (1964) has proposed the most widely accepted description of stuttering as:

1. (a) disruption in the fluency of verbal expression, which is (b) characterized by involuntary, audible or silent, repetitions or prolongations in the utterance of short speech elements, namely: sounds, syllables, and words of one syllable. The disruptions (c) usually occur frequently or are marked in character and (d) are not readily controllable. 2.

Sometimes the disruptions are (e) accompanied by accessory activities involving the speech apparatus, related or unrelated body structures, or stereotyped speech utterances. These activities give the appearance of being speech-related struggle. 3. Also, there are not infrequently (f) indications or report of the presence of an emotional state, ranging from a general condition of "excitement" or "tension" to more specific emotions of a negative nature such as fear, embarrassment, irritation, or the like. (g) The immediate source of stuttering is some in-coordination expressed in the peripheral speech mechanism; the ultimate cause is presently unknown and may be complex or compound.

According to Van Riper (1971), "Stuttering is primarily a puzzle, the pieces of which lie scattered on tables of speech pathology, psychiatry, neurophysiology, and genetics and many other disciplines".

Starkweather (1990), defined stuttering from his demands and capacity model perspective as "stuttering results when demands for fluency from child's social environment exceed the child's cognitive, linguistic, motor or social-emotional capacities for fluent speech".

According to Cooper (1993), "stuttering is a diagnostic label referring to a clinical syndrome characterized most frequently by abnormal and persistent dysfluencies in speech accompanied by characteristics affective, behavioral and cognitive pattern".

Yairi and Ambrose (2005) defined that, "stuttering is characterized by involuntary disruptions in the flow and rhythm of speaking even though the individual knows exactly what he/she wants to say. These uncontrolled interruptions in producing speech,

commonly perceived as sound prolongations, syllable repetitions and silent blocks can be brief or last for many seconds”.

Thus, definitions provided by different authors from different disciplines differ with respect to their perspective in terms of characteristic features or causative factors of stuttering disorder.

## **2.2 Causes of stuttering – some theoretical issues**

Stuttering has been attributed to many causative factors since the time of Aristotle during 400 BC and the focus has been changed from psychogenic to physiogenic several times over the years. Recent theories have stressed the role of both nature and nurture in explaining the causative factors of stuttering.

During 1940s, the SLPs felt that stuttering might be due to the reaction of parents/caregivers towards the disfluencies. This belief of SLPs was proved by the Iowa family study and the Diagnosogenic theory was proposed by Wendell Johnson (1939). The diagnosogenic theory by Johnson, states that identifying and labeling the speaker's so called normal disfluencies causes the stuttering problem. The response of the parents to their children's early speech was mediated by their “diagnoses” of this speech as the disorder “stuttering”. It was not the term “stuttering” that caused the “stuttering disorder” but from the frustration and failure while attempting to talk stuttering emerges (Bloodstien, 1987, 1997).

During 1986, the Iowa research was re-evaluated and some researchers suggested the role of genetic transmission to provide similar viable explanations for the data.

Around 25 studies have examined the genetic patterns in the incidence of stuttering. The findings of the research differed vastly and many studies are contradicted by other studies. Kidd (1984) reported important defect in many earlier studies was their self imposed disadvantage of reporting only the presence of positive family history.

Orton and Travis noticed that most of the persons with stuttering (PWS) were left handers forced right handers (Travis, 1931). They believed that the change in handedness led to conflict in the control of speech in either of the hemispheres responsible for speech. The lack of cerebral dominance, they reasoned produced neuro motor disorganization and the mistiming of speech caused stuttering. Some of the researchers believed that stuttering was due to timing error. Van Riper (1982) reported that when an individual stutters on a word it results in temporal disturbance of the concurrent and consecutive programming of muscular movements required to produce one of the word's integrated sounds.

The third perspective of onset of stuttering was provided by the demand and capacity model (Starkweather, 1987). This states that the stuttering occurs when the environmental and self-imposed demands are more than the child's linguistic, motoric, cognitive and socio-emotional capacities required for speech performance.

Most of the authors have been intrigued by the influence of linguistic factors on stuttering. Bloodstein (2002) reported that the frequency of stuttering is more when the load on functions of language is heaviest.

### **2.3 Multi-dimensional nature of stuttering**

From the past decades, stuttering is best comprehended from a multidimensional view. This differs from the earlier perspective that stuttering is unidimensional and could be described simply as psychological, physiological, linguistic, or learned behaviors. In contrast, numerous recent views of stuttering as a multifactorial or multi-dimensional speech disorder have promoted a wider view for comprehending the difficulties of stuttering. Such views incorporate the significance of individual variability and typical differences among PWS. Starkweather (1999) said that, the most evident feature of stuttering is its inconsistency. An evaluation of various recent multi-dimensional models highlights on child's speech related neuro-physiological processes, linguistic skills and capabilities, emotional and attitudinal factors, reaction to various moments of stuttering, and cognitive skills. One among such multi-dimensional models is the CALMS model of stuttering which was put forth by Healey, Scott, Trautman, & Susca (2004). It proposes 5 domains or factors maintaining stuttering including Cognitive, Affective, Linguistic, Motor and Social-emotional (CALMS) which contribute to a stuttering disorder. These factors interact in a complicated manner between and within factors.

The 5 domains can contribute in combination or alone to produce various types and frequencies of stuttering. Each child exhibits, different levels of abilities in each of the 5 CALMS domains. In general, CALMS reflects the strengths and weaknesses of each component of stuttering. These kinds of models help in assessing and managing associative contributions of cognitive, affective, linguistic, motor, and social components on stuttering.

Multi-dimensional nature of stuttering helps the clinicians in better understanding of different components which influence stuttering and this in turn facilitates in better assessment and management of stuttering. It explains the association and differences among different components or domains.

## **2.4 Language and linguistic issues in stuttering**

Since many years, researchers are investigating the possibility of an association between stuttering and language skills in children and the inference that a connection may hold for extending the comprehension related to the nature, cause, and treatment of stuttering (Anderson & Conture, 2000; Berry, 1938; Bloodstein, 2006; Byrd & Cooper, 1989; Johnson, 1955; McDowell, 1928; Nippold, 1990; Ratner, 1997; Silverman & Williams, 1967; Watkins, Yairi, & Ambrose, 1999; Watkins & Johnson, 2004; Watkins, 2005; Westby, 1974; Yaruss, LaSalle, & Conture, 1998). The language and stuttering connection has been the object of research interest for decades by many researchers and clinicians dealing with stuttering. The importance of language determinants in stuttering is highlighted due to the following research evidences accrued: 1) the onset of stuttering occurring during the peak of language development stage in more than 90% of children, 2) the commonly associated language and phonological delay or disorders in more than one third of children with stuttering 3) the most characteristic feature of linguistic variability during the moments of stuttering, 4) CWS using less complex utterances compared to CWNS, and 5) evidences supporting the Demand Capacity Model (DCM)

Numerous stuttering models suggest that fluency breakdown is connected with failure in encoding or retrieving lexical, syntactic, phonological, phonetic, and or

suprasegmental targets of speech production (Bloodstein, 2006; Howell, 2004; Karniol, 1995; Perkins, Kent, & Curlee, 1991; Packman, Onslow, Richard, & van Doorn, 1996; Postma & Kolk, 1993; Ratner, 1997; Wingate, 1988;).

Ntourou, Conture and Lipsey (2011) summarized language skills of CWS and CWNS from empirical studies. The results indicated that a significantly lower score than CWNS on norm-referenced measures of overall language, receptive and expressive vocabulary, and mean length of utterance was obtained by CWS. The result suggests that children's language skills are possible significant variables linked with childhood stuttering.

Several factors have contributed to the idea that stuttering is associated to language ability. Numerous models, theories and studies have the same perspective. Hence, language is considered to be the important component while assessing and treating CWS.

#### ***2.4.1 Phonology and stuttering***

Children's phonological and language skills both typically go through very fast development between 2 and 4 years of age. In addition, during this age that stuttering onset, and recovery, frequently occurs. Thus, it is reasonable to predict some association or interaction between these aspects of phonology and a fluency disorder.

Survey of 1184 SLPs exhibited that 12.7% of CWS had phonological disorders 33.5% of CWS had articulation disorders (Blood, Ridenour, Qualls, & Hammer, 2003). Persistent CWS were more delayed in phonology compared to spontaneously



recovering CWS (Paden & Yairi, 1996; Paden, Yairi, and Ambrose, 1999). Further, CWS were found to encode phonological information in a different way than CWNS (Melnick, Conture, & Ohde, 2003).

A view that that phonological deficits are the most frequently co-occurring disorder with stuttering when compared to other speech–language problems because of the close association between the two has been supported by many researchers (Bloodstein, 1987; Cantwell & Baker, 1985; Louko, Edwards, & Conture, 1990; Paden, 2004; St. Louis & Hinzman, 1988; Wolk, Edwards, & Conture, 1993).

To study the early phonological skills of 36 children, The study considered children. With the aim of studying early phonological skills, Paden and Yairi (1996) used the Assessment of Phonological Processes - Revised (Hodson, 1986) on a set of 36 children who comprised of those whose stuttering persisted, early recovered and recovered after a long period children, and normal children. The study was performed soon after the onset. Their findings revealed that near stuttering onset, on specific phonological patterns as well as on the overall mean percentage error scores, significantly different scores were obtained between the children who persisted stuttering and normal children. The scores of children who eventually recovered and normals did not differ significantly.

Louko, Edwards, and Conture (1990) examined CWS (aged 2.5 to 6.11 years) to determine the phonological processes that the children were using. They found that cluster reduction was the most frequently occurring age-inappropriate process used by their young participants who stuttered.

Wolk, Edwards, and Conture (1993) analyzed the differences in stuttering, diadochokinetic, and phonological behaviors in young male, 4.2 to 5.11 year children who showed stuttering and phonological disorder and children who exhibited only one disorder. The study included twenty one male children, representing three groups of seven children each: (a) stuttering and normal phonological abilities (*S+NP*), (b) stuttering and disordered phonology (*S+DP*), and (c) normal fluency and disordered phonology (*NF+DP*). During conversational speech task stuttering behavior was analyzed and during a picture-naming task phonological behavior was evaluated. During bi-syllable and multisyllable productions, the diadochokinetic abilities were rated. The results revealed that the *S+DP* group had considerably greater amount of sound prolongations and significantly less iteration per whole-word repetition than the *S+NP* group. On other stuttering index no group differences were quoted. Furthermore, similarities were noticed among the *S+DP* and *NF+DP* groups in phonological behavior. Among the three groups, diadochokinetic rates were similar suggesting that all the three groups had same temporal processing for speech.

The phonological abilities of children whose stuttering persisted were compared to those who recovered by Yairi and Ambrose (1999). The children's verbal responses to the Assessment of Phonological Processes–Revised (APP-R; Hodson, 1986) were considered for the analysis of their phonological abilities. The finding revealed that the children whose stuttering persisted had lesser scores than the children who recovered from stuttering. Both groups, exhibited progress in phonological development, and typical strategies were noted when patterns had not been acquired. The persistent group

was moving more gradually and hence phonological development was more delayed than in those who recovered from stuttering.

A study involving a group of 51 CWS with the aim to study the effect of phonologically complex sounds (consonant clusters and consonants that emerges late) on the percentage of disfluencies in conversational samples, was investigated by Howell, Au-Yeung, and Sackin (2000). This study revealed that the frequency of stuttering was more on the phonologically complex sounds.

The association between phonological skills and stuttering was studied by Gregg and Yairi (2006) in 28 preschool children near the onset of their stuttering, with the age range from 25 to 38 months. Among two groups of CWS with dissimilar ratings of stuttering, phonological skills were compared in a conversational speech sample. Likewise, the two groups were compared on the severities of stuttering with various levels of phonological skills. There was no significant difference for either of the two factors.

With an auditory priming paradigm involving a picture naming task Byrd, Conture, & Ohde, (2007) examined holistic and segmental processing in 26 CWS and CWNS. There were around 13 three-year-olds and 13 five-year-olds in each of the groups. The subjects were presented with the neutral (tone), holistic, or segmental primes before the onset of target pictures and response time to picture naming was calculated from picture onset to the time of initiation of naming. The outcome of the study showed that the younger group comprising of the CWS and CWNS were faster on the condition of holistic priming and slower on conditions of the incremental priming. But differences

were noted in the patterns exhibited by the group comprising of 5 year olds. The 5 year old CWNS were fastest in the incremental condition, but the CWS of the same age were fastest in the holistic condition. The authors attributed the outcome to developmental difference in phonological encoding among the groups i.e., at younger age CWS exhibit age appropriate holistic encoding skills but by the older age they appear to exhibit a delay in segmental encoding skills as compared to CWNS.

Sasisekaran and Byrd (2012) studied skills critical for phonological encoding i.e., segmentation and rhyme abilities in CWS and CWNS. The participants were 9 CWS and 9 CWNS in the age range of 7 and 13 years. The experimental paradigm consisted of two verbal monitoring tasks, rhyme and phoneme monitoring, in silent naming. The performances in the verbal monitoring tasks were compared to a neutral, nonverbal tone monitoring task. Furthermore, the phoneme monitoring task difficulty was varied such that they were instructed to monitor for consonant clusters vs. singletons. Although there were few indications towards presence of segmentation difficulties with increasing phonological complexity of the stimuli, the results of the study was not successful in establishing the presence of deficit in segmentation and rhyme abilities in CWS.

Many studies have tried to examine the acquisition of rhyme, segmentation skills, and the manner of the phonological lexicon in CWS using multiple tasks comprised of nonword repetition, priming and rhyme judgment (Arnold, Conture, & Ohde, 2005; Byrd, Conture, & Ohde, 2007; Hakim & Ratner, 2004; Melnick, Conture, & Ohde, 2003; Spencer, & Smith, 2008; Weber-Fox, Spruill).

Pelczarski and Yaruss (2013) assessed the phonological encoding abilities of 5 and 6 year old CWS using multiple measures of phonological awareness abilities (i.e., phoneme blending, sound matching, elision), In addition measures of articulation and expressive and receptive vocabulary were compiled by the investigators. The results indicated that young CWS performed significantly poorer than CWNS on elision and sound blending tasks. Between-group differences were not observed in sound matching skills or in any of the background linguistic measures. The findings imply that young CWS have slight, but strong, language differences in some phonological encoding aspects that might lead to an unstable linguistic planning system in young CWS.

From the above studies we can conclude that there is a strong association and interaction between phonology and stuttering. Phonological deficits co-occur most frequently with stuttering when compared to other speech and language disorder.

#### ***2.4.2 Syntax and stuttering***

Since decades, many investigations have been carried out to study the role of syntax in speech fluency of persons with stuttering (PWS). Most of the studies have been conducted on children, which has facilitated better comprehension of the nature of stuttering and factors that contribute to the variability of its symptoms. Johnson (1965) investigated the internal structure of sentences using a task of sentence recall. A hierarchical significance to the internal constituent breaks of a sentence was observed in the results, with the most important breaks equivalent to subject-predicate, verb-object splits. It has been reported that clause type and sentence complexity might affect rate of stuttering (Hannah & Gardner, 1968; Wells, 1976). Hannah and Gardner (1968) found a

high rate of dysfluencies on post-verbal clauses, but Wells (1976) reported more disfluencies on complex sentences containing two or more relative clauses, as opposed to one relative clause.

Bloodstein and Gantwerk (1967) observed more dysfluencies in young CWS on conjunctions and pronouns than on other words in spontaneous speech. The authors reported that such words occurs frequently at the beginning of sentences. In contrast, Williams, Silverman, and Kools (1969) found a similar finding in children as in adults that is more disfluencies on content words when compared to functional words, even though it was found that children had more dysfluencies in the initial words of a sentence. Williams et al. (1969) examined the wider range of ages wherein he found different results in some of the 11 year old children, and hence the patterns of stuttering were similar to adult like. Bloodstein (1974) reported an association between the position of stuttering and development of syntax in young CWS.

The difference between small groups of CWS and CWNS was compared on syntactic structure of the spontaneous speech, using a method of constituent analysis by Wall (1980). The speech sample was recorded during play session and the method of analysis had high reliability. Differences were observed in the number of complete clauses, the number of complex sentences, and in clause types among the two groups. The findings suggested that CWS used simple and less mature language when compared to the CWNS.

Wall, Starkweather and Cairns (1981) studied the rate and location of stuttering in the spontaneous speech of 9 CWS (4 to 6.6 years) in relation to certain aspects of

syntactic structure of a sentence. The spontaneous speech was recorded in a play session. Stuttering was found to be significantly higher at clause boundaries than at internal positions of clauses.

The amount of usage of various sentence types in groups of CWS and CWNS in age range 4, 6, and 11 years was studied by Kadi-Hanifi and Howell (1992). They found no difference in the amount of usage of various sentence categories. The reason attributed by them to the difference was the use of semantically based sentence analysis and the second discrepancy involved the instances of stuttering on syntactic sentences which are complex.

There is limited support for the idea that, the CWS represent significant delays or syntactic processing deficits (Kloth, Janssen, Kraaimaat & Brutten, 1995; Ratner, 1995; Ryan, 1992; Watkin, Yairi & Ambrose, 1999), whereas there is abundant proof to indicate that fluent utterances produced by children is related in some way to the syntactic structure. Numerous researchers have suggested that stuttering in children usually coexist with onset of most important syntactic units within utterances (Bernstein, 1981; Bloodstein & Grossman, 1981; Logan & Lasalle, 1999; Wall, Starkweather & Cains, 1981).

Logan (2000) assessed whether syntactic complexity continues during adolescence and adulthood. 12 PWS produced self generated sentences within a structured conversation task and prepared sentence within a reaction time task. The frequency of stuttering was less in prepared sentence task than during length matched conversation.

The above mentioned studies, suggests the possibility of some syntactic deficits in stuttering. Many of the researchers have reported that syntactic deficits are related to stuttering (Kloth, Janssen, Kraaimaat & Brutten, 1995; Ratner, 1995; Ryan, 1992; Watkin, Yairi & Ambrose, 1999). In contrast to these studies, few others did not find any syntactic deficits in stutterers (Kadi-Hanifi & Howell, 1992). As there is mixed opinions regarding this issue, further research is required to arrive at a better conclusion.

### ***2.4.3 Semantics and stuttering***

Recent empirical studies of CWS (Anderson & Conture, 2000, 2004; Melnick, Conture, & Ohde, 2003; Pellowski & Conture, 2005) as well as AWS (Cuadrado & Weber-Fox, 2003; Weber-Fox, 2001; Weber-Fox, Spencer, Cuadrado, & Smith, 2003; Weber-Fox, Spencer, Spruill, & Smith, 2004) suggested “slightly different speech–language planning and poorer lexical/semantic skills in CWS than CWNS”. For example, Pellowski and Conture (2005) stated “CWS exhibit slower speech reaction times (SRTs) than CWNS in response to semantically related primes (e.g., hearing “dog” just before naming a picture of “cat”)”.

Empirical studies (Byrd & Cooper, 1989; Silverman & Williams, 1967; Wagovich & Ratner, 2007; Westby, 1974; Hall, Wagovich, and Ratner, 2007) of the receptive vocabulary of CWS specify that, lesser scores in tests of receptive vocabulary for CWS when compared to CWNS. Though two groups (CWS and CWNS) were observed to have vocabulary within the normal range (Ratner & Silverman, 2000; Silverman & Ratner, 2002) but, CWS exhibited a reduction in their expressive vocabulary when compared with CWNS, this was a major finding in many similar researches. Based on these results,



one may assume that the lexical encoding, storage and retrieval might vary among CWS and CWNS.

Essential differences on the aspect of receptive vocabulary among younger CWS and CWNS have been investigated by many authors (Andrews, Craig, Feyer, Hoddinott, Howie, & Neilson, 1983; Bernstein-Ratner, 1997). On measures of receptive vocabulary such as the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997), young CWS have been found to score lesser when compared to young CWNS, (Meyers & Freeman, 1985; Murray & Reed, 1977; Ryan, 1992; Westby, 1974). Bloodstein (1995) reported “this early ‘linguistic disadvantage’ of the young CWS may become less evident as children advance in age, an idea that may explain the ambiguous findings associative to differences in receptive vocabulary among the older CWS and CWNS”.

Westby (1979) evaluated the syntactic and semantic language performance of typically disfluent CWNS, CWS, and highly disfluent CWNS. The 3 groups of children did not show significant difference on Developmental Sentence Analysis scores. The stuttering and highly disfluent CWNS secured significantly lesser receptive vocabulary scores, made significantly more grammatical errors, and secured significantly more incorrect response scores on the semantic tasks.

The expressive language abilities of 84 preschool-age children who stuttered, 62 who recovered from stuttering and 22 who persisted in stuttering were examined by Watkins, Yairi and Ambrose (1999). A range of morphological, syntactic, and lexical measures were analyzed from spontaneous language samples collected near onset of stuttering. The results did not differ significantly with respect to the expressive language performance near the onset of stuttering of children whose stuttering persisted or

recovered. Additionally, persistent and recovered CWS exhibited expressive language abilities near or higher than developmental expectations, based on comparison with normative data, at all age intervals.

Blood et al. (2003) surveyed 1,184 school-based Speech Language Pathologist's (SLP's) who were enquired about the children on their caseloads. The SLP was asked to point out if a given child with stuttering also had an associated language disorder. It was reported that 2,628 children were getting treatment for stuttering. Out of this total, 527 (20%) had a deficit in syntactic development and 672 (26%) had a deficit in semantic development.

The influence of conceptual and perceptual properties of words on the speed and accuracy of lexical retrieval in CWS and CWNS during a picture-naming task was studied by Hartfield and Conture (2006). The participants consisted of thirteen 3 to 5-year old CWS and the same number of CWNS. These pictures were named during four auditory priming conditions: (a) a *neutral* prime consisting of a tone, (b) a word prime *physically* related to the target word, (c) a word prime *functionally* related to the target word, and (d) a word prime *categorically* related to the target word. The findings of the study highlight that CWS seemed to be slower than CWNS across various priming conditions (i.e., neutral, physical, function, category) and that the speed of lexical retrieval of CWS was more affected by functional aspects of the target pictures rather than perceptual aspects. The results were considered to imply that CWS tend to organize lexical information more functionally than physically and that this trend may relate to difficulties establishing normally fluent speech and language.

Anderson (2008) studied 22 CWS and 22 CWNS between the age range of 3.1 and 5.7 years to gain insights into the effects of age of acquisition and repetition priming on picture naming latencies and errors. Children participated in a computerized picture naming task involving naming of pictures of both early as well as late acquired age of acquisition (AoA) words in two consecutive stages. The results revealed that the picture naming latencies and errors were reduced subsequent to repetition priming and in response to early AoA words when compared to late AoA words for all the participants. It was also found that similar AoA and repetition priming effects were present in both the talker groups, with one exception of error reduction in CWS than CWNS from repetition priming for late AoA words. Additionally, it was noted that CWNS exhibited a significant, positive relation between linguistic speed and measures of vocabulary, whereas those with stuttering did not. These results suggested that the (a) semantic–phonological associations of CWS may not be as strong as those of CWNS and (b) existing lexical measures may not be sensitive enough to differentiate CWS from CWNS in lexically related aspects of language production.

Many studies reported that the lexical semantic skills will be lesser in CWS than their typically developing peers. Some studies have found slower reaction time in response to semantically related primes and that the CWS differ in terms of lexical retrieval, encoding and storage. From these findings one can speculate that CWS differ from typically developing peers in their semantic abilities.

#### ***2.4.4 Reading deficits and stuttering***

The association between stuttering and reading has been assessed from many years. Mainly, two approaches have been considered to examine this association in children: researchers have either compared CWS and CWNS on measures of reading skills, or have tried to measure the frequency of reading deficits occurrence in different groups of CWS. The reading skills of CWS have been questioned by many researchers (Andrews & Harris, 1964; Blood & Seider, 1981; Conture & Naerssen, 1977; Daly, 1981; Janssen, Kraaimaat, & Meulen, 1983; McDowell, 1928; Schindler, 1955; Williams et al., 1969). Provided the significance of reading in nowadays educated and technological society, CWS might be hindered, in their speaking skills, and also in their academic and vocational achievements.

Differences between CWS and CWNS in the acquisition of reading abilities are relatively less noticed. Reading is a form of linguistic behavior which requires proficiency in comprehending and formulating an oral language. Children who do not attain a good knowledge of semantics, syntax and other skills which are necessary to the process of language formulation will encounter difficulties in learning to read.

An early version of the Stanford Achievement Tests was administered on 45 CWS and CWNS by McDowell (1928). The results revealed that there were no significant differences among the two groups on the reading sections, especially with regard to word meaning, sentence meaning and paragraph meaning, also other domains of the test including spelling and arithmetic revealed the same. Lesser mean values were also observed for the CWS group than the CWNS group on each domains of the test.

Schindler (1955) assessed the oral reading accuracy in 24 CWS, 2 to 5 grade CWS and silent reading comprehension in 9 to 12 grade CWS. The study involved administration of The Gray Oral Reading Test on the younger group, while the older group was assessed using the Advanced Form of the Iowa Silent Reading Tests. The findings indicated that the older group had better median scores than the younger group, CWS were delayed approximately one year in oral reading but the older CWS consistently scored better. This study also highlights that the Gray Oral Reading Test is a timed task in which lesser scores were procured by the slow reader when compared to the fast readers (Compton, 1980). Readers were also corrected for misarticulations, substitutions, omissions, additions, or repetitions of sounds or words based on previous studies (Salvia & Ysseldyke, 1981). Thus the authors speculate the results based on the fact, CWS frequently exhibit more disfluencies under time pressure (Van Riper, 1982).

Andrews and Harris (1964) evaluated 80 CWS and 80 CWNS, aged 9 through 11 years on their reading skills. The Word Recognition and Word Comprehension sections of the Schonell Reading Tests (Schonell, 1950) were administered for each participant. The accuracy in word comprehension which is required to enhance the child's ability to read a passage silently and to answer questions about its content and also reading single words aloud, were measured using Word recognition. The findings suggested that the CWS had slightly lesser reading scores than that of the CWNS group on the two tests. But, they did not find statistically significant difference.

Williams, Melrose, and Woods (1969) assessed reading comprehension in 6<sup>th</sup> grade CWS and CWNS using Iowa Tests of Basic Skills (ITBS). Skill development in both literal and inferential reading comprehension can be assessed using reading subtest

of ITBS where the participants are required to answer particular questions regarding the content of the paragraphs after reading those paragraphs. The results showed a significantly lower performance in CWS than CWNS in the reading. The range of scores was almost equal for both the groups, suggesting that all CWS do not exhibit delay in reading comprehension.

Cecconi, Hood, and Tucker (1977) reported that, as the difficulty of reading material increases, the frequency of dysfluencies and especially the stuttering like dysfluencies also increases. Blood and Hood (1978) confirmed these results for CWS from different grade levels. Using a standardized reading test, Conture and Naerssen (1977) found similar performance of CWS and CWNS.

The reading abilities of elementary school CWS and CWNS were compared by Janssen, Kraaimaat, and Meulen (1983). 44 CWS and CWNS were matched for their age and gender from 4 grade levels. The reading ability was assessed by means of 3 Dutch standardized tests yielding a total of 6 scores. During oral reading, the disfluency scores were also obtained for each participant. The findings suggested significant differences across the two groups on reading rate and reading errors, but statistically significant differences were not found on reading comprehension. The analysis of reading errors showed similar errors in reading among the subjects.

Previous studies have reported that CWS may be at higher risk for poor academic achievement when compared to CWNS (Conradi, 1912; Darley, 1955; McAllister, 1937; Root, 1926; Schindler, 1955; Williams, Melrose, & Woods, 1969). Andrews et al. (1983)

reported that CWS “lag some 6 months behind their peers educationally” which is in support with the above studies.

Comparison of reading ability in CWS and CWNS explored in the previous studies shows different findings and perspectives. Few studies have assessed oral reading abilities in CWS (Andrews & Harris, 1964; Conture & Naerssen, 1977; Janssen et al., 1983; Schindler, 1955). The findings suggested CWS have lower scores than the expected scores in oral reading (Janssen et al., 1983; Schindler, 1955). CWS also exhibit problems in learning to read (Blood & Seider, 1981; Daly, 1981). Evidence suggests that CWS having a history of deviant or delayed speech and language development are more susceptible to reading problems in their later age (Daly, 1981). These results therefore hold good to the notion that reading problems in CWNS often results from earlier language deficits (Aram & Nation, 1980; Catts, 1989; Kamhi & Catts, 1986; Maxwell & Wallach, 1984).

Thus, from the studies mentioned above, we can infer that most of the studies reported slow reading rate and more reading errors and poor reading comprehension in CWS, especially under time pressure. In contrast to these, few other authors reported that CWS performed similar to their typically developing peers.

#### ***2.4.5 Writing deficits and stuttering***

There are no studies done on the writing abilities or deficits and stuttering, the future research is required in this area. Hence, in the present study the writing abilities were considered to profile language abilities in CWS.

#### ***2.4.6 Bilingualism and stuttering***

An area related to stuttering in bilinguals did not gain much interest from the researchers. De Houwer (1998) estimated that around 50% of world's population includes bilinguals and 1% includes PWS. Seeman (1974) reported that high risk of stuttering is noticed in the early bilinguals.

Travis, Johnson and Shover (1937) did a survey on a total of 4,827 children, who were interviewed in their schools. The results revealed that the prevalence of stuttering was more (2.16%) in bilinguals than in monolinguals. Stern (1948) conducted a similar study wherein he included 1861 children and found a prevalence of stuttering in 1.66% but for children who were bilinguals before 6 years, the prevalence of stuttering was 2.16%.

Lebrun and Paradis (1944) observed that linguistic input provided to the bilingual children is the major contributing factor for the development of stuttering in bilinguals. Specifically they reported that input of linguistically combined utterances can provoke the developmental stuttering in bilingual children.

Kim, Relkin, Lee and Hirsch (1997) acquired functional magnetic resonance images (fMRI) of 6 early bilinguals and 6 late bilinguals during internally expressive linguistic tasks. It represented nearly 10 languages. All the participants had similar use of fluency and frequency of each language utilized during the time of experiment. They noted that, in the late bilinguals, the native language was separated from the second language spatially within the Broca's area whereas in case of early bilinguals, both the native and second language was represented in the common frontal cortical regions. The



areas activated in Wernicke's area by the native and second language overlapped in the two groups, in spite of the acquisition of second language.

Likewise, Dehaene et al (1997) explored the comprehension of language in late bilinguals by examining different cortical areas related with native and second languages. Eight fluent French and English bilinguals were used as participants who were assessed using fMRI to investigate cortical representation of language comprehension. However the evident reason for activation of distinct areas in brain for the native and second languages in late bilinguals is not clear.

Shenker, Conte, Gingras, Courcay, and Polomeno (1998) did a case study on French-English speaking child's mixed utterances, wherein they did not find an increase in stutter like disfluencies. It was noticed that word finding difficulties were substituted by code-mixed words, where interjections would have been utilized at initial stages. A functional relation among the moments of stuttering and code-mixing would support the language encoding difficulties in stuttering onset (Cabera& Bernstein Ratner, 2000). Redlinger and Park (1980) have also stated "code mixing in young bilinguals is a role of linguistic proficiency".

There are reported discrepancies in association among bilingualism and stuttering (Krniol, 1992). There is a divergence in the results of studies on bilingual CWS, regarding the prevalence of stuttering, its manifestation and treatment. The difference in results of the study implies that both CWS and bilinguals are heterogeneous population.

There is dearth of literature in profiling language abilities in CWS, especially in Kannada language. Hence the present study was planned to look into these aspects in CWS. This would serve as a quick reference to all the speech language pathologists working with CWS and would guide them for arriving at appropriate diagnosis and intervention program.

## CHAPTER III

### METHODOLOGY

Studies on the linguistic abilities of CWS have provided equivocal findings. Few investigations report of CWS exhibiting poorer linguistic abilities than their fluent peers and few others of identical abilities in the linguistic domains. For acquiring a better comprehension in this area, the present study was taken up with the purpose of developing a comprehensive language assessment protocol for CWS in Kannada language, field testing the assessment protocol on CWS and CWNS and to see if CWS differ from CWNS in various measures of language abilities.

#### 3.1 Participants

The current study considered 20 children who were diagnosed as having stuttering (CWS) by experienced speech and language pathologist and an age and gender matched group of 40 children with no stuttering (CWNS).

The following inclusion criteria were used for the selection of participants for the clinical group who were screened using WHO Ten test.

- i. Age range within 6-10 years
- ii. Kannada as the native language
- iii. No complaints of any peripheral sensory impairment (hearing or visual)
- iv. No problems in the general intellectual and motoric abilities
- v. No psychological and neurological deficits
- vi. diagnosed as having stuttering by a qualified speech and language pathologist

The participants were recruited from the Department of Clinical Services, AIISH, Mysuru, who were registered at the Institute with the complaint of stuttering and subsequently diagnosed as having stuttering.

The normal group (CWNS) had to satisfy the same inclusion criteria except that they did not exhibit any stuttering. These CWNS group of 40 participants was further divided into 4 groups, 10 participants (i.e., 5 girls and 5 boys) in each group based on their age range 6-7 years; 7-8 years; 8-9 years; 9-10 years and similarly, the CWS were also divided in 4 groups based on age range, each group included 5 subjects (i.e., 4 boys and 1 girl).

### **3.2 Tools and Materials**

The test materials included in this study were;

- 1) A checklist developed to obtain information regarding the demographic data, family, birth and developmental history, general intellectual and peripheral sensory abilities, onset, development, severity of stuttering, academic performance, attitudinal and behavioral aspects, native language, medium of instruction at school, and exposure to number of languages (See Appendix I).
- 2) WHO Ten test checklist was utilized to screen both CWNS and CWS for normal orofacial mechanism, hearing sensitivity, visual acuity, neurological and other sensory-motor deficits. The checklist consisted of 10 questions where the caregivers/participants had to answer yes or no. This test was used as an inclusion criteria for the study.

- 3) Stuttering severity instrument (SSI-3; Riley, 1994) was used to obtain stuttering severity values for all CWS. The total frequency of disfluencies and duration of the longest moment of stuttering were calculated. The physical concomitants were rated on 5 point scale. The overall score was computed by adding scores on all the 3 sections. Percentiles and severity equivalents were obtained as per the instructions in the manual.
- 4) The available standardized tools or parts of the test materials or protocols such as Linguistic Profile Test in Kannada and Reading Acquisition Profile in Kannada were considered for the assessment of syntax, semantics, morphophonology, reading and writing domains. The scores for various skills were compiled to make a Protocol.

**Linguistic Profile Test** (LPT; Karanth, 1980) assesses the participants' proficiency in phonology, syntactic and semantic features of Kannada language. There are three sections in the test including Phonology (assesses the phonemic discrimination and expression abilities); Syntax (provides information regarding the grammaticality judgment tasks); and semantics covering numerous semantic categories and relations. Normative data are available for children from grade 1 (6 years) through grade 9 (16 years). The total score for each domain is 100, and the overall score is 300.

In the present study only the syntax and semantics sections were considered. Syntactic section includes a) morphophonemic structures, b) plural forms, c) tenses, d) PNG markers, e) case markers, f) transitives, intransitives and causatives, g) sentence types, h) predicates, i) conjunctions, comparatives and

quotatives, j) conditional clauses, and k) participial constructions. Semantic section consisted of two subsections semantic discrimination and semantic expression. In semantic discrimination section the children were asked to point out to the named colors, furniture and body parts. In semantic expression again there are items on a) Naming, b) Lexical category, c) Synonymy, d) Antonymy, e) Homonymy, f) Polar questions, g) Semantic anomaly, h) Paradigmatic relations, i) Syntagmatic relation, j) Semantic contiguity, and k) Semantic similarity. The total score for each section is 100 and hence the total score is 200.

Test of morphophonology, reading and writing skills were taken from **Reading Acquisition profile** in Kannada (RAP-K; Prema, 1997). RAP-K consists of a battery of tests including existing language tests and adaptation of language based tests of reading and writing in Kannada.

The current study includes only Morphophonological tests, reading and writing sections. A Morphophonological test has a) Rhyme recognition, b) Syllable stripping c) syllable oddity (words), d) Syllable oddity (non words), e) Phoneme stripping, and f) Phoneme oddity. It had a total score of 72; each subsection under Morphophonological test had maximum score of 12. In reading and writing section it was further divided into Syllable inventory and words and non words. Syllable inventory included CV, CCV, and CCCV combinations, words and non words included CVCVCV for words and non words. The scores were 100 each for reading and writing.

5) **SPSS software** version 17 for data entry and statistical analysis

### **3.3 Procedure**

The children who registered at AIISH with the complaint of disfluent speech, satisfying the study criteria were recruited from the department of clinical services. Children fulfilling the age, gender and other selection criteria for the CWNS group were selected from the nearby schools. Before administering the protocol informed written consent was obtained from the caregivers/ parents of the children/participants. The study was carried out in two phases.

#### **Phase I**

In Phase I, checklists were prepared to collect information regarding the demographic data and other details from all participants including details of stuttering history from CWS. Based on the survey of literature and available tests and tools, a Protocol was developed along with the score sheets for the data collection purpose as per the study objectives. The Protocol was given to three expert SLPs for validation. After incorporating the suggested modifications, the tool was ready for administration. After modifications based on pilot study, instruction manual and scoring procedures for various subsections of the Protocol was prepared

#### **Phase II**

In Phase II, the developed tool was administered on all CWS and CWNS selected for the study. The data collection for the study was carried out in a quiet room with adequate light and ventilation. The children were seated on a chair comfortably and tested individually. Initially the parents were instructed to fill/ answer the checklist which was

developed to collect information from all participants. The WHO checklist was administered on all participants to screen for any other associated problems. Each child was initially administered the checklist to confirm that the child passes the inclusion criteria. After the child passes the criteria SSI-III was administered on all CWS and the severity of stuttering was assessed. For the elucidation of spontaneous speech samples, the child was instructed to narrate an event or stories and general conversation questions regarding hobbies and school were utilized to elicit spontaneous conversation samples. After the administration of syntax and semantics section 10 minutes break was provided for the child and then the morphophonological, reading and writing tests were administered.

### **Scoring**

The scoring procedure of the stuttering severity was similar as that suggested in the manual of SSI-3. The developed protocol for CWS included only few sections of LPT-K such as section II & III i.e., syntax and semantics respectively. The scores were 100 for each domain and hence the overall score was 200. A few sections of RAP-K such as Morphophonological tests (rhyme recognition, syllable stripping, syllable oddity for words and non words, phoneme stripping and phoneme oddity), reading (syllable inventory, word and nonwords reading) and writing (syllable inventory, word and nonwords writing) were also included in the protocol. The scoring is different for each section and as per the instructions provided in the respective test manuals.



### **Statistical Analysis:**

After accumulating data from 40 CWNS and 20 CWS, these two groups were further divided into four groups based on their age as mentioned earlier. The data obtained was tabulated and analyzed using the SPSS software 17.0 version. Descriptive statistics, non-parametric tests were used to arrive at various statistical values and test-retest reliability was also assessed. Descriptive statistics was carried out for the various tasks to obtain the mean, median and standard deviation (SD).

**Normality:** Shapiro-Wilk test for normality was administered to see whether the data follows normal distribution. The data did not follow normal distribution hence, non parametric test was carried out.

Non parametric tests such as

- Mann-Whitney test was employed to find the significant difference if any, across the groups.
- Kruskal Wallis test was done to see significant difference between the ages, within the group, if there is a significant difference; further,
- Mann Whittney U test was administered to see pair wise age significant difference.

Cronbach's alpha test was obtained for determining the test-retest reliability.

The details of the statistical analysis results are discussed in the next chapter.

## CHAPTER IV

### RESULTS AND DISCUSSION

The present study was designed to investigate, the language abilities of CWNS and CWS and also to see whether there is any significant difference between the two groups.

The CWNS and CWS were divided into four groups based on their age i.e., 6-7 years, 7-8 years, 8-9 years, 9-10 years. The gender and the age are given below for these groups in table 4.1.

**Table 4.1**

*Number and gender of CWNS and CWS in four age groups*

Age groups (years)	CWNS		CWS		Total
	Male	Female	Male	Female	
6-7 years	5	5	4	1	15
7-8 years	5	5	4	1	15
8-9 years	5	5	4	1	15
9-10 years	5	5	4	1	15
Total	20	20	16	4	60

A checklist was administered on CWS for extracting information regarding their family, developmental, birth history and about their academic performances. According to the data obtained in CWS group, out of twenty CWS, sixteen children were male and four were female. Two children had family history of stuttering and none of them had history of delayed speech and language development, abnormal structural and functional oral mechanism and academic difficulties and all the children had English as their medium of instruction except one child. Table 4.2 summarizes the data obtained from the checklist for CWS.

**Table 4.2**

*Summary of the data obtained from the checklist for CWS.*

Particulars	Age range (years) in CWS				Total
	6-7 yrs	7-8 yrs	8-9 yrs	9-10 yrs	
Response from the checklist					
Number of subjects (N)	5	5	5	5	20
Positive family history of stuttering	0	0	0	2	2
Delayed speech and language development	0	0	0	0	0
Kannada as a medium of instruction	0	0	0	1	1
Below average academic performance	0	0	0	0	0
Exposure to more than 2 languages	0	5	5	4	14
Abnormal articulation	2	1	0	0	3

Discussion of the results for various language parameters are presented in the sequence given below.

4.3 Syntactic skills

4.4 Semantic skills

4.5 Morphophonological skills

4.6 Reading skills

4.7 Writing skills

4.9 Overall Language skills

4.10 Reliability

### 4.3 Syntactic skills

In the syntactic skill, based on the linguistic Profile Test (LPT), morphophonemic structures, plural forms, tenses, PNG markers, case markers, transitive, intransitives and causatives, sentence types, predicates, conjunctions, comparatives, quotatives, conditional clauses, and participial constructions were assessed. The results of the study are mentioned in the table 4.3.

**Table 4.3**

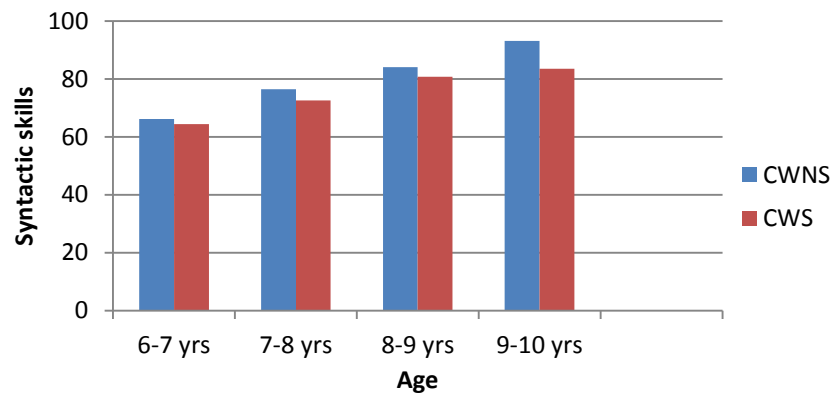
*Mean, median, SD and significance on Syntax task for CWNS and CWS groups*

Age Range	CWNS			CWS			/Z/	p
	Mean	S.D	Median	Mean	S.D	Median		
6-7 years	66.20	1.874	67.00	64.40	2.702	64.00	1.310	.190
7-8 years	76.50	2.173	77.00	72.60	2.510	72.00	2.469	.014*
8-9 years	84.10	1.370	84.50	80.80	1.304	81.00	2.871	.004*
9-10 years	93.20	2.098	92.00	83.60	1.342	83.00	3.109	.002*

Note: \*p < 0.05

Table 4.3 provides the mean and median, standard deviation (SD), /Z/ and p values for scores on Syntax section of CWNS and CWS. The mean scores show differences between CWNS and CWS, where the mean scores of CWNS were better than the CWS in all four age groups. Mann Whitney U test was administered to see the significant difference between the two groups and the result revealed significant

difference, (\* $p < 0.05$ ) between CWNS and CWS in all the age groups except in 6-7 years age, where CWS performed similar to CWNS.



*Figure 4.1.* Mean scores of CWNS and CWS on syntactic skills

These observations of CWS exhibiting lower scores than their fluent peers on syntactic abilities are in agreement with the previous study done by Wall (1980) where the author compared the syntactic structure of the spontaneous speech between the CWNS and CWS groups and found differences in the number of complete clauses, the number of complex sentences, and in clauses types across the groups. He suggested that the CWS use simple and less mature language than the typically developing children. Many authors (e.g., Bernstein Ratner & Sih, 1987; Buhr & Zebrowski, 2009; Gaines, Runyan, & Myers, 1991; Logan & Conture, 1997; Richels, Buhr, Conture, & Ntourou, 2010; Sawyer, Chon, & Ambrose, 2008) found that as the length and syntactic complexity of the sentence increased the stuttering dysfluencies also increased and most of them reported that the CWS use syntactically less complex sentences when compared to their fluent peers.

It is generally reported in literature that more than 30-40% of CWS perform poorer than that of CWNS in their language skills which is more predominant in the

younger age groups and older children are supposed to catch up their language skills with development. However, it is surprising that in the present study older children have shown more differences and no significant difference in the lowest age of 6-7 years considered for the study. This could be because of the limited number of children considered for the study and individual differences.

#### 4.4 Semantic skills

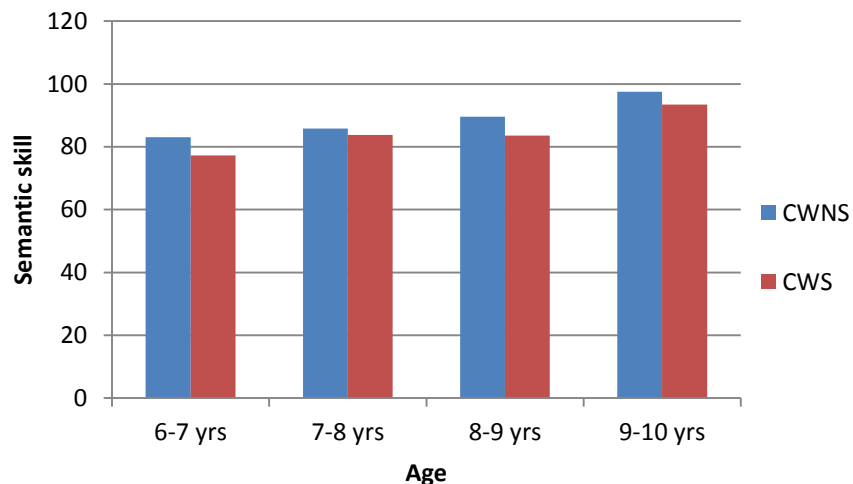
CWNS and CWS were examined for their semantic skill performance. The section consisted of two subsections including semantic discrimination and semantic expression, the semantic discrimination section included identification of colours, furniture, body parts, and semantic expression consisted of naming, lexical category, synonymy, antonymy, homonymy, polar questions, semantic anomaly, paradigmatic relation, syntagmatic relation, semantic contiguity, and semantic similarity. The table 4.2 below gives the mean, median, SD and significance values for semantic skills across the age groups of CWS and CWNS.

**Table 4.4**

*Mean, median, SD and significance on Semantic task for CWNS and CWS groups.*

Age Range	CWNS			CWS			/Z/	P
	Mean	S.D	Median	Mean	S.D	Median		
6-7 years	83.00	1.563	83.00	77.20	2.775	78.00	3.081	.002*
7-8 years	85.80	1.033	86.00	83.80	4.207	82.00	1.799	.072
8-9 years	89.60	1.174	89.00	83.60	1.140	84.00	3.124	.002*
9-10 years	97.50	1.509	97.50	93.40	.894	94.00	2.945	.003*

The mean scores on the semantic section were better in CWNS when compared to CWS across the age groups. Mann Whitney U test was administered to see the significant difference between the two groups, the results revealed significant differences in all the age groups, except in 7-8 years, where CWS performed on par with that of CWNS. This finding of the study is supported by survey conducted by Blood et al. (2003) where they reported that out of 2,628 CWS undergoing treatment for stuttering, 672 (26%) had deficits in the semantic development.



*Figure 4.2.* Mean scores of CWNS and CWS on semantics skills.

The results of the current study also support that of Dunn and Dunn (1997) who compared the Peabody picture vocabulary test (PPVT) scores of CWS and CWNS. They also found that the scores of CWNS were better than CWS and that the CWS had poor receptive vocabulary. Again, as in the syntax section, only one age group (7-8 years) did not show significance which could be due to the group variability, However, it is

surprising that even the older age group CWS, as late as 9-10 years, still show differences in some aspects of language measures.

#### 4.5 Morphophonological Skill

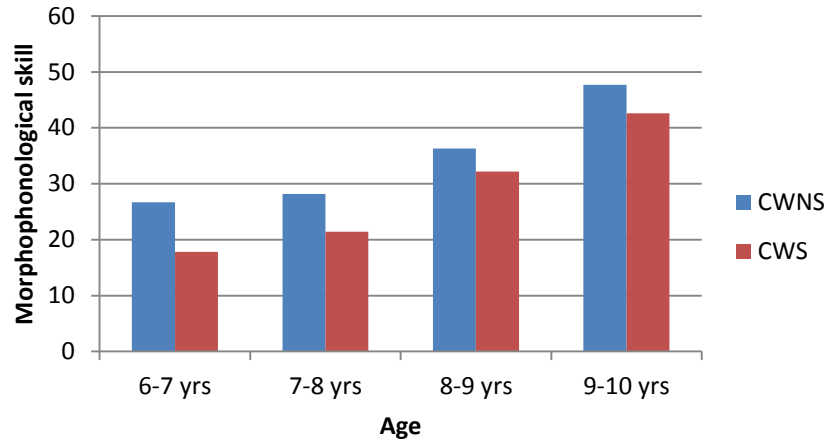
Under the morphophonological skills, rhyme recognition, syllable stripping, syllable oddity (words), syllable oddity (non words), phoneme stripping, and phoneme oddity were assessed using Reading Acquisition Profile- Kannada test. The results are provided in table 4.5 with respect to mean, median, SD and significance based on Mann Whitney U test.

**Table 4.5**

*Mean, median, SD and significance on Morphophonological skills for CWNS and CWS groups.*

Age Range	CWNS			CWS			Z	P
	Mean	S.D	Median	Mean	S.D	Median		
6-7 years	26.70	2.669	27.00	17.80	1.643	17.00	3.081	.002*
7-8 years	28.20	1.814	28.00	21.40	1.673	21.00	3.081	.002*
8-9 years	36.30	1.947	36.00	32.20	1.643	32.00	2.783	.005*
9-10 years	47.70	.949	48.00	42.60	1.140	43.00	3.107	.002*





*Figure 4.3.* Mean scores of CWNS and CWS on Morphophonological skills.

Table 4.5 and figure 4.3 represents performance of CWNS and CWS on Morphophonological tasks. As seen there is a statistically significant difference between the CWNS and CWS on Morphophonological skills in all the age groups. In all the age groups CWS performed poorer than CWNS. There are many studies which support this finding. The study done by Yashaswini and Geetha (2010) found that the CWS performed poorer on all the meta-phonological skills except for rhyme recognition and phoneme oddity when compared to CWNS. Pelczarski and Yaruss (2014) who compared the phonological encoding abilities of CWS and CWNS found that the CWS performed significantly poorly on task of elision and blending. In the study conducted by Hakim and Ratner (2012) results revealed that CWS showed more phonological errors than their age and gender matched peers. The authors concluded that CWS have strong linguistic differences in some facet of phonological encoding which shows inconsistent language planning in CWS.

## 4.6 Reading Skill

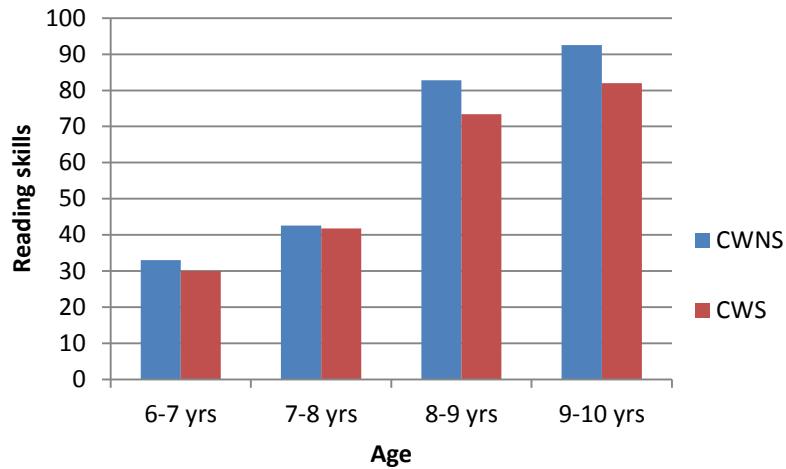
Reading skill assessment considered from Reading acquisition profile-Kannada the test material is comprised of syllable inventory and words and non words reading. The syllable inventory had CV, CCV and CCCV combinations, words and non words had CVCVCV words and non words.

**Table 4.6**

*Mean, median, SD and significance on Reading skills for CWNS and CWS.*

Age Range	CWNS			CWS			/Z/	P
	Mean	S.D	Median	Mean	S.D	Median		
6-7 years	33.00	1.414	33.00	30.00	2.000	29.00	2.383	.017*
7-8 years	42.60	1.350	43.00	41.80	1.643	41.00	.954	.340
8-9 years	82.80	1.814	83.00	73.40	1.140	73.00	3.081	.002*
9-10 years	92.50	1.841	93.00	82.00	2.236	82.00	3.101	.002*

Table 4.6 and figure 4.5 represent the result of reading skills assessment in CWNS and CWS. The results show less mean scores for CWS when compared to CWNS indicating poorer reading abilities in CWS compared to the age matched CWNS. The significant difference based on the Mann Whitney U test was noticed in all the age groups except for 7-8 years age, where CWS performed similar to CWNS in reading tasks.



*Figure 4.4.* Mean scores of CWNS and CWS on Reading skills.

This present finding is in consonance with the study done by Blood and Seider (1981) and Daly, (1981) who have shown that some CWS also exhibit problems in learning to read. Andrews et al. (1983) reported that CWS lag 6 months behind their peers educationally.

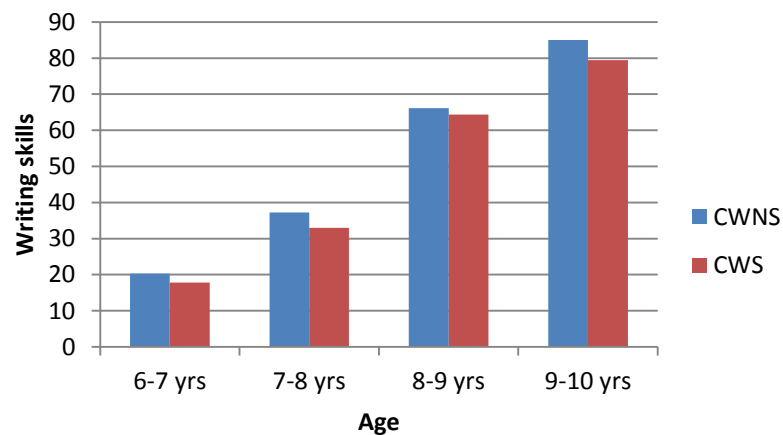
#### **4.7 Writing skill**

Writing skills assessed were divided into syllable inventory and words and non words. Syllable inventory included CV, CCV, and CCCV combinations and words and non words include CVCVCV combination for both words and non words. Table 4.7 provides the mean, median, SD and significance on Writing skills for CWNS and CWS groups.

**Table 4.7**

*Mean, median, SD and significance on Writing skills for CWNS and CWS.*

Age Range	CWNS			CWS			Z	P
	Mean	S.D	Median	Mean	S.D	Median		
6-7 years	20.30	1.636	21.00	17.80	1.924	17.00	2.307	.021*
7-8 years	37.20	2.530	37.00	33.00	2.449	33.00	2.460	.014*
8-9 years	66.10	1.792	66.50	64.40	1.673	64.00	1.687	.092
9-10 years	85.00	1.333	85.00	79.40	1.140	79.00	3.090	.002*



*Figure 4.5. Mean scores of CWNS and CWS on writing skills.*

The performance of CWNS and CWS on writing skills is represented in table 4.5. The mean scores show difference between CWNS and CWS, where the CWNS mean scores are better than the CWS in all the four age groups. Also, the results showed a typical developmental trend with scores steeply increasing with age in both groups,

unlike for other language skills. The statistically significant difference between CWNS and CWS are found in all the age groups except in 8-9 years age, where CWS performed similar to CWNS.

There are no other studies on writing abilities of CWS for comparison with the present study results. Hence the supporting studies could not be quoted for the above obtained results.

#### 4.8 Overall Language skills

The overall group difference considering all the language parameters was obtained by administering Mann Whitney test. It was administered to investigate the difference between CWNS and CWS for different skills or variables, irrespective of age. The significant difference is noticed only in Semantic and morphophonological skills. These results are presented in table 4.8.

**Table 4.8**

*Significance of CWNS and CWS on different skills, irrespective of age*

Language skills	/Z/	p
Syntactic skill	1.720	.085
Semantic skill	2.703	.007*
Morphophonological skill	2.291	.022*
Reading skill	1.680	.093
Writing skill	1.208	.227

These results indicate that there are marked developmental trends observed in the language abilities of both CWNS and CWS in the sample considered. To confirm this observation, further statistical analysis was undertaken.

Kruskal Wallis test was administered on the CWNS and CWS group to see whether there are significant differences in the performance across the age groups. The results on this measure indicated statistically significant difference in both CWNS and CWS groups across the four age groups. Thus the age effect on the two groups is statistically significant. These results are summarized in table 4.9.

**Table 4.9**

*Results of Kruskal Wallis test on overall language skills in CWS and CWNS*

Language skills	CWNS			CWS		
	Chi-Square	df	Asymp. Sig.	Chi-Square	df	Asymp. Sig.
Syntactic	36.723	3	.000*	17.689	3	.001*
Semantic	35.858	3	.000*	16.377	3	.001*
Morphophonological	33.426	3	.000*	17.689	3	.001*
Reading	36.744	3	.000*	17.898	3	.000*
Writing	36.689	3	.000*	17.925	3	.000*

#### **4.10 Reliability:**

Testing was repeated on 10% of participants from both the groups. The test-retest reliability was done using the Cronbach's alpha co-efficient of reliability test. The reliability was found to be 0.97 to 0.99 for all measures. This suggested good test-retest reliability.

Thus to conclude, the results of the present study indicated that CWS performed poorly when compared to the age matched CWNS on all the language skills and sub skills. The statistical significance was found for almost all the language measures except for in one of the age groups under each. However, the combined language measure showed significance only in semantics and morphophonological skills. The developmental trend was significant across the ages. The language abilities of 9-10 years children were better than the younger age groups. The findings should be considered carefully as the subjects considered for the current study is limited.

## CHAPTER V

### SUMMARY AND CONCLUSION

Stuttering is considered has one of the most common fluency disorders, which is difficult to define, explain and to treat. Since many years the role of language has been considered as an important factor in many theories and research pertaining to stuttering (Ratner, 1997). The major focus of the investigations was to find whether the individual who stutter score poorer on different tests of linguistic skill when compared to their age and gender matched controls. But, on the other hand there are no clear explanations regarding this point (Nippold, 1990; Ratner, 1997). Stuttering is also well known as a multidimensional problem, assessment of stuttering usually involves the overt behaviors such as frequency, duration and severity of stuttering. Although not every CWS exhibit other associated speech and language problems, literature suggests such deficits in more than one third of the population. Thus, considering the complex nature of language and linguistic determinants of stuttering, a comprehensive assessment procedure was established to obtain detailed information focusing towards assessing multiple aspects of the problem.

There is dearth of resource for the comprehensive assessment of CWS in different languages and that to among Kannada speaking children. There is no comprehensive protocol for profiling individuals with stuttering, more so in case of CWS to assess linguistic nature of stuttering. Although it is reported by many authors that there are many concomitant disorders associated with stuttering, there are very few attempts to develop a comprehensive protocol for the profiling of stuttering. The detailed assessment



can provide a profile of skills and deficits of the child which otherwise ignored. This provides direction towards the comprehensive management of CWS. Hence, in an attempt to throw light on the possible factors influencing the CWS to persist in stuttering during their school age the present study was designed.

The first aim of the study was to develop a comprehensive language assessment protocol for 6-10 year old CWS in Kannada language, second aim was to field test the assessment protocol on 6-10 year old CWS and CWNS as there are no standardized tools covering various aspects of language measure and the third aim of the study was to see if CWS differ from CWNS in various measures of language abilities. With these objectives, the checklists were developed to collect information regarding the demographic data and other details from all participants including details of stuttering history from CWS. Based on the survey of literature and available tests and tools, a Protocol was developed. The protocol was administered on both CWNS and CWS groups consisting of 40 CWNS (5 male and 5 female children in each of the four age groups selected i.e., 6-7 years, 7-8 years, 8-9 years, and 9-10 years). In order to obtain a clear picture regarding the developmental trend of language skills in CWNS and CWS the 6-10 age range was further divided into four groups, with age interval of 1 year as above. The scores obtained on different language measures such as syntax, semantic, morphophonological, reading and writing skills by both groups were subjected to descriptive statistical analysis and Mann whitney test, in order to see the significant difference between CWNS and CWS.

The findings of the study are;

- The overall significant difference was noticed only on semantic and morphophonological skills across CWNS and CWS groups, irrespective of age.
- With respect to age, in syntactic skills significant difference was noticed in all the age groups except in 6-7 years. In semantic and reading skills the CWS performed poorer than CWNS except in 7-8 years. The CWS scored significantly lesser than CWNS on morphophonological tasks. In writing skills the significant difference was noticed in all the age groups except in 8-9 years.
- The clear developmental trend of language abilities was obtained by administering Kruskal Wallis test, where significant difference was found across all the ages. The older groups performed better than the younger group.
- The test and retest reliability was obtained using Cronbach's alpha co-efficient reliability test, which suggested good reliability.

**Limitations of the study:**

- Due to time constraints the number of participants in each group had to be restricted
- The participants could not be included under various subgroups as gender, severity of stuttering, etc due to small number, which are important variables for these measures.
- Age range for the study had to be restricted due constraints of availability of time, tools and participants for the study.

**Implications of the study:**

It would be the first comprehensive Protocol to be developed for the assessment of stuttering in CWS in Kannada language. The Protocol would enable to get systematic information on linguistic nature of stuttering which would in turn facilitate planning individualized management protocols in young CWS along with the required documentation for future research purposes.

**Suggestions for future direction of research:**

- In future research larger number of participants can be considered for arriving at better results and conclusions.
- The various language skills can be studied under different subgroups of CWS, with respect to gender, severity of stuttering, genetic factors, etc.
- Language comprehension skills could be considered across domains
- More younger and older age groups could be considered to see if there is developmental trend in language deficits seen in children and adults

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# Appendix I

## Checklist

DOR:

Case Name:

Case number:

Age/gender:

Date of birth:

Education:

Contact Address/ mobile number/E-mail Id:

1. Annual income of the family:
  - a) Slab I
  - b) Slab II
  - c) Slab III
2. Number of languages uses (specify the language):
  - a) one;
  - b) Two;
  - c) > Two;
3. Handedness: a) R-Right; b) L-Left; c) Ambidextrous;
4. Change in handedness (if yes, specify): a) No b) Yes
5. Family history ( specify relation if any): a) Not available b) NA; c) +ve; d) -ve;
6. Family Pedigree if available (Draw and specify):
  
7. Type of Fluency disorder:
  - a) NNF;
  - b) Stuttering;
  - c) Fast rate of speech;
  - d) Cluttering;
  - e) Cluttering-Stuttering;
8. Severity of the disorder:
  - a) Very mild
  - b) mild
  - c) Moderate
  - d) Severe
  - f) Very Severe
9. Age of Onset of disorder:
10. Nature of onset (if sudden specify the reason): a) Gradual; b) Sudden (specify);
11. Chronicity ( duration of the problem): a) Not known; b) Acute (<1 month since onset) c) 1-3 months; d) 3-6 months; e) 6-12 months; f) >12 months
12. Awareness of the problem: a) Not aware; b) Aware

13. Concern of the parent/care giver about the problem:  
 a) Not Concerned;    b) somewhat concerned;    c) Highly concerned
14. Variability of the disorder:  
 i) Person    a) No;    b) somewhat Variable;    c) Highly variable  
 ii) Situations    a) No;    b) somewhat Variable;    c) Highly variable  
 iii) Languages    a) No;    b) somewhat Variable;    c) Highly variable
15. Rate of speech: a) Very Slow    b) Slow    c) Average    d) Fast    e) Very fast
16. Type of Dysfluencies:  
 SLDs:    a) Repetition    b) Prolongation    c) Block  
 NDs:    a) Pauses    b) Interjections    c) Broken words
17. Position of disfluency: a) Initial;    b) Intermediate;    c) Final;    d) No position effect
18. Secondaries:    a) Absent    b) Present (specify)
19. Avoidance behaviour: a) Absent    b) Present (specify)
20. Breathing pattern:    a) NA    b) clavicular    c) thoracic    d) paradoxical  
 e) Diaphragmatic
21. Associated problem if any  
 a) Voice;    b) Fluency;    c) Articulation;  
 d) Language;    e) Learning Disability;    f) MR;  
 g) Hearing Impairment;    h) Others (specify)
28. Whether therapy attended:    a) Yes;    b) No
30. Any other kinds of treatment tried for stuttering: a) No;    b) Yes  
 If yes, specify
31. Academic performance at school: a) Below Average b) Average c) Above average
33. SSI Scores:

## Appendix II A

### Score sheets

Syntax and Semantics sections were considered from **Linguistic Profile Test** in kannada (LPT; Karanth, 1980).

Section	Possible Total Score	Subject's Response					Total score
		Stimulus		Response			
		Verbal	Graphic	Verbal	Graphic	Gestural	
<b>SECTION II (Syntax)</b>							
A. Morphophonemic Structures	10						
B. Plural Forms	5						
C. Tenses	5						
D. PNG Markers	10						
E. Case Markers	10						
F. Transitives, Intransitives & Causatives	10						
G. Sentence Types	10						
H. Predicates	10						
I. Conjunctions, Comparitives & Quotatives	10						
J. Conditional Clauses	10						
K. Participal Constructions	10						
<b>SECTION III (Semantics)</b>							
<b>A. Semantic Discrimination</b>							
1.Colours	5						
2.Furnitures	5						
3.Body parts	5						
<b>B. Semantic Expression</b>							
1.Naming	20						
2.Lexical Category	15						
3.Synonymy	5						
4.Antonymy	5						
5. Homonymy	5						
6. Polar Questions	10						
7. Semantic Anomaly	5						
8. Paradigmatic Relations	5						
9.Syntagmatic Relation	5						
10.Semantic Contiguity	5						
11.Semantic Similarity	5						
<b>Grand Total</b>	<b>200</b>						

## II B

Test of Morphophonology, Reading and Writing skills considered from **Reading Acquisition profile** in Kannada (RAP-K; Prema, 1997).

Section	Sub Sections	Maximum Score	Patient's Score	Grade
II	Metaphonological Tests			
	1) Rhyme Recognition	12		
	2) Syllable Stripping	12		
	3) Syllable oddity (words)	12		
	4) Syllable Oddity (Non words)	12		
	5) Phoneme Stripping	12		
	6) Phoneme Oddity	12		
	<b>Total</b>	<b>72</b>		
III	Reading and Writing			
	A) Reading			
	1. Syllable Inventory			
	CV	40		
	CCV	10		
	CCCV	10		
	2. Words and Non Words			
	i)CVCVCV words	20		
	Non- words	20		
	<b>Total</b>	<b>100</b>		
	B) Writing			
	1. Syllable Inventory			
	CV	40		
	CCV	10		
CCCV	10			
2. Words and Non Words				
i) CVCVCV words	20			
Non- words	20			
<b>Total</b>	<b>100</b>			