SENTENCE COMPREHENSION IN CHILDREN WITH LEARNING DISABILITIES

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CERTIFICATE

This is to certify that the dissertation entitled "***Sentence comprehension in Children with Learning Disabilities***" is a bonafide work submitted in part fulfilment for the degree of ***Master of Science (Speech-Language Pathology)*** of the student Registration No. 10SLP003. This has been carried out under the guidance of a faculty of the institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

Mysore,
May, 2012

Dr. S. R. Savithri
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CERTIFICATE

This is to certify that the dissertation entitled "***Sentence comprehension in Children with Learning Disabilities***" has been prepared under my supervision and guidance. It is also certified that it has not been submitted earlier to any other university for the award of any Diploma or Degree.

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Mysore,
May, 2012

DECLARATION

This dissertation entitled "***Sentence Comprehension in Children with Learning Disabilities***" is the result of my own study and has not been submitted earlier to any other university for the award of any Diploma or Degree.

Mysore,
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Register No. 10SLP003

CHAPTER I

INTRODUCTION

According to the National Joint Committee on Learning Disabilities (1997) "Learning disabilities is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical skills. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span. Problems in self-regulatory behaviours , social perception, and social interaction may exist with learning disabilities but do not, by themselves, constitute a learning disability" (cited in Paul, 2001).

Evidence of an association between learning disabilities (LD) and language impairments comes from investigations of language abilities of poor readers. This work has shown that children with reading disabilities often have deficiencies in vocabulary, morphology, and syntax (Scarborough, 1990). Catts, Fey, Zhang and Tomblin (1999) investigated the kindergarten language abilities of 183 children who performed at least one standard deviation (SD) below the mean on a composite measure of reading comprehension in second grade. In comparison to age matched peers, the poor readers had significantly lower scores on kindergarten measures of vocabulary, grammar, and narration. More than half of the poor readers (59%) had a language composite score in kindergarten that was at least one standard deviation (SD) below the mean of the

normative sample. These findings show that poor readers may have more widespread deficiencies in basic language abilities.

It is well known that deficits in phonological processing impair the ability to map phonemes with their corresponding graphemes in children with dyslexia. Although dyslexia is by definition a reading disorder, there is a strong consensus that spoken language deficits also play a role in reading failure (Robertson & Joanisse, 2010). It is now well accepted that reading consists of two components, decoding and comprehension (Aaron, Joshi & Williams, 1999). Decoding is the word recognition process that transforms print to words, whereas comprehension assigns meaning to words, sentences and texts. It is also now widely accepted that reading is a language- based skill (Catts & Kamhi, 1999). Word recognition relies heavily on phonological and lexical knowledge, whereas comprehension of larger discourse units requires syntactic, morphologic, semantic and discourse knowledge.

On these lines, yet another term to be familiar with is Language learning disability (LLD). Paul (2001) reported that children with LLD may experience difficulty comprehending complex syntax particularly those with relative clauses, passive voice, or negation. He opines that whereas normally developing children move to full comprehension of complex syntax by age 7 to 8 years, children with LLD continue to rely on comprehension strategies for passive sentences and those with relative and adverbial clauses. According to him children with LLD have a tendency to produce "simple" or "immature" sentences with fewer complex sentences, using fewer multiple modifiers, prepositional phrases, relative clauses, and verb phrases. They may experience difficulty with morphological markers including plurals, possessives and third-person

singular, comparatives and superlatives, irregular forms, and advanced prefixes and suffixes.

Spoken sentence comprehension in children with learning disabilities

Spoken sentence comprehension involves storing and processing verbal material. Verbal information tends to be temporarily stored in a phonological code (phonological short-term memory [STM]) to enable further processing in WM i.e., verbal WM (Just & Carpenter, 1992). If verbal material is not stored adequately, the task of syntactic processing may be all the more difficult.

An accumulating body of evidence indicates that poor readers do not comprehend sentences as well as good readers do (Mann, Cowin & Schoenheimer, 1989). It has been shown that good and poor readers differ in the ability both to repeat and to comprehend spoken sentences that contain relative clauses (Mann, Shankweiler & Smith, 1985). Some investigators attribute this to deficient syntactic abilities in children with learning disabilities while some opine that the comprehension problems were mainly due to their short term memory deficits. Rispens and Been (2007) examined sentence comprehension in children with dyslexia and found that children with dyslexia were poorer than control children. Botting, Simkin, and Conti-Ramsden (2006) found that in a group of 11-year-old poor readers, the strongest predictor of word recognition and reading comprehension was sentence comprehension at age 7 years.

In a study done by Sabisch, Hahne, Glass, von Suchodoletz and Friederici in 2006, event-related brain potentials (ERPs) were used to compare auditory sentence

comprehension in 16 children with developmental dyslexia (age 9–12 years) and unimpaired controls matched on age, sex, and nonverbal intelligence. Passive sentences were presented, which were either correct or contained a syntactic violation (phrase structure) or a semantic violation (selectional restriction). In an overall sentence correctness judgment task, both control and dyslexic children performed well. In the ERPs, control children and dyslexic children demonstrated a similar N400 component for the semantic violation. For the syntactic violation, it was found that the children with dyslexia showed a different pattern characterized by delayed negativity compared to control children.

Need for the study

Although there is much evidence in support of the strong relationship between phonological deficits and reading failure in children with dyslexia, less attention has been devoted to whether these children also have language deficits at the level of syntax. Clinical experience has led Speech-Language Pathologists to opine that children with learning disabilities often have a history of delay/deviance in spoken language acquisition at the level of syntax comprehension leading to impaired syntactic expression. The language difficulties of such children being subtle go unnoticed or unassessed by professionals who focus only on their academic skills. Therefore, the present study is an attempt to investigate the sentence comprehension in children with learning disability.

Aim of the study

The primary aim of the present study is to investigate sentence comprehension in children with learning disability.

Objectives of the study

- To examine the speed and accuracy of sentence comprehension in children with learning disabilities (LD) using grammaticality judgement tasks.
- To compare the performance of children with learning disabilities (LD) with typically developing children on sentence comprehension.

CHAPTER II

REVIEW OF LITERATURE

Learning disability (LD) is difficult to define because it is not an observable construct (Fletcher, Lyon, Fuchs & Barnes, 2007).

2.1 Classification of LD

Learning disabilities represent a diagnosable neurological condition, and the manifestations of the characteristics of LD will vary across individuals. The most prevalent type of learning disability is dyslexia (National Center for Learning Disabilities, 2009). Frequently occurring learning disabilities include:

- Dyslexia: a reading disorder, which includes difficulty with decoding (sounding out words), word recognition, reading fluency (automaticity or speed of reading), and reading comprehension (National Institute of Neurological Disorders and Stroke, NINDS, 2010);
- Dyscalculia: a math disorder, which involves challenges in computation/calculation, problem solving, and application (National Center for Learning Disabilities, 2007);
- Dysgraphia: a written language disorder, which includes difficulty with receptive and expressive language, writing mechanics (grammar, punctuation), and spelling (NINDS, 2009);
- Auditory and Visual Processing Disorders: specific disorders in which a person with normal hearing and vision has difficulty understanding and using verbal or written language (National Center for Learning Disabilities, 2009); and

- Non-verbal LD: specific disorders that cause problems with visual-spatial, intuitive, organizational, evaluative, and holistic processing functions (National Center for Learning Disabilities, 2009).

2.2 Studies of normal grammatical development

Theakston (2004) investigated what leads children to stop producing verb argument overgeneralization errors such as "*Don't giggle me"* to reach an adult grammar. Their aim was to assess the role of entrenchment in constraining or preventing verb argument structure overgeneralization errors. They used a grammaticality judgment task and the participants were 5 year old, 8 year old children and adults. The participants were offered examples of verb argument structure errors including high and low frequency verbs which were matched for semantic class. The participants were asked to indicate whether the sentences were grammatical and the extent to which they were grammatical. The investigators found that among all age groups including adults, sentences containing low frequency verbs were judged to be more grammatical compared to sentences containing high frequency verbs. Thus the authors conclude that verb frequency plays an important role in constraining or preventing verb argument structure overgeneralization errors.

Brooks and Tomasello (1999) taught children two novel verbs. One verb had a meaning that was consistent with a verb class that can be used both transitively and intransitively, whereas the second verb had a meaning consistent with a verb class that had fixed transitivity. The investigators found that at 2 years of age, children did not pay much attention to the meaning of the verbs and produced a large number of errors on

verbs with fixed transitivity than bitransitive verbs. Results also showed that from 4.5 years of age, the children tended to make fewer errors of the verbs from a fixed transitivity class, but extended use of the verb from a bitransitivity class to constructions not modeled in the input i.e made overgeneralization errors. However, 2-year-olds did not observe the semantic constraints and in fact produced a larger number of transitivity violations with fixed transitivity verbs than with bitransitive verbs. These findings suggest that narrowly defined semantic classes may help children to constrain their argument structure productions from around 4.5 years of age (Brooks&Zizak, 2002), but that at earlier stages of development children may use alternative mechanisms to constrain productivity.

Prema (1979) attempted to investigate syntactic abilities of 5-6 year old children. Four children in the aforementioned age range with Kannada as their mother tongue were chosen for the study. Speech samples from these children were collected for three days using spontaneous speech and story narration task. The findings of the study are summarised as follows:

- Children had not yet acquired comprehension of negative suffixes but when the same meaning is implied in a simplified manner the children would comprehend them.
- Transformational rules to derive negative sentences were still in the process of acquisition.
- /-u/ was used as verb phrase conjunction.
- /-adare/ as conjunction was not used by these children.

- The children made mistakes in gender and number markers indicating their instability in this age group
- Causative suffixes were not used appropriately by these children. Sometimes causative suffixes were used to refer to object noun phrase by these children leading to an ungrammatical sentence.

2.3 Relationship between language abilities and Learning Disability (LD)

Evidence of an association between learning disabilities and language impairments comes from investigations of language abilities of poor readers. This work has shown that children with reading disabilities often have deficiencies in vocabulary, morphology, and syntax (Scarborough, 1990). Catts, Fey, Zhang and Tomblin (1999) investigated the kindergarten language abilities of 183 children who performed at least one standard deviation (SD) below the mean on a composite measure of reading comprehension in second grade. In comparison to age matched peers, the poor readers had significantly lower scores on kindergarten measures of vocabulary, grammar, and narration. More than half of the poor readers (59%) had a language composite score in kindergarten that was at least one SD below the mean of the normative sample. These findings show that poor readers may have more widespread deficiencies in basic language abilities.

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Saxton, Dockrell, Bevan and Herwegen (2007) examined grammatical judgment abilities in children with and without language delay. The task was presented through a computer and they measured accuracy of judgments and reaction time in both the groups. The grammatical classes selected were copula, articles and auxiliaries which were found

to be deficient in children with language delay. 26 children (8 girls, age range: 3; 8 to 6; 0) with language delay and 116 typically developing children (62 girls, age range 3; 1 to 7; 9) were chosen for the study. The children with language delay were those who were diagnosed as having Specific Language Impairment. These children underwent intervention focusing on the three grammatical lasses chosen for the study. The therapeutic sessions for each child lasted for about 20 minutes daily for each child over a period of 6 weeks. Performance of children with language delay was measured at 4 points in time: pre- intervention, mid-intervention, immediately post intervention, 6 months post intervention. The authors found significant difference between the performance of children with language delay and typically developing children. Their findings revealed that even the oldest of the typically developing children did not show maximum performance on the tasks. Authors also found that children with language delay found significant improvements after therapy.

Research studies have demonstrated that many children with learning disabilities show language/ syntactic deficits that affect their auditory comprehension (Wallach, 1984; Wiig, 1984; Wiig & Fleischmann,1980; Wiig & Semel,1975). These difficulties include difficulty interpreting passive voice sentences; sentences with temporal, conditional, and causal clauses; relative clauses; past perfect tenses; grammatical morphemes; personal and indefinite pronouns; question forms; negative forms; modals; homonyms; and abstract vocabulary (Abrahamsen & Shelton, 1989). Various other syntactic difficulties that have been demonstrated include passive voice, center embedded sentences (Huggins & Adams,1980), grammatical morphemes (McClure, Kalk, & Keenon,1980) , compound and complex sentences (Bormouth, Manning, Carr, &

Pearson,1970), causal relationships signaled by prepositions (Irwin, 1979) and anaphora (Bormouth et al., 1970; Richet, 1976-1977; Webber, 1980).

Reading comprehension, the comprehension of written language develops after listening comprehension (Menyuk, 1984). Menyuk posits that those grammatical structures that are well established in a child's brain are easier to comprehend while reading. But those children in whom these grammatical structures are not firmly established may have to consciously compare the written structures with their oral analogue. Children may misunderstand those sentences with structures which have not yet developed.

Stein, Cairns, and Zurif (1984) state that poor readers often have a poor language comprehension system that relies on earlier developing forms. Adams (1980) concluded that syntax is more important in reading comprehension than listening comprehension since the non linguistic contextual cues which can assist comprehension are missing during reading. In English, Rubin (1980) emphasizes that during general conversation simple past is used in place of past perfect sentences thus necessitating the need to learn the latter type of sentences within reading.

In linguistics, anaphora is a type of expression whose reference depends on another referential element. E.g., in the sentence 'Sally preferred the company of herself', 'herself' is an anaphoric expression in that it is coreferential with the expression in subject position. Usually, an anaphoric expression is represented by a pro-form or some other kind of deictic--for instance, a pronoun referring to its antecedent.Most studies show that

poor readers are lacking in understanding anaphoric reference thus leading to poor comprehension.

Abrahamsen and Shelton (1989) investigated reading comprehension in ninety two adolescents with LD. They randomly assigned the subjects into four groups: a control group and three treatment groups. The control group had to read a passage without any modification. The three treatment groups had to read passages with semantic modifications alone, syntactic modifications alone and combined syntactic and semantic modifications respectively. The investigators found that comprehension was significantly better for the syntactic modifications alone and combined syntactic and semantic modifications group when compared to control group and semantic modifications alone group. This study demonstrated an underlying syntactic deficit in children with LD necessitating syntactic modifications to improve reading comprehension.

Ripich and Griffith (1988) studied narrative abilities of children with LD in comparison with typically developing children. They included four story difficulty levels and three vocabulary age groups. They analyzed story events correct, story structures, propositions and cohesive devices. Their results revealed that children with LD performed as well as typical children on a general level but a significant difference was noticed between the two groups in terms of the parameters analyzed mentioned above. The authors were able to find specific patterns among the narratives of children with LD and typically developing children. Deficit in narrative abilities in children with LD may implicate a pervasive deficit in their linguistic system beyond the sentence level.

Rispens and Been (2007) attempted to investigate whether the phonological processing deficits and morphosyntactic problems in children with dyslexia are causally related. They found that children with dyslexia performed poorer than age matched controls on subject-verb agreement, phonological awareness and non word repetition task. The authors also found associations between non word repetition and sensitivity to subject verb agreement thus indicating that problems with phonological processing have an impact on the morphosyntactic deficits.

As a group, children with learning disabilities are markedly deficient in their ability to hold together grammatical frames and abstract meanings from larger contexts (Wallach & Goldsmith, 1977). During auditory language comprehension these children often process single words and fail to process clauses together.

Shankweiler and Crain (1986) examined the listening comprehension problems in children with specific reading disabilities. They said that these comprehension deficits are not exclusively due to insufficient semantic or syntactic knowledge but due to inadequate working memory. The authors opine that since working memory is a system which temporarily stores and processes linguistic segments as they are integrated into longer segments, a faulty or deficient working memory would lead to sentence comprehension problems. The authors suggest that for children with reading disabilities their poor word-decoding skills inflict additional burden on their working memory during reading.

2.4 Spoken sentence comprehension in children with learning disabilities

Spoken sentence comprehension involves storing and processing verbal material. Verbal information tends to be temporarily stored in a phonological code (phonological short-term memory [STM]) to enable further processing in WM (i.e., verbal WM; Just & Carpenter, 1992). If verbal material is not stored adequately, the task of syntactic processing may be all the more difficult.

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Sabisch et al. (2006) hypothesized that the syntactic deficits in children Learning Disability may be linked to the inability of these children to use prosodic information for syntactic processing. The authors used ERPs to compare children with typical development and age, gender and non verbal intelligence- matched children with learning disability on the domain of sentence comprehension. In the study, event-related brain

potentials (ERPs) were used to compare auditory sentence comprehension in 16 children with developmental dyslexia (age 9–12 years) and unimpaired controls matched on age, sex, and nonverbal intelligence. Passive sentences were presented, which were either correct or contained a syntactic violation (phrase structure) or a semantic violation (selectional restriction). In an overall sentence correctness judgment task, both control and dyslexic children performed well. In the ERPs, control children and dyslexic children demonstrated a similar N400 component for the semantic violation. For the syntactic violation, it was found that the children with dyslexia showed a different pattern characterized by delayed negativity compared to control children.

2.5 Learning disability/ Dyslexia and SLI

Researchers have recently suggested that dyslexia and SLI exist on a continuum of language disorder (Goulandris , Snowling & Walker, 2000; Catts, 1995; Stackhouse and Wells, 2000). Within such a continuum, dyslexia is regarded as a form of language impairment affecting primarily the phonological system. Additionally, dyslexia is seen as the lasting result of the disorder should oral language difficulties disappear. The two syndromes are accordingly treated as different manifestations of the same underlying problem, differing only in severity and in the stage when the disorder manifests itself (i.e. SLI is considered the more severe manifestation of the disorder, appearing in early childhood. Dyslexia is considered to be the less severe manifestation of the disorder, appearing later in childhood). Nowadays, this idea has become so widespread that researchers use new terms such as *language learning impairment* or *language learning disability (LLD)* to refer to children with reading and/or oral language impairments.

Some researchers, however, have recently pleaded against the tendency to collapse these diagnostic categories or to treat them as points on a continuum of severity rather than as distinct syndromes. In their review of the literature on the relationship between dyslexia and SLI, Bishop and Snowling (2004) point out that a single dimension of severity is not sufficient to capture the range of clinical variation that exist in these disorders. The authors admit that there are commonalities between dyslexia and SLI in the type of phonological deficits experienced, but believe that children with SLI generally have additional syntactic and semantic difficulties affecting their oral language. However, a subgroup of LD called *language learning disability also have found to exhibit deficits at phonological, syntactic and semantic deficits.* These deficits are found to paly an important role in attaining fluent reading. A few researchers (Bishop & Snowling, 2004) believe that there could be a distinction between dyslexia and SLI. Children with SLI usually have the same phonological deficits that are traditionally regarded as a core feature (and a causal factor) of dyslexia. However, children with SLI also experience pronounced deficits in syntax and semantics, which have an additional affect on their literacy development. Bishop & Snowling (2004) conclude that although dyslexia and SLI present enticing similarities, it might prove essential to rethink the relationship between these disorders.

2.6 Theories of developmental dyslexia

2.6.1 The phonological deficit theory

Phonological deficit theory has been widely used to explain the deficits in developmental dyslexia. According to this theory the representation, storage and/or

retrieval of speech sounds are assumed to be impaired in dyslexia (Ramus, Rosen, Dakin, Day, Castellote, White & Frith, 2003). Poor representation of speech sounds, storage or retrieval would result a poor understanding of the grapheme-phoneme correspondences of a particular language (Snowling, 1981, 2001).

According to Snowling (2001) poor verbal short term memory and slow automatic naming could be responsible for a basic phonological deficit. The existence of phonological problems in dyslexia is argued to represent only one facet of a more general disorder. Phonological deficits, for example, could be secondary to a more basic auditory deficit. This view has been elaborated in the temporal processing theory.

2.6.2. The temporal processing deficit hypothesis

The temporal processing deficit hypothesis (also known as the rapid auditory processing theory) challenges the specificity of the phonological deficit in dyslexia by claiming that phonological problems arise as a result of a more basic auditory deficit (Tallal, 1980, Tallal, Miller & Fitch, 1993). Originally, Tallal introduced the rapid auditory processing theory in the 1970's as an explanation of SLI, but went on to suggest that it could also explain the problems of dyslexics. The main idea of this theory is that dyslexia is the result of a perturbation of *auditory language processing in the temporal domain*. The consequence of a 'temporal processing deficit' is that children are not fully capable of perceiving and processing short or rapidly varying acoustic events, including those crucial to the recognition of speech sounds (Tallal, Miller, Bedi, Byma, Wang, Najarajan, Schreiner, Jenkins, & Merzenich, 1996). According to Tallal et al. (1993, 1996) a failure to correctly represent short sounds and fast transitions would cause further

difficulties; in particular when such acoustic events are cues to phonemic contrasts (like in *'ba'* versus *'da'*). This claim is compatible with various indications that dyslexic children have deficient speech sound representations (Liberman, 1973; Lyytinen et al. 1992). The auditory processing deficit is further supported by findings of Tallal and her colleagues that dyslexics perform poorly on auditory tasks like tone discrimination and temporal order judgement as well as on backward masking.

2.7 Theories of linguistic deficits in Specific Language Impairment

Various theoretical accounts of language impairment in disorders such as SLI are attempted to adopt to explain certain possible common underlying language deficits that may be manifested in children with LD. There can be three explanations adopted for this purpose. Some theories explain the language impairments as a developmental delay that is also present in younger normally developing children. Others theorists believe that the problems of children with language impairment are the result of a deviant, rather than delayed grammar. These are the so-called modular accounts. Yet other theories explain the limitations of children with language impairment as the result of a (general) processing deficit (the non-modular accounts).

The main theories within each of these explanations are discussed in the following section. Importantly, the theories reviewed here were all proposed as an explanation of the *grammatical* impairment in SLI. These theories are not concerned with children suffering exclusively from phonological or pragmatic impairments, even though such children exist.

2.7.1. From the Extended Optional Infinitive Stage towards the Agreement and Tense Omission Model

Rice & Wexler (1996) and Wexler, Schutze and Rice (1998) proposed the Extended Optional Infinitive Stage (EOIS) as an explanation of SLI. This explanation suggests that the *Optional Infinitive Stage (OI)* (Wexler, 1994), a developmental stage that normally developing children go through between the ages of approximately 1; 10 and 3; 6, persists in children with SLI. During this developmental stage, children use both bare infinitives and finite verbs in finite contexts. Finiteness is not obligatory yet and as a result, the tense and agreement features of the verb are not always marked. So, for example, in a past tense context a child in the OI stage might say either *I fell on my knee* or *I fall on my knee*, alternating between the finite verb form *fell* and the bare infinitive form *fall*. Wexler also observed that during the OI stage, children tend to omit auxiliaries and copula BE in finite contexts, saying for instance *Mommy eating* instead of *Mommy is eating* or *Daddy gone* rather than *Daddy has gone.* The generalization is that during the OI stage, children alternate between producing finite and non-finite clauses in finite contexts. Wexler and Rice suggest that children with SLI go through an Extended Optional Infinitive stage, which typically lasts until they are 7 or 8 years old.

Initially, Wexler (1994) argued that children with SLI have a Tense Deficit in the sense that they sometimes mark tense but sometimes leave verbs underspecified for tense. The use of bare infinitive forms in contexts that require finite forms represents a tense-omission error under Wexler's assumptions. In later collaborative work between Wexler and Schütze (Schütze & Wexler 1996), it was argued that optional infinitives could arise as a result of either tense or agreement features (or both) being underspecified (i.e.

omitted). In their 1998 paper Wexler, Schütze and Rice argue that SLI involves a syntactic feature deficit, which leads affected children to sometimes omit tense and agreement features in obligatory contexts. Wexler et al. refer to this model as ATOM (Agreement & Tense Omission Model). Support for this model comes from erroneous case marking of subject NP's by children with SLI and (younger) normally developing children using root infinitives. In adult English, the subject must be marked with nominative case. However, in SLI and in early (normal) language development, children use root infinitives with accusative subjects as in *him fall down* and *her have a big mouth* (examples from Schütze, 1997). Tense and Agreement both have a relation with the subject. Tense licenses overt subjects, while Agreement assigns the subject's case. With regard to case marking, the Agreement & Tense Omission Model predicts that:

- Structures containing an inflected verb (both tense and agreement are marked) will have nominative subjects.
- Modal/past tense structures in which tense is marked, but agreement may or may not be marked will have either nominative or default subjects (i.e. *He/Him went out*).

A bare infinitive is an infinitival verb-form used without the infinitive particle *to*. The infinitival status of the verb-form is clearer in languages in which infinitives carry an overt inflection, such as German or Dutch. A finite context is a context where an adult would use a (auxiliary or main) verb marked for tense and agreement. Bare verb/missing auxiliary structures are ambiguous with respect to whether they are (i) specified for agreement but not for tense, (ii) specified for tense but not agreement, or (iii) specified for neither tense nor agreement. Such structures will have nominative subjects (i.e. *He*

snore, He snoring) in the case of (i) and accusative subjects (e.g. Him snore, Him snoring) in the case of (ii) / (iii).

Both the EOI and ATOM accounts presume a delay in the language development of children with SLI. Thus, the grammar of a child with SLI is not qualitatively different from the grammar of a normally developing child; it merely develops at a slower pace.

2.7.2. The Missing feature hypothesis / Implicit Rule Deficit Hypothesis

In this account, the grammatical problems of children with SLI are believed to stem from an underspecification of the morphosyntactic rules that mark features such as tense, number and person. Gopnik (1990a, 1990b) originally characterized the problem as *feature blindness* (the features of tense, number and person are missing from the underlying grammars of children with SLI) and based this assumption on a case study of a language-impaired boy. Morphophonological rules and rules that match features in the syntax were absent in the language production of this boy. Feature blindness entails that the grammatical morphemes that encode these features will be produced in a haphazard way. Gopnik presented further evidence for her account with data from a British family (the KE-family).

Gopnik and Crago (1991) reconstructed the missing feature hypothesis by proposing an absence of rules rather than features in the grammars of children with SLI. They proposed the Implicit Rule Deficit account as an explanation of SLI, using as backdrop the dual model of acquisition of morphology (Pinker & Prince, 1988). According to the dual model, regular and irregular inflections are acquired differently. Irregular forms are stored in memory, whilst the acquisition of regular morphology

necessitates an abstract rule that affixes a morpheme to a verb stem. The suggestion of the implicit rule deficit hypothesis is that such abstract rules are not available to children with SLI and that these children can use only memory. Thus, learning regular forms will be approached in the same way by children with SLI than learning irregular forms (i.e. they will also be rote-learned).

However, the implicit rule deficit hypothesis cannot account for the fact that children with SLI sometimes produce overgeneralizations of irregular verb forms. Such productions are an indication that a rule is 'at work' and cannot be rote-learned, as they do not appear in the input. Also, the authors of this account have struggled to deal with the problem of grammatical utterances in an 'ungrammatical child'. Gopnik (1991) assumes that correct manifestations of grammatical morphology in children with SLI are also to be interpreted as the outcome of a deficient system. Thus, examples that do not fit the theory are not seen as counterevidence, but as the chance output of a deficient grammar. As Bol and De Jong (1999) point out, falsifying such a theory is hard or even impossible, making the theory itself weak.

2.7.3. The Missing agreement hypothesis

The Missing Agreement hypothesis was proposed by Clahsen (1989). Working with data from German-speaking children with SLI, Clahsen proposes that the children's problem lie in establishing the structural relationships of grammatical agreement. Clahsen claims that children with SLI lack the knowledge of asymmetrical relations between categories, where one category controls the other. Support for this claim came from his observations that children with SLI have trouble with gender and number markings on

determiners and articles. Furthermore, the children in this initial study frequently made agreement errors on verbs and produced sentences with the verb in the final position rather than in the appropriate second or first position. According to Clahsen, these children's ungrammatical verb-final productions are not the result of a deficit in 'movement' itself, but are related to their inability to generate the morphology (i.e., finite forms) required for the verb-second position.

Grammatical morphemes are missing from the output as children lack the agreement relations that permit their use and not because the children cannot produce the forms themselves. Following Generalised Phrase Structure Grammar (particularly the Control Agreement Principle (see Gazdar, Klein, Pullum, & Sag, 1985), Clahsen (1992) anticipates that a deficit in Agreement will cause problems in several domains that depend on agreement relations. The Missing Agreement hypothesis predicts that subject-verb agreement, finite forms of auxiliaries, overt structural case marking and gender marking on determiners and adjectives will all be deficient in SLI. Furthermore, the Missing Agreement hypothesis does not predict significant difficulties with Tense. Clahsen acknowledges that children with SLI have problems with Tense, but he sees such problems as marginal in comparison to the problems experienced with subject-verb agreement.

2.7.4. The surface hypothesis

The surface hypothesis (Leonard, 1989, 1998) is perhaps the best known of the non-modular accounts of SLI. The physical properties of grammatical morphemes in English are accentuated in this account, hence the term "surface" hypothesis. Acoustic

features such as low phonetic substance and short duration render the acquisition of English grammatical morphology difficult even for normally developing children. The surface hypothesis supposes "a general processing capacity limitation in children with SLI but assumes also that this limitation will have an especially profound effect on the joint operations of perceiving grammatical morphemes and hypothesizing their grammatical function" (Leonard, 1998). This limited processing capacity is maybe best described as a *reduced speed* of processing. The main idea is that children with SLI can perceive word-final consonants and weak syllables, but that these children's processing capacity is severely strained when such taxing forms play a morphological role. When this is the case, children do no not only have to perceive the short duration consonant or weak syllable, they also have to perform additional operations to discover that it functions as a separate grammatical morpheme and fills a specific cell of the morphological paradigm. These additional operations are in effect those discussed in Pinker's (1984) learnability model, in which Pinker offers an explanation for the way in which children build morphological paradigms. According to this model, language acquisition starts off with children forming word-specific paradigms. In the course of language development these paradigms become general and children become aware of the fact that specific affixes represent specific syntactic features. When this happens, children "know" that different affixes represent different dimensions and they can apply them to new words. Thus, on hearing the Italian verb *corre* (he/she runs) a child who has moved from word-specific paradigms to general paradigms can produce *corro* (I run) without having heard it before. Affixes are not all acquired at the same time. Rather, Pinker (1984) argues for a ranking order determined by several characteristics of the

affixes themselves. Affixes that are perceptually salient and semantically transparent (e.g. *–ing* and plural *–s* in English) are introduced earlier than affixes that are non-salient or abstract in nature (e.g. 3rd singular *–s* in English).

Ultimately, the surface hypothesis assumes the underlying grammars of children with SLI to be in tact; the morphological paradigms that these children form are essentially the same as those of normally developing children. However, due to their reduced processing speed, the input of children with SLI is distorted. In particular, grammatical morphemes that are perceptually unsalient are at risk of not being perceived or processed. As the processing speed limitation is believed to be general rather than specific, its effect may be different from one language to another. In English, grammatical morphology is affected because of the fact that morphology is quite fragile. In a language with a typology that differs markedly from English (e.g. Italian), the effects of the same processing limitation can lead to a different kind of linguistic profile in children with SLI

2.7.5. The limited processing account

Another non-modular explanation of SLI is that children with SLI have a limited resource capacity for the processing and storage of information. The notion of a limited capacity system has been incorporated in various models of language processing (Baddeley, 1986, 1996; Bloom, 1993; Bock & Levelt, 1994; Just & Carpenter, 1992). These models all share the same underlying idea that our cognitive resources (which are assigned to different tasks) are limited. In situations where task demands exceed available resources, the processing and/or storage of information are affected negatively. In other

words, when processing one aspect of a cognitive task is unusually difficult and demands a lot of the available resources, fewer resources are left for processing other aspects. Thus, breakdowns in performance can occur when processing demands exceed resource capacity. Although task accuracy also is used to measure processing capacity, the speed with which mental operations are carried out is viewed as a fundamental processing resource.

Capacity limitations are typically revealed in linguistic interactions and trade-offs across language domains. Individual differences in cognitive capacity are thought to hamper language processing more in some individuals than in others (Just and Carpenter's, 1992).

Several researchers have suggested that children with SLI, even more than normally developing children, have limitations in their capacity to process and store information (Bishop, 1992b; Ellis Weismer & Hesketh, 1996; Gathercole & Baddeley, 1990, 1993; Johnston, 1994; Lahey & Bloom, 1994; Montgomery, 1995a, 1995b). Limitations are proposed to be either specific to a particular resource capacity (e.g. Gathercole & Baddeley, 1990 proposed a limitation in phonological working memory) or more general.

General resource capacity limitations include limitations in working memory size, computational energy, processing rate, or all three (Kail & Salthouse, 1994)

2.8 Linguistic precursors of developmental dyslexia

2.8.1 Phonological development

Several prospective and retrospective studies in the eighties consistently found that phonological processing abilities of kindergartners at risk of developing dyslexia (and older children with dyslexia) are deficient.

Especially, phoneme awareness (the representation, retrieval, metalinguistic analysis of phonological information) is said to be less well developed in dyslexics than in non-dyslexics. In agreement with this view, Mann (1984), Mann & Ditunno (1990) and Stuart & Coltheart (1988) found evidence that dyslexic children had impaired phonemic awareness as kindergartners. Lefly & Pennington (1996) found that the at-risk group in their study differed from the control group in letter knowledge, detection of initial consonant differences, rhyme oddity and rapid naming in kindergarten. According to Byrne, Fielding-Barnsley, Ashley & Larsen (1997), the strongest predictors of dyslexia in the sample of at-risk children that they studied were deficiencies in phonological awareness, poor letter knowledge and knowledge of print at age 55 months. In a similar study with Danish at-risk children, Elbro,Borstrom, & Peterson (1998) found that the best predictors of dyslexia were letter naming and phoneme identification skills in preschool, together with a measure of a child's accuracy in articulation.

2.8.2 Syntactic development

Hollis Scarborough (1990) conducted a groundbreaking study with children at-risk of developing dyslexia. She found that 65% of the children in her sample of at-risk children could be classified as dyslexic by the age of 8 years. A retrospective analysis of

the early language skills of these children revealed that they experienced more language difficulties as kindergartners than a group of normal controls. These language difficulties had a changing pattern over time. At age 30 months, the dyslexic children had a similar range of vocabulary items as the comparison group, but they demonstrated a more restricted range of syntactic devices and made more speech production errors. However, at the ages of 36 and 42 months, the vocabulary skills of the dyslexic children were less well developed than those of the controls and their syntactic difficulties persisted (Scarborough & Dobrich, 1991). At age 60 months, the dyslexic children displayed deficiencies in phonological awareness and letter knowledge, but their syntactic difficulties were no longer visible. According to Scarborough, the most important finding of her study was that phonological skills did not account for significant variance in outcome, but that syntactic skills was a unique predictor of reading disability. Thus, she argued, the phonological deficit hypothesis cannot fully explain the occurrence of dyslexia.

In an attempt to evaluate the phonological deficit hypothesis and extend the available evidence concerning the precursors of dyslexia, Gallagher, Frith, & Snowling (2000) studied 63 at-risk children with an average age of 45, 68 months. They found that almost half of the at-risk children were late in taking their first steps into literacy development. Retrospective analysis of their language development suggested that these children were subject to mild delays in all aspects of their spoken language. Consistent with Scarborough's finding that preschool syntactic ability was a significant predictor of reading at 8 years, the language factor (sentence length as a measure of syntactic proficiency) in Gallagher et al.'s study accounted for unique variance in literacy

development. Furthermore, consistent with the other above-mentioned studies, Gallagher et al. found that the at-risk children recognized fewer letters than the control children at age 45 months.

Thus, it is still not clear whether a specific aspect of language ability (e.g. phonological processing) or a more general language delay is most directly responsible for reading failure. More evidence of delayed morphosyntactic development in young at-risk children comes from studies by Lyytinnen et al. (2001) and Rispens (2004). In Lyytinnen et al's study, a group of at-risk children produced significantly shorter sentences (measured in MLU) than their normally developing peers at the age of 2; 0. Rispens (2004) found evidence that kindergarten children at-risk for dyslexia were less sensitive to violations of subject verb agreement than normally developing children. Rispens revisited the at-risk children in her sample after they had received one year of reading instruction and found that those children who did not show normal reading progress differed significantly in their sensitivity to subject verb agreement from children who show normal reading progress.

The literature suggests that SLI and LD fall on a continuum. Several hypotheses have been proposed to explain the linguistic deficits in SLI and LD. Some of the explanations given for the linguistic deficits in children with LD are phonological deficit hypothesis, temporal processing deficit hypothesis, optional movement hypothesis, missing feature hypothesis, implicit rule deficit hypothesis, missing agreement hypothesis and limited processing account. Thus the present study was necessitated to study the sentence comprehension abilities in children with LD.

Although there is much evidence in support of the strong relationship between phonological deficits and reading failure in children with dyslexia, less attention has been devoted to whether these children also have language deficits at the level of syntax. Clinical experience has led Speech-Language Pathologists to opine that children with learning disabilities often have a history of delay/deviance in spoken language acquisition at the level of syntax comprehension leading to impaired syntactic expression. The language difficulties of such children being subtle go unnoticed or unassessed by professionals who focus only on their academic skills. Therefore, the present study is an attempt to investigate the sentence comprehension in children with learning disability.

Morpho-syntactic processing has, as yet, not been researched in children with LD in the Indian context (like Kannada) which follows a different language system (non-alphabetic). An understanding of the process of morpho-syntactic functioning in children with LD could yield vital information and implicate for clinical use. Reaction time measurement studies have often been used in behavioral studies for a better understanding of processing speed in children with LD along with accuracy measures. Hence, the present study attempted to investigate sentence comprehension in children with learning disability using reaction time paradigms.

CHAPTER III

METHOD

The present study attempted to investigate the sentence comprehension abilities in children with learning disabilities (LD) on a grammaticality judgement task.

3.1 Participants

Two groups of participants were included in the study-

Group 1: Children with LD in the age range of 6-12 years studying in the state syllabus schools with Kannada as their mother tongue and English as medium of instruction.

Group 2: Typically developing children in the age range of 6-12 years studying in state syllabus schools with Kannada as their mother tongue and English as medium of instruction.

Participant selection criteria

- All the participants had Kannada as their mother tongue and English as medium of instruction in school.
- Participants of Group 1 were diagnosed as Learning Disability by a qualified Speech-Language Pathologist and clinical psychologist.
- Participants of Group 2 did not have any history of language, hearing, neurological, developmental, academic and intellectual disorders, which was

ensured using the 'WHO Ten question disability screening checklist' (cited in Singhi, Kumar, Malhi & Kumar, 2007)

- Participants from group 1 were recruited from those who were receiving speech and language services at the All India Institute of Speech and Hearing, Mysore. Participants from group 2 were selected from the schools in and around Mysore city. The details of the participants from group 1are given in Table 3.1.

Table 3.1: *Details of children with learning disability (LD)*

PARTICIPANT CODE	CHRONOLOGICAL AGE	GENDER
LD1	6 years	Male
LD2	6 years	Female
LD3	7 years	Male
LD4	7 years 6 months	Male
LD5	8 years 3 months	Male
LD6	8 years 5 months	Male
LD7	9 years	Male
LD8	9 years 7 months	Male
LD9	10 years	Male
LD10	10 years 2 months	Male
LD11	10 years	Male
LD12	10 years	Male
LD13	10 years 6 months	Male
LD14	11years 6 months	Male
LD15	11 years	Male
LD16	11 years 9 months	Male
LD17	11 years 6 months	Male
LD18	12 years	Male

3.2 Test stimuli

The sentence stimuli were chosen from the Linguistic Profile Test in Kannada (Karanth, Ahuja, Nagaraja, Pandit & Shivashankar, 1991) from the syntax section. In the syntax section, the sentence categories chosen were:-

- Tenses. Eg: / site monne baruta:le; avanu kaleda va:ra bandidda/
- PNG markers; /Eg: hasu baruta:ne; kamala baruta:le/
- Case markers; Eg: /pustaka annannannu koTTe; bassininda hode/.
- Transitives, Intransitives and Causatives; Eg: /avaru namminda kelasa maaDuttare/
- Sentence types; Eg: /naavu ha:Du heLali; ninu a: kelasa ma:Daba:radu/
- Predicates; Eg: /ninna ko:ne jaava?; i pustaka nannnadu/
- Conjunctions, comparatives and quotatives; Eg: /nanna anna makkalu bandaru; ramanu shankaranu skoolige hodaru /
- Conditional clauses: Eg: /ni:nu manege banda hannu koDutide; avanu manege bandare duDDu kodute:ne/
- Participial constructions. Eg: /na:nu ivatu ka:fi kudi tinDi tinde; ninnannu noDade bahaLa dinava:jitu/

Each sentence category had 10 sentences with 5 correct and 5 grammatically wrong sentences in random order except the sentence category ‘PNG markers’ which had 20 sentences. The total number of sentences chosen for this study was 100.

Instrumentation

The sentence stimuli from LPT in Kannada (Karanth, Ahuja, Nagaraja, Pandit & Shivashankar, 1991) were audio recorded using PRAAT software. The test stimuli were presented using DMDX software. DMDX is a Windows-based program designed primarily for language-processing experiments (Forster & Forster, 2003). The DMDX software, as mentioned earlier (in the review section), was used to make the task more sensitive to the time taken by the participants to process the sentence stimuli. The 100 sentences of LPT were divided into 4 sets containing 25 sentences each. After the completion of each set the child was asked if he/she needed a break before continuing with the next set. Each set of 25 sentences would approximately last for duration of 5 minutes. The inter stimulus interval was 5000 ms.

3.3 Procedure

The participants were seated comfortably and were tested in a room with minimum external noise. The task used was a grammaticality judgement task. The sentences were presented via Beetel Boom 300 head phones using a Dell Inspiron 14" laptop. The participants were instructed in Kannada. The children were instructed to press the '1' key on the computer keyboard if the sentence is grammatically correct and '0' key on the computer keyboard if the sentence is grammatically wrong. Instructions were modified a bit for younger children. They were instructed to press '0' if the sentence sounded wrong and 1 if the sentence sounded corrected. Examples were given orally by the investigator to make the children understand the task correctly. The children were instructed to listen to the sentence carefully as it would be presented only once. Practice

stimuli of 5 sentences were presented to the children using the DMDX software (these practice stimuli were presented apart from the examples given orally by the investigator). During the practice trial, the child was asked as to why he/ she thought the sentence was wrong for the sentences for which the child pressed the '0' key. This was done to ascertain that the child did not press the key due to chance factors. Also, this helped to know if the child had understood the instructions correctly. During the entire testing period, the monitor screen appeared blank and only the auditory stimulus was presented using the DMDX software.

3.4 Scoring and Analysis

The scores of the participants were recorded through the DMDX software itself on an excel sheet. The Reaction Time (RT) was measured in milliseconds. The data was analysed for RT and accuracy measures and subjected to statistical analysis using SPSS version 17. The performance of children with LD was compared with that of typically developing children (TDC) on RT and accuracy measures.

CHAPTER IV

RESULTS

The aim of the present study was to investigate sentence comprehension abilities in children with LD. Sentence comprehension abilities were tested in typically developing children (TDC) and children with LD on a grammaticality judgement task. The data was analysed for reaction Time (RT) and accuracy measures for both the groups. Only the responses of data which were accurate were considered for analyzing RT measures.

The following statistical measures were used to analyse the data,

- Mixed ANOVA (with age as between factor) was done to compare the performance of TDC on different categories of sentences across age groups.
- MANOVA was done to compare the performance of TDC across age groups within each sentence category with age as independent factor and sentence categories as dependent factor.
- Repeated measures ANOVA was done to compare the performance of TDC on across sentence categories within each age group with sentence categories as independent factor and age as dependent factor.
- One way ANOVA was done to compare the overall performance of TDC on RT across age groups with age group as the independent factor and RT was the dependent factor.
- Duncan's post hoc test was done to investigate significant difference of performance of children between age groups.

- Mann Whitney test was done to compare the performance of TDC and children with LD.

The results of the study are explained in the following sections,

4.1: Performance of TDC across age groups on RT and accuracy measures

4.2: Comparison of performance of children with LD and TDC on RT and accuracy measures.

4.1 Performance of TDC across age groups on RT and accuracy measures

4.1.1 Comparison of performance of TDC on reaction time (RT) across age groups

One way ANOVA was done to compare the performance of TDC on RT measure across age groups. Table 4.1.1.1 shows mean and standard deviation (SD) values for RT across different age groups.

Table 4.1.1.1: *Mean and standard deviation (SD) values of RT (in ms) for TDC across age groups.*

Age groups (in years)	Mean RT (in ms)	SD
6-7	1527.97	561.33
7-8	1504.79	538.01
8-9	1224.36	328.65
9-10	1833.13	825.18
10-11	782.29	113.31
11-12	967.29	410.59
Total	1306.64	607.82

Analysis of results in Table 4.1.1.1 revealed that the mean scores of children in the age group of 6-7 years to 11-12 years ranged from 1527.97 ms to 967.29 ms. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend. The results showed that there was a significant difference across age groups at $F(5, 54)=5.808$, $p<0.001$. Post hoc Duncan's test revealed that there was a significant difference between the performance of TDC in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 10-11; 7-8 and 10-11; 7-8 and 11-12; 8-9 and 9-10; 9-10 and 10-11; 9-10 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 9-10; 7-8 and 8-9; 7-8 and 9-10; 8-9 and10-11; 8-9 and 11-12; 10-11 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.1).

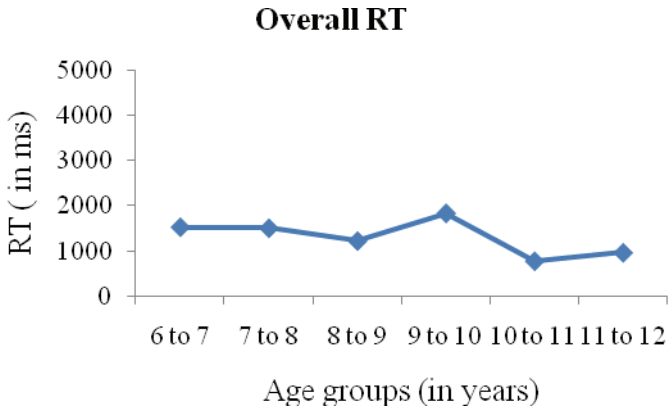

Figure 4.1.1.1: Mean RT for TDC across age groups.

Further, a Mixed ANOVA (Repeated Measure ANOVA with age as between factor) was used to compare the performance of TDC on RT for each sentence category across age groups. Analysis of results revealed that there was a significant main effect seen across sentence categories at $F(5, 54) = 36.825$, $p<0.001$ and across age groups at $F(5, 54) = 5.815$, $p<0.001$. A significant interaction effect was also seen between sentence categories and age groups at $F(5, 54) = 17.045$, $p<0.001$.

MANOVA was used to compare the performance of different age groups within each sentence category with age as independent factor and sentence category as dependent factor. The results for each sentence category are discussed below using Table 4.1.1.2.

Table 4.1.1.2: *Mean and SD values on RT for TDC for each sentence category across age groups.*

Sentence Categories	Age groups (in years)													
	6-7		7-8		8-9		9-10		10-11		11-12		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
T N	1775.33	634.40	1849.27	684.01	1418.88	553.66	1275.52	428.13	831.29	363.60	1102.23	514.00	1384.64	630.36
PNG	1480.42	688.60	1307.26	621.56	1044.91	476.98	681.65	417.10	412.41	251.10	662.70	444.08	940.36	615.30
CM	1153.33	573.89	1069.96	543.33	923.92	530.16	804.66	530.57	320.64	174.38	730.63	487.33	842.55	544.65
TIC	1281.71	765.61	1290.77	718.14	1054.56	506.33	647.04	306.34	523.74	290.84	902.45	795.18	957.27	648.34
ST	1489.51	571.29	1262.20	740.15	1023.54	286.20	897.52	458.78	557.45	204.39	755.91	326.59	1005.15	546.85
PR	1026.98	509.48	1276.47	668.32	750.21	320.98	596.43	279.26	587.62	203.72	634.67	343.40	815.87	478.28
CCQ	1792.68	806.76	1595.27	698.26	1356.37	272.99	1309.45	503.07	1202.35	274.38	1223.90	464.57	1416.91	563.37
CC	2074.20	558.27	2183.34	667.03	2038.66	591.45	1739.63	348.85	1663.93	229.10	1734.76	490.90	1909.85	524.67
PC	1798.42	706.14	1934.52	733.29	1529.65	370.37	1307.78	6086.60	1268.23	204.11	1291.87	406.57	1725.749	3937.39

Note: TN: Tenses, PNG: PNG markers; CM: Case markers; TIC: Transitives, Intransitves and Causatives; ST: Sentence Types; PR: Predicates; CCQ: Conjunctions, Comparatives and Quotatives; CC: Conditional Clauses; PC: Participial Constructions.

1. Tenses

Analysis of results in Table 4.1.1.2 for 'tenses' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1775.33 ms to 1102.23 ms . This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend. The results showed that there was significant difference among age groups for the sentence category 'tenses' , $F(5, 54) = 4.983$, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 10-11; 7-8 and 9-10; 7-8 and 10-11; 7-8 and 11-12;8-9 and 10-11 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8;6-7 and 8-9; 6-7and 9-10; 7-8 and 8-9;8-9 and 9-10;9-10 and 10-11;10-11 and 11-12 year old TDC. . The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.3).

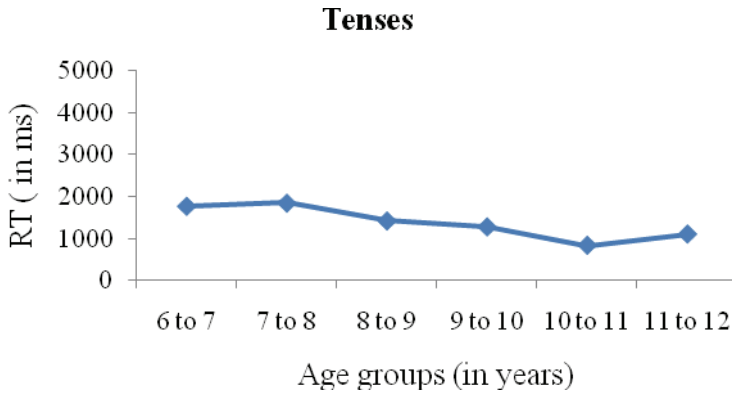

Figure 4.1.1.3: Mean RT across different age groups for 'Tenses'

2. PNG markers

Analysis of results in Table 4.1.1.2 for 'PNG markers' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1480.42 ms to 662.70 ms. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend. The results showed that there was significant difference among age groups for the sentence category 'PNG markers', $F(5, 54) = 6.468$, $p<0.001$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 6-7 and 10-11; 7-8 and 9-10; 7-8 and 10-11; 7-8 and 11-12; 8-9 and 10-11 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9;7-8 and 8-9;8-9 and 9-10;8-9 and 11-12;9-10 and 10-11; 9-10 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.4).

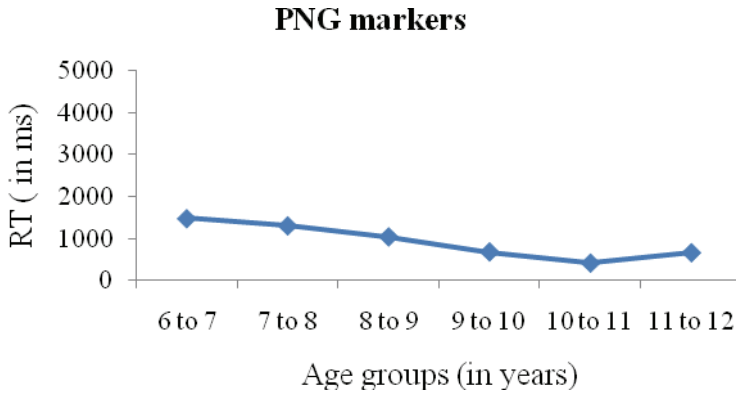

Figure 4.1.1.4: Mean RT across different age groups for 'PNG markers'

3. Case markers

Analysis of results in Table 4.1.1.2 for 'Case markers' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1153.33 ms to 730.63 ms. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend. The results showed that there was a significant difference among age groups for the sentence category 'PNG markers', $F(5, 54) = 3.359$, $p<0.05$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 10-11; 7-8 and 10-11;7-8 and 11-12; 8-9 and 10-11; 8-9 and 11-12; 9-10 and 10-11; 9-10 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 9-10; 7-8 and 8-9; 7-8 and 9-10; 8-9 and 9-10; 10-11and 11-12 year old TDC. The

findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.5).

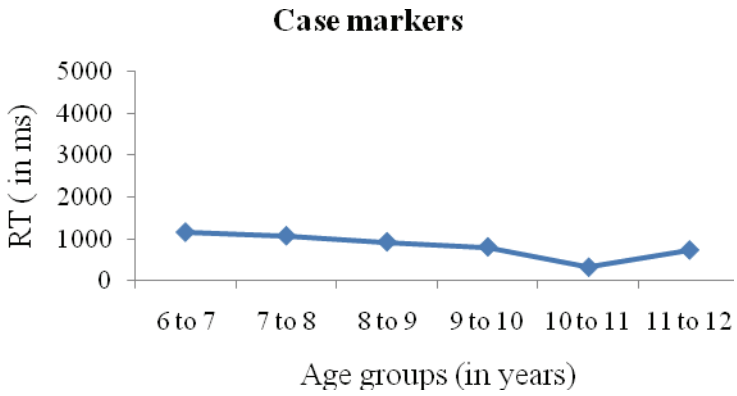

Figure 4.1.1.5: Mean RT across different age groups for 'Case markers'

4. Transitives, Intransitives and Causatives

Analysis of results in Table 4.1.1.2 for 'Transitives, Intransitives and Causatives' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1281.71 ms to 902.45 ms.This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was a significant difference among age groups for the sentence category 'Transitives, Intransitives and Causatives', $F(5, 54) = 2.696$, $p<0.05$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 6-7 and 10-11; 7-8 and

9-10; 7-8 and 10-11; 7-8 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9;6-7and 9-10;7-8 and 8-9; 7-8 and 9-10;8-9 and10-11; 8-9 and 11-12;10-11 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.6).

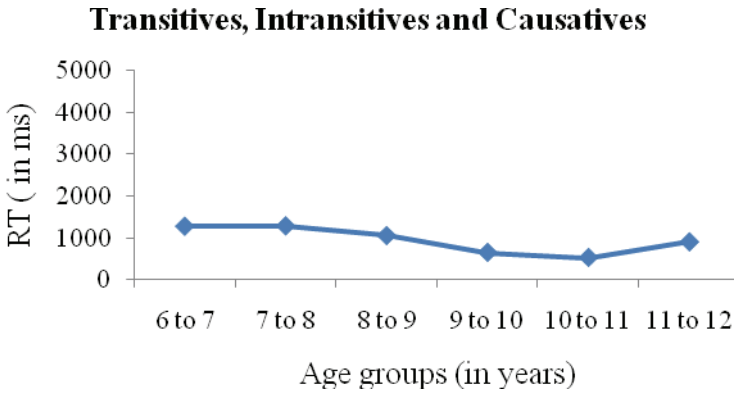

Figure 4.1.1.6: Mean RT across different age groups for 'Transitives, Intransitives and Causatives'

5. Sentence types

Analysis of results in Table 4.1.1.2 for 'Sentence types' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1489.51 ms to 755.91 ms. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was a significant difference among age groups for the sentence category 'Sentence types', $F(5, 54) = 4.396$, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference

between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 8-9; 6-7 and 9-10; 6-7 and10-11; 7-8 and 10-11; 7-8 and 11-12; 8-9 and 10-11year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8;7-8 and 8-9; 7-8 and 9-10; 8-9 and 9-10; 8-9 and 11-12; 9-10 and 10-11; 9-10 and 11-12; 10-11 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.7).

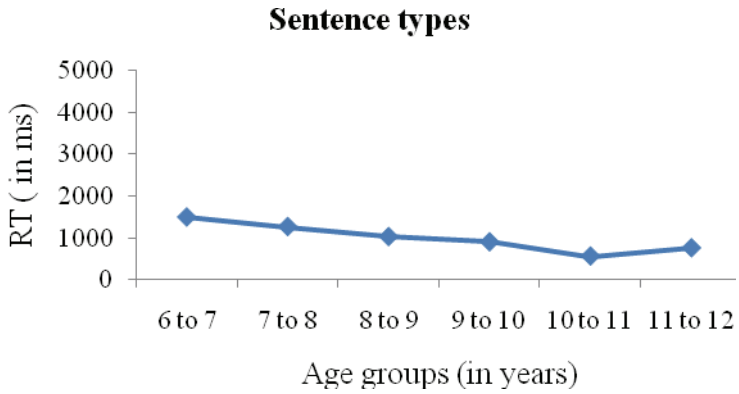

Figure 4.1.1.7: Mean RT across different age groups for 'Sentence types'

6. Predicates

Analysis of results in Table 4.1.1.2 for 'Predicates' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1026.98 ms to 634.67 ms. This indicated that there was an

improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was a significant difference among age groups for the sentence category 'Predicates', F (5, 54) =4.396, p<0.01. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 6-7 and10-11; 7-8 and 8-9 ; 7-8 and 9-10; 7-8 and10-11; 7-8 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7 and 11-12; 8-9 and 9-10;8-9 and 10-11;8-9 and 11-12;9-10 and 10-11; 9-10 and 11-12; 10-11 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.1.8).

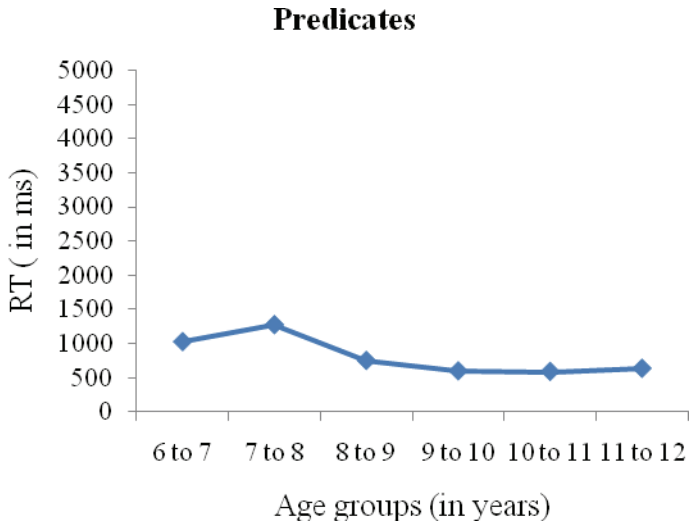

Figure 4.1.1.8: Mean RT across different age groups for 'Predicates'.

7. Conjunctions, Comparatives & Quotatives

Analysis of results in Table 4.1.1.2 for 'Conjunctions, Comparatives and Quotatives' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1792.68 ms to 1223.90 ms. The results showed that there was no significant difference among age groups for the sentence category 'Conjunctions, Comparatives & Quotatives'.

This may show that this sentence category may have been reached its peak performance by the age of 6-7 years. (Figure 4.1.1.9).

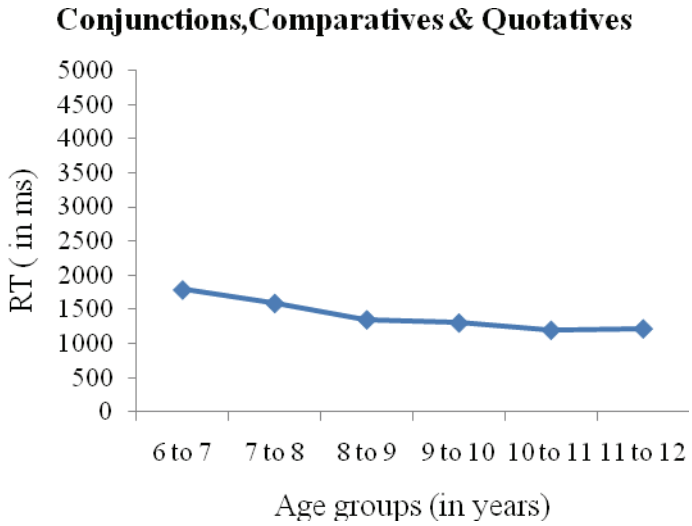

Figure 4.1.1.9: Mean RT across different age groups for 'Conjunctions, Comparatives and Quotatives'.

8. Conditional clauses

Analysis of results in Table 4.1.1.2 for 'Conditional Clauses' revealed that the mean scores of performance of TDC in the age group of 6-7 years to

11-12 years ranged from 2074.20 ms to 1734.76 ms. The results showed that there was no significant difference among age groups for the sentence category 'Conditional clauses'.

This may show that this sentence category may have been reached its peak performance by the age of 6-7 years (Figure 4.1.1.10).

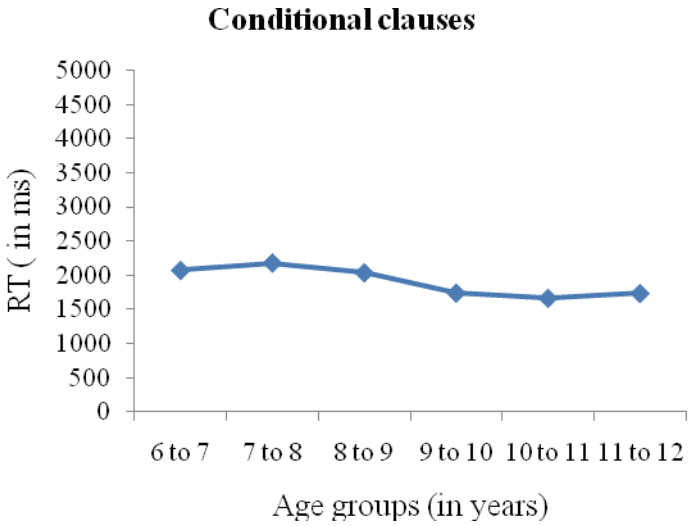

Figure 4.1.1.10: Mean RT across different age groups for 'Conditional clauses'

9. Participial constructions

Analysis of results in Table 4.1.1.2 for 'Participial Constructions' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 1798.42 ms to 1291.87 ms. This would indicate that there is no developmental trend observed for the sentence category "Participial constructions" (Figure 4.1.1.11).

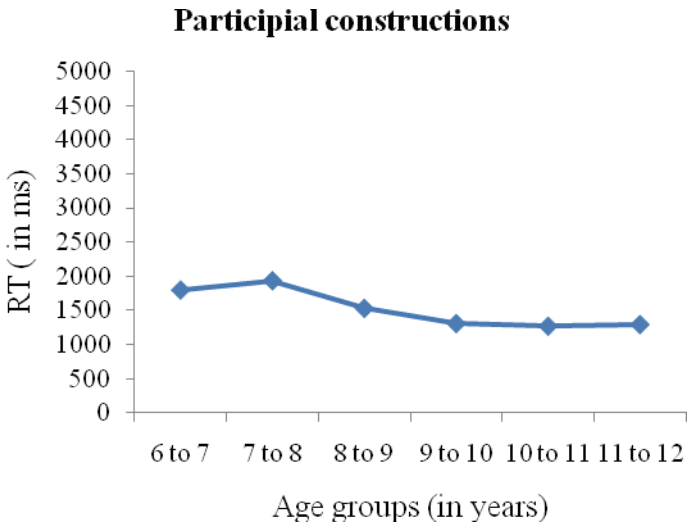

Figure 4.1.1.11: Mean RT across different age groups for 'Participial constructions'

To summarize the results on RT measure for TDC, the findings of the present study showed that there was an improvement in the performance of TDC from 6-7 years to 11-12 years showing an overall developmental trend. Among the sentence categories, the categories on which the TDC showed a significant developmental trend were Tenses; PNG markers;Case markers;Transitives,intransitives, causatives;Sentence types and Predicates. The categories which did not show a significant developmental trend were conjunctions,comparatives & quotatives; Conditional clauses and Participial constructions. However, the mean scores of TDC on these sentence categories also showed a developmental trend. Findings showed that the sentence categories, Tenses; PNG markers; Case markers; Transitives, Intransitives and Causatives; Sentence types and Predicates were acquired developmentally earlier since they showed lesser mean reaction time across age groups. The sentence categories Conjunctions, Comparatives & Quotatives; Conditional clauses showed an increased mean reaction time across age groups.

Hence we can infer that these sentence types are more complex and are acquired later developmentally.

4.1.2 Comparison of performance of children on accuracy measure for TDC across age groups:

One way ANOVA was done to compare the overall accuracy of TDC across age groups. Table 4.1.2.1 shows mean and SD values of performance of children on accuracy measure for TDC across age groups.

Table 4.1.2.1: *Mean and SD values of performance of children on accuracy measure for TDC across age groups*

(Max. score=100)

Age group (in years)	Mean	SD
6-7	53.80	9.163
7-8	54.70	10.853
8-9	63.50	13.778
9-10	64.40	13.468
10-11	45.00	12.745
11-12	63.00	15.592
Total	57.40	14.096

Analysis of results in Table 4.1.2.1 revealed that the mean scores of children in the age group of 6-7 years to 11-12 years ranged from 53.80 to 63.00.This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend. The results showed that there was a significant difference across age groups at $F(5, 54) = 3.576$, $p<0.01$. Post hoc Duncan's test

revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 8-9 and 10-11; 9-10 and 10-11; 10-11 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 9-10; 6-7 and 10-11; 7-8 and 8-9; 7-8 and 9-10; 7-8 and 10-11; 7-8 and 11-12; 8-9 and 9-10; 8-9 and 11-12; 9-10 and 11-12 year old TDC. . The findings showed that there was a significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.2.1).

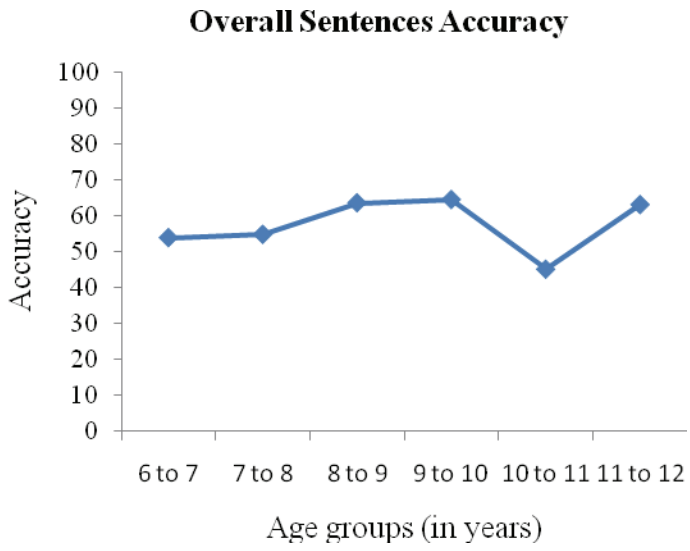

Figure 4.1.2.1: Mean accuracy for overall performance of TDC across age groups.

Mixed ANOVA (Repeated Measure ANOVA with age as between factor) was used to compare the performance of TDC on RT for each sentence category across age groups. Analysis of results revealed that there was a significant main effect seen

across sentence categories at F (5, 54) = 63.542, $p<0.001$ and across age groups at F (5, 54) =4.359, $p<0.001$. A significant interaction effect was also seen between sentence categories and age groups at F (5, 54) = 3.860, $p<0.001$.

MANOVA was used to compare the performance of age groups within each sentence category with age as independent factor and sentence category as dependent factor. The results for each sentence category are discussed below using Table 4.1.2.2.

Table 4.1.2.2: *Mean and SD values of accuracy for TDC for each sentence category across age groups.*

Senetnce Categories	Age groups (in years)													
	6-7		7-8		8-9		9-10		10-11		11-12		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
T N	5.50	1.65	5.40	1.65	5.89	1.62	7.50	1.51	5.50	2.17	7.90	2.03	6.29	2.00
PNG	12.40	2.12	10.90	4.15	14.44	2.51	12.30	5.40	6.10	3.45	11.30	4.88	11.19	4.57
CM	5.10	1.20	5.10	1.29	5.78	1.72	4.90	2.19	3.70	2.00	5.20	2.15	4.95	1.83
TIC	6.90	1.29	5.40	1.84	6.78	1.56	6.00	1.56	3.90	1.73	5.30	1.89	5.69	1.89
ST	5.90	1.66	6.30	2.50	7.33	1.41	7.00	1.83	4.60	2.27	6.40	2.55	6.24	2.18
PR	5.00	1.76	6.80	1.14	7.44	1.24	5.70	3.06	3.30	1.89	5.50	2.80	5.59	2.42
CCQ	5.00	1.70	4.80	1.03	6.33	1.66	7.00	1.16	6.00	1.76	6.70	1.06	5.97	1.60
CC	4.90	1.29	4.40	1.35	6.44	2.30	7.10	1.79	5.30	1.70	8.00	1.70	6.02	2.08
PC	5.30	0.95	5.60	1.65	6.11	1.27	6.90	1.60	6.60	1.90	6.70	1.70	6.20	1.60

Note: TN: Tenses, PNG: PNG markers; CM: Case markers; TIC: Transitives, Intransitves and Causatives; ST: Sentence Types; PR: Predicates; CCQ:Conjunctions, Comparatives and Quotatives; CC: Conditional Clauses; PC: Participial Constructions.

1. Tenses

Analysis of results in Table 4.1.2.2 for 'tenses' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.5 to 7.9 .This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend .

The results showed that there was significant difference among age groups for the sentence category 'tenses' , $F (5, 54) = 3.899$, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 7-8 and 9-10; 7-8 and 11-12; 8-9 and 11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 10-11; 7-8 and 8-9;7-8 and 10-11; 8-9 and 9-10;8-9 and 10-11;9-10 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on accuracy from 6-7 years to 11-12 years of age (Figure 4.1.2.3).

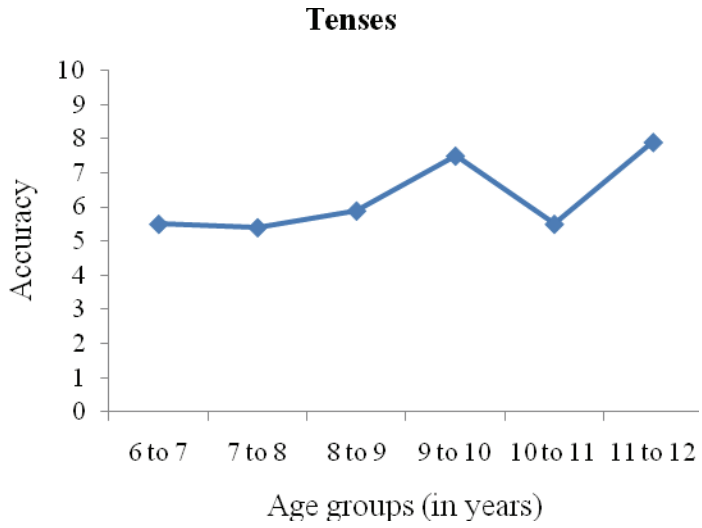

Figure 4.1.2.3: Mean accuracy across different age groups for 'Tenses'

2. PNG markers

Analysis of results in Table 4.1.2.2 for 'PNG markers' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 12.40 to 11.30. This indicated that there was no improvement in the performance of children from 6-7 years to 11-12 years.

The results showed that there was significant difference among age groups for the sentence category 'PNG markers', $F(5, 54) = 4.891$, $p<0.001$. Post hoc Duncan's test revealed that there was a significant difference between the performances of children in the 10-11 year age group from the other age groups. However, there was no significant difference in the performances of other age groups. The findings showed that there was no significant developmental trend observed in the performance of TDC on RT from 6-7 years to 11-12 years of age (Figure 4.1.2.4).

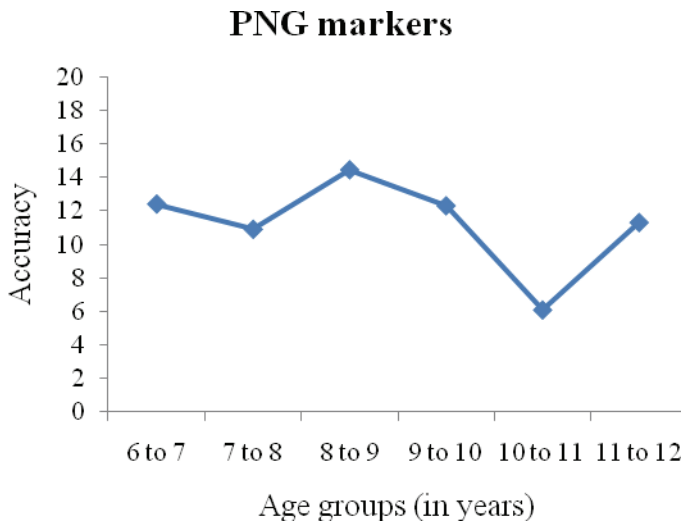

Figure 4.1.2.4: Mean accuracy across different age groups for 'PNG markers'

3. Case markers

Analysis of results in Table 4.1.2.2 for 'Case markers' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.10 to 5.20. The results showed that there was no significant difference among age groups for the sentence category 'Case markers' (Figure 4.1.2.5).

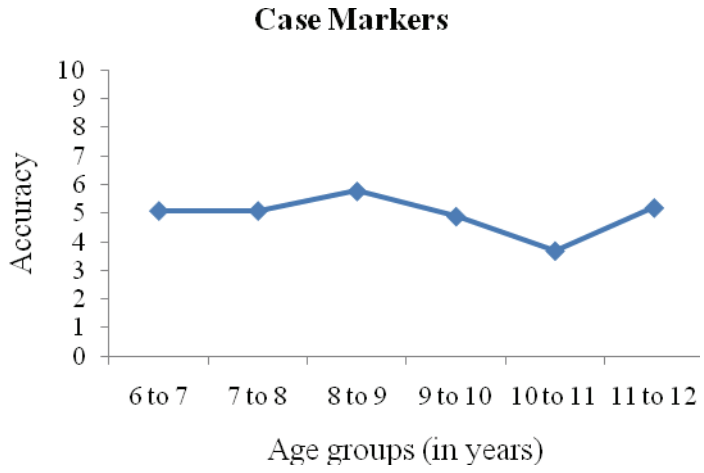

Figure 4.1.2.5: Mean accuracy across different age groups for 'Case markers'

4. Transitives, Intransitives and Causatives

Analysis of results in Table 4.1.2.2 for 'Transitives, Intransitives and Causatives' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 6.90 to 5.30. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was significant difference among age groups for the sentence category 'Transitives, Intransitives and Causatives', $F(5, 54) = 4.408$, $p < 0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was significant difference between the performance of 6-7 and 10-11; 7-8 and 10-11; 8-9 and 10-11; 9-10 and 10-11 year old TDC.

Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 9-10; 7-8 and 8-9; 7-8 and 9-10; 7-8 and 11-12; 8-9 and 9-10; 8-9 and 11-12; 9-10 and 11-12; 10-11 and 11-12 year old TDC. . The findings showed that there was a significant developmental trend observed in the performance of TDC on accuracy from 6-7 years to 11-12 years of age (Figure 4.1.2.6).

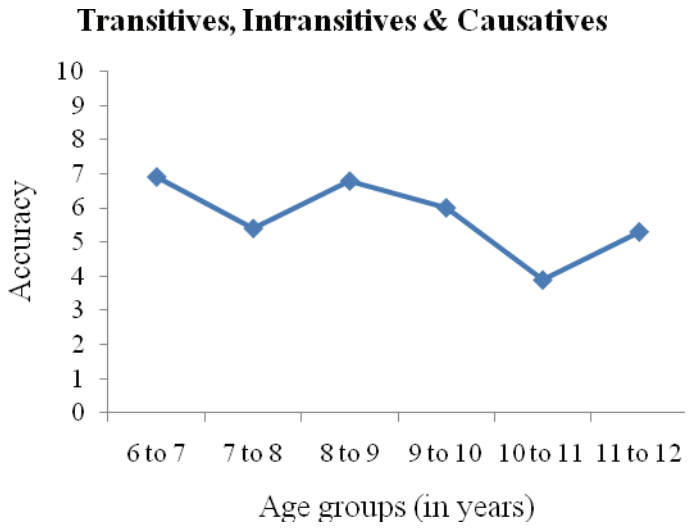

Figure 4.1.2.6: Mean accuracy across different age groups for 'Transitives, Intransitives and Causatives'

5. Sentence types

Analysis of results in Table 4.1.2.2 for 'Sentence types' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.90 to 6.40.. The results showed that there was no significant difference among age groups for the sentence category 'Sentence types' (Figure 4.1.2.7)

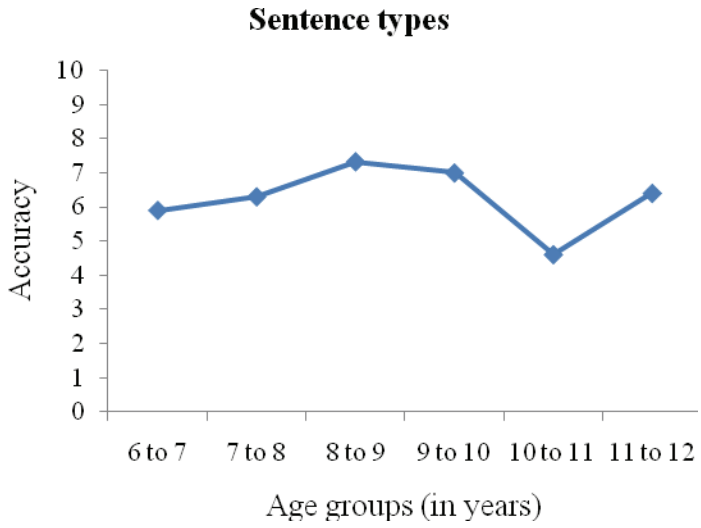

Figure 4.1.2.7: Mean accuracy across different age groups for 'Sentence types'

6. Predicates

Analysis of results in Table 4.1.2.2 for 'Predicates' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.00 to 5.50. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was significant difference among age groups for the sentence category 'Predicates', $F(5, 54) = 4.520$, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was

also significant difference between the performance of 6-7 and 8-9; 7-8 and 8-9; 7-8 and10-11; 8-9 and 10-11; 9-10 and 10-11 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 9-10; 7-8 and 8-9; 7-8 and 9-10; 7-8 and 11-12; 8-9 and 9-10; 8-9 and 11-12; 9-10 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on accuracy from 6-7 years to 11-12 years of age (Figure 4.1.2.8).

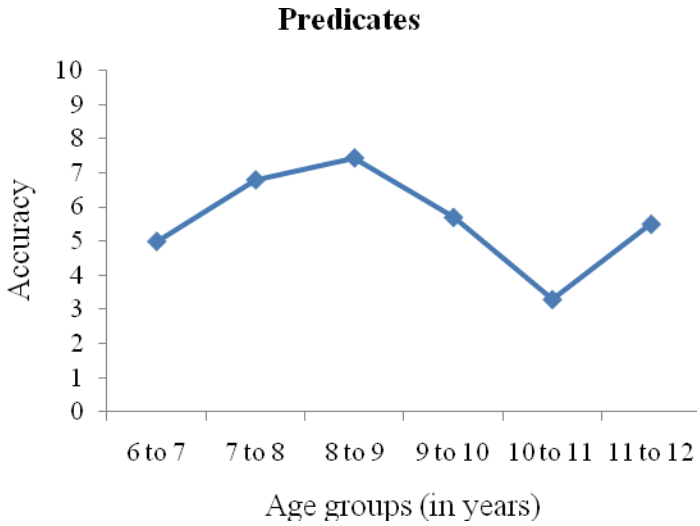

Figure 4.1.2.8: Mean accuracy across different age groups for 'Predicates'.

7. Conjunctions, Comparatives & Quotatives

Analysis of results in Table 4.1.2.2 for 'Conjunctions, Comparatives and Quotatives' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.00 to 6.70. This indicated that

there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was significant difference among age groups for the sentence category 'Conjunctions, Comparatives and Quotatives', F (5, 54) =4.520, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 6-7 and 10-11; 7-8 and 8-9; 7-8 and 9-10; 7-8 and11-12 year old TDC. Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 10-11; 7-8 and 10-11;8-9 and 9-10; 8-9 and10-11; 8-9 and 11-12; 9-10 and 10-11; 9-10 and 11-12; 10-11 and 11-12 year old TDC. The findings showed that there was a significant developmental trend observed in the performance of TDC on accuracy from 6-7 years to 11-12 years of age (Figure 4.1.2.9).

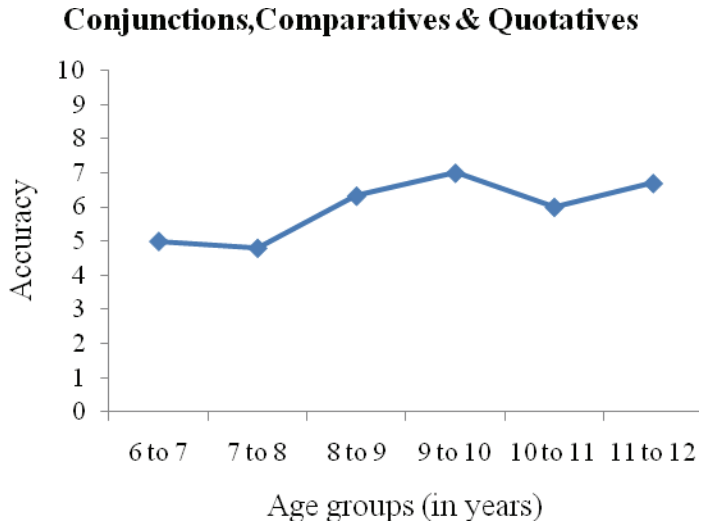

Figure 4.1.2.9: Mean accuracy across different age groups for 'Conjunctions, Comparatives and Quotatives'

8. Conditional clauses

Analysis of results in Table 4.1.2.2 for 'Conditional Clauses' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 4.90 to 8.00. This indicated that there was an improvement in the performance of children from 6-7 years to 11-12 years showing a developmental trend.

The results showed that there was significant difference among age groups for the sentence category 'Conditional Clauses', $F(5, 54) = 4.520$, $p<0.01$. Post hoc Duncan's test revealed that there was a significant difference between the performance of children in the younger group (6-7years) and the older group (11-12 years) at 0.05 level thus indicating an overall developmental trend. There was also significant difference between the performance of 6-7 and 9-10; 7-8 and 8-9; 7-8 and 9-10; 7-8 and 11-12; 9-10 and 10-11; 10-11 and 11-12 year old TDC.

Duncan's post hoc test also revealed that there was no significant difference between the performance of 6-7 and 7-8; 6-7 and 8-9; 6-7and 10-11; 7-8 and 10-11; 8-9 and 9-10; 8-9 and 10-11;8-9 and 11-12; 9-10 and 11-12 year old TDC. . The findings showed that there was a significant developmental trend observed in the performance of TDC on accuracy from 6-7 years to 11-12 years of age (Figure 4.1.2.10).

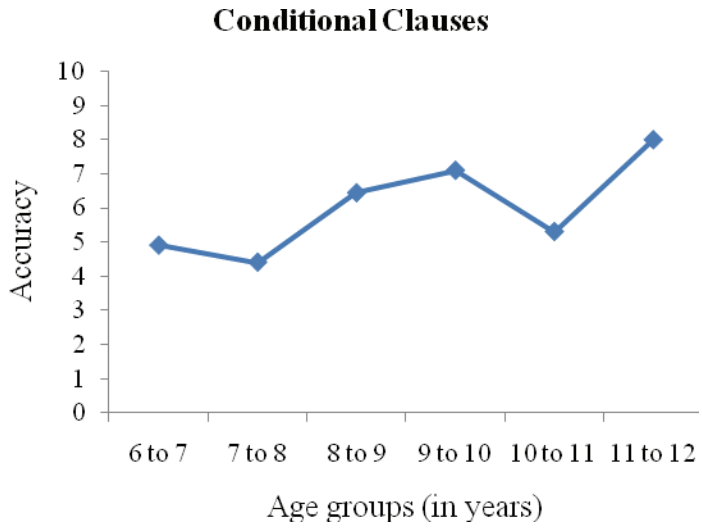

Figure 4.1.2.10: Mean accuracy across different age groups for 'Conditional clauses'

9. Participial constructions

Analysis of results in Table 4.1.2.2 for 'Participial Constructions' revealed that the mean scores of performance of TDC in the age group of 6-7 years to 11-12 years ranged from 5.30 to 6.70 . This would indicate that there is no developmental trend observed for the sentence category "Participial constructions" (Figure 4.1.2.11).

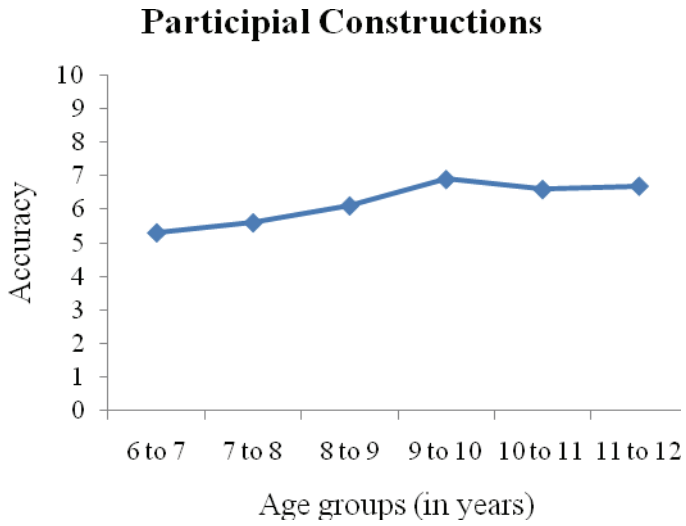

Figure 4.1.2.11: Mean accuracy across different age groups for 'Participial constructions'

To summarize the results on accuracy measure for TDC, the findings of the present study showed that there was an improvement in the performance of children from 6-7 years to 11-12 years showing an overall developmental trend. Among the sentence categories, those categories which showed a developmental trend are Tenses; PNG markers; Transitives,intransitives & causatives; Conjunctions,comparatives & quotatives ; Conditional clauses and Predicates. The categories which did not show a developmental trend are Case markers; Sentence types and Participial constructions. Results also showed that that the sentence category, PNG markers which had the highest total mean accuracy (Mean= 11.19, SD= 4.57) was acquired developmentally earlier. The rest of the sentence categories were acquired later.

4.2 Comparison of performance of children with LD and TDC on RT and accuracy measures

In the present study, the clinical group consisted of a total of eighteen children with LD from 6-12 years of age. The 6-7 years, 7-8 years, 8-9 years and 9-10 years age groups consisted of two children in each age group. The 10-11 and 11-12 years age groups consisted of five children in each age group. Non parametric statistics was used to compare TDC and children with LD as there were unequal number of subjects in both the groups. Mann Whitney test was used to compare the performance of children with LD and TDC for RT and accuracy measures.

4.2.1 Comparison of performance of children with LD and TDC on RT measure

Overall results indicated that it was found that children with LD (Mean= 1527.00, SD =519.65) took longer time to respond when compared to TDC (Mean= 1306.64, SD= 607.82). Also, children with LD (Mean= 56.56, SD= 12.14) were less accurate when compared to TDC (Mean=57.40, SD= 14.10). Further, Mann Whitney test was used to compare the overall performance of children with LD and TDC on RT and accuracy measures.

Mann Whitney test was used to compare performance of children with LD and TDC with respect to RT across age groups. Table 4.2.2.1 shows Mean and SD values on RT for LD and TDC across age groups.

Table 4.2.2.1: Mean and SD values on RT measure for LD and TDC across age groups

Age (in years)	**Groups**			
	LD		**TDC**	
	Mean	**SD**	**Mean**	**SD**
6-7	2106.53	645.52	1527.97	561.33
7-8	1286.25	165.88	1504.79	538.01
8-9	1739.31	779.59	1224.36	328.65
9-10	1628.75	32.77	1833.13	825.18
10-11	1259.08	372.92	782.29	113.31
11-12	1533.80	656.46	967.29	410.59

Analysis of results in Table 4.2.2.1 revealed that the mean scores of children with LD in the age group of 6-7 years to 11-12 years on RT measure ranged from 2106.53 ms to 1533.80 ms and the mean scores of TDC in the age group of 6-7 years to 11-12 years ranged from 1527.97ms to 967.29 ms. The findings revealed that there was an improvement in performance of both children with LD and TDC from 6-7 years to 11-12 years (Figure 4.2.2.1).

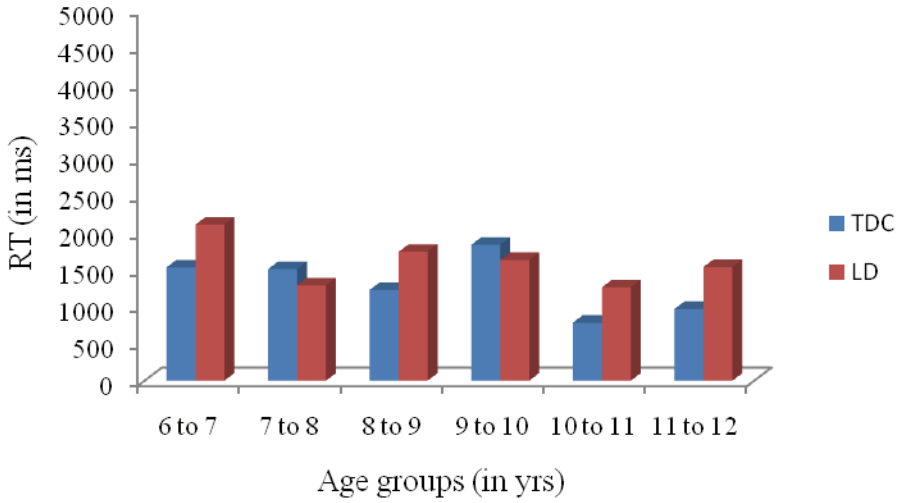

Figure 4.2.2.1: Comparison of performance of TDC and LD on RT measures across age groups

4.2.2. Comparison of performance of children with LD and TDC on accuracy

Mann Whitney test was used to compare performance of children with LD and TDC with respect to accuracy across age groups. Table 4.2.2.2 shows Mean and SD values on accuracy measure for LD and TDC across age groups.

Table 4.2.2.2: Mean and SD values on accuracy measure for LD and TDC across age groups

Age group (in years)	GROUPS			
	LD		TDC	
	Mean	SD	Mean	SD
6-7	44.00	2.83	53.80	9.16
7-8	56.50	2.12	54.70	10.85
8-9	50.50	10.61	63.50	13.78
9-10	68.50	0.71	64.40	13.47
10-11	57.60	13.80	45.00	12.75
11-12	58.20	15.21	63.00	15.59

Analysis of results in Table 4.2.2.2 revealed that the mean scores of children with LD in the age group of 6-7 years to 11-12 years ranged from 44 to 58.20 and the mean scores of TDC in the age group of 6-7 years to 11-12 years ranged from 53.80 to 63.00. The findings revealed that there was an improvement in performance of both children with LD and TDC from 6-7 years to 11-12 years (Figure 4.2.2.2).

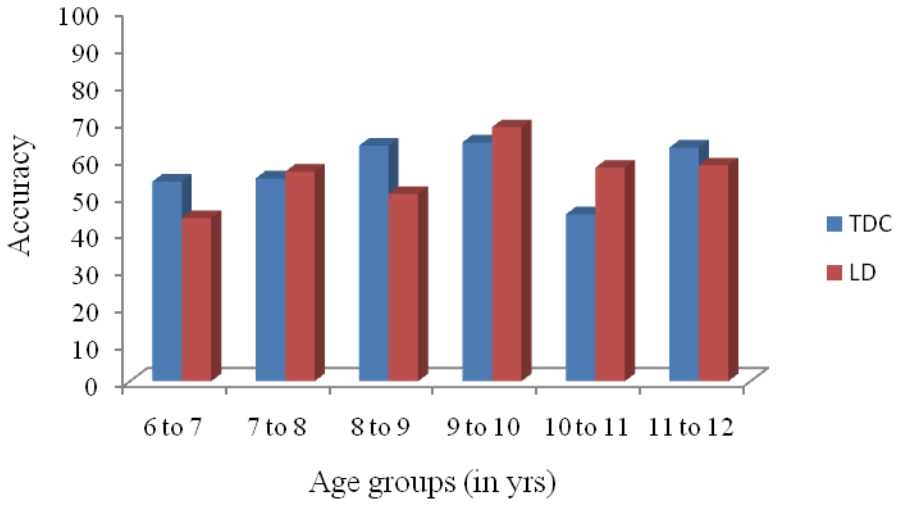

Figure 4.2.2.2: Comparison of performance of TDC and LD on accuracy measures across age groups

Mann Whitney test was used to compare the performance of children with LD and TDC on RT measures across sentence categories. Median values were also considered along with mean and SD values as mean is affected by extreme values in non-parametric statistics which was used in the present study. Table 4.2.3.1 shows the mean, median and SD values for both the groups on RT measures across sentence categories.

Table 4.2.3.1: Comparison of Mean, Median and SD values of children with LD and TDC on RT measures across sentence categories

Sentence categories	GROUPS					
	TDC			LD		
	Mean	Median	SD	Mean	Median	SD
T N	1363.76	1200.57	645.59	1980.61	1620.80	962.17
PNG	972.20	755.84	658.03	1285.28	1131.63	611.33
CM	842.55	697.85	544.65	1179.75	976.95	705.73
TIC	945.42	741.28	649.34	1332.62	1427.00	625.46
ST	992.93	828.21	550.40	1206.43	1126.55	693.71
PR	803.00	584.22	484.56	1064.96	1073.03	474.13
CCQ	1401.86	1346.88	570.62	1678.58	1787.53	815.91
CC	1904.38	1795.48	521.93	2374.46	2372.51	631.25
PC	2919.34	1467.88	3910.99	1942.17	1862.87	558.60
Overall RT	1306.64	1118.46	607.82	1527.00	1526.19	519.65

Note: TN: Tenses, PNG: PNG markers; CM: Case markers; TIC: Transitives, Intransitves and Causatives; ST: Sentence Types;PR: Predicates; CCQ:Conjunctions, Comparatives and Quotatives; CC: Conditional Clauses; PC: Participial Constructions.

Analysis of results revealed that the children with LD took longer time compared to TDC across sentence categories. However, the results indicated a significant difference in the performance of children with LD and TDC for the following sentence categories: Tenses ($Z= -2.360$, $p <0.05$), PNG markers ($Z= -2.040$, $p <0.05$), Transitives,

intransitives & causatives (Z= -2.467, p <0.05), Predicates (Z= -2.407, p <0.05) and Conditional clauses (Z= -2.882, p <0.01). Results also showed that there was no significant difference for the sentence categories Case markers; Sentence types; Conjunctions, comparatives & quotatives and Participial constructions between the two groups.

Mann Whitney test was used to compare performance of children with LD and TDC with respect to accuracy measures across sentence categories. Median values were also considered since non parametric statistics were used because mean is affected by extreme values. Table 4.2.3.2 shows the mean, median and SD values for both the groups for accuracy measures across sentence categories.

Table 4.2.3.2: Comparison of Mean, Median and SD values of children with LD and TDC for accuracy measures across sentence categories

Sentence categories	Groups					
	TDC			LD		
	Mean	Median	SD	Mean	Median	SD
TN	6.32	6.00	1.99	5.22	5.00	1.59
PNG	11.08	11.50	4.60	11.89	11.50	3.356
CM	4.95	5.00	1.83	4.65	4.00	2.15
TIC	5.67	6.00	1.88	5.78	7.00	2.32
ST	6.22	6.50	2.17	5.72	6.00	2.42
PR	5.52	6.00	2.47	6.11	7.00	2.17
CCQ	5.93	6.00	1.60	5.72	6.00	1.23
CC	5.97	6.00	2.10	5.61	5.50	2.00
PC	6.20	6.00	1.58	6.11	6.00	1.02
Overall accuracy	57.40	57.00	14.10	56.56	55.50	12.14

Note: TN: Tenses, PNG: PNG markers; CM: Case markers; TIC: Transitives, Intransitves and Causatives; ST: Sentence Types;PR: Predicates; CCQ:Conjunctions, Comparatives and Quotatives; CC: Conditional Clauses; PC: Participial Constructions.

The results showed that there was no significant difference between the performance of the two groups for all the sentence categories (PNG markers, Case markers, Transitives,intransitives & causatives, Sentence types, Predicates, Conjunctions,comparatives & quotatives, Conditional clauses, Participial constructions) except Tenses ($Z=-2.163$, $p<0.05$).

Subjective analysis of children with Learning Disability (LD)

A subjective analysis of the performance of children with LD in comparison to TDC for each sentence category (Tenses; PNG markers; Case markers; Transitives, Intransitives and causatives; Sentence types; Predicates; Conjunctions, Comparatives and Quotatives; Conditional Clauses; Participial Costructions) was done and the results are explained in the following section,

Tenses

On accuracy, for the 6-7 year age group, LD2 (Mean= 3.00) performed the poorest on accuracy when compared to age matched TDC (Mean=5.50) whereas LD1 (Mean= 5.00) performed as well as age matched TDC. In the 7-8 year age group, both LD3 (Mean= 7.00) and LD4 (Mean= 7.00) performed better than age matched TDC (Mean=5.40). In the 8-9 year age group, **LD5** (Mean= 2.00) performed the poorest and LD6 performed as well as age matched TDC (Mean=5.89). In the 9-10 year age group, LD7 (Mean= 5.00) performed poorer and LD8 (Mean= 8.00) performed as well as age matched TDC (Mean=7.50). LD5 made errors on sentences such as /si:the monne barutha:le/ (see Appendix)

In the 10-11 year age group, LD10 (Mean= 4.00) and LD12 (Mean= 4.00) performed the poorest and LD9 (Mean= 5.00) and LD13 (Mean= 5.00) performed as well as age matched TDC (Mean=5.50) and LD 11(Mean= 7.00) performed better than age matched TDC. In the 11-12 year age group, LD14 (Mean= 4.00), LD15 (Mean= 4.00), performed the poorest and LD 17(Mean= 6.00) and LD18 (Mean= 6.00) performed

poorer than age matched TDC. LD16 (Mean=7.00) performed as well as age matched TDC (Mean=7.90).

On reaction time measure it was found that, in the 6-7 years age group LD1 (Mean= 3598.34) and LD2 (Mean= 3426.26) took longer time to respond than age matched TDC (Mean= 1775.33). In the 7-8 years age group LD3 (Mean= 1096.06) and LD4 (Mean= 823.11) took shorter time to respond than age matched TDC (Mean= 1849.27). In the 8-9 years age group LD5 (Mean= 3144.20) and LD6 (Mean= 1444.95) took longer time to respond than age matched TDC (Mean= 1418.88). In the 9-10 years age group LD7 (Mean= 3175.38) and LD8 (Mean= 1539.77) took longer time to respond than age matched TDC (Mean= 1275.52). In the 10-11 years age group LD10 (Mean= 2496.77), LD12 (Mean= 2023.11), LD13 (Mean= 1701.84), LD9 (Mean= 1194.02) and LD11 (Mean= 966.21) took longer time to respond than age matched TDC (Mean= 831.29). In the 11-12 years age group LD16 (Mean= 3005.11), LD17 (Mean= 2599.09), LD18 (Mean= 1390.80) took longer time to respond than age matched TDC (Mean= 1102.23). LD14 (Mean= 1016.20), LD15 (Mean= 1009.79) took shorter time to respond than age matched TDC (Mean= 1102.23).

PNG markers

On accuracy measure for PNG markers the 6-7 year age group, LD1 (Mean= 11.00) performed poorer when compared to age matched TDC (Mean=12.40) whereas LD2 (Mean= 16.00) performed better than age matched TDC. LD1 made errors on sentences such as /naavu noduvalu/ and /adu malagithu/ (see Appendix). In the 7-8 year age group LD4 (Mean= 6.00) and LD3 (Mean= 9.00) performed poorer than age matched

TDC (Mean=10.90). In the 8-9 year age group, LD5 (Mean= 13.00) and LD6 (mean=11.00) performed poorer than age matched TDC (Mean=14.44). In the 9-10 year age group, LD8 (Mean= 12.00) performed as well as age matched TDC (Mean=12.30). LD7 (Mean= 15.00) performed better than age matched TDC. In the 10-11 year age group, LD10 (Mean= 15.00) and LD11 (Mean= 10.00), LD 12 (Mean=7.00), LD13 (Mean=18.00) performed as well as TDC but LD9 (Mean= 5.00) and LD13 (Mean= 5.00) performed poorer than age matched TDC (Mean=6.10). In the 11-12 year age group, LD14 (Mean= 10.00), LD15 (Mean= 8.00) and LD18 (Mean= 10.00) performed poorer than age matched TDC (Mean=11.30). LD 17(Mean= 16.00) and LD16 (Mean=14.00) performed better than age matched TDC.

On RT measures, in the 6-7 years age group LD2 (Mean= 2252.07) and LD1 (Mean= 1787.29) took longer time to respond than age matched TDC (Mean= 1480.42). In the 7-8 years age group, both LD3 (Mean= 1277.15) and LD4 (Mean= 1017.01) took shorter time to respond than age matched TDC (Mean= 1307.26). In the 8-9 years age group LD5 (Mean= 2271.77) took longer time to respond than age matched TDC (Mean= 1044.91). LD6 (Mean= 1000.74) took shorter time to respond than age matched TDC (Mean= 1044.91). In the 9-10 years age group, both LD7 (Mean= 1504.94) and LD8 (Mean= 1314.78) took longer time to respond than age matched TDC (Mean= 681.65). In the 10-11 years age group LD13 (Mean= 1142.31), LD10 (Mean= 1120.95), LD12 (Mean= 1016.67) and LD9 (Mean= 716.96) took longer time to respond than age matched TDC (Mean= 412.41). LD11 (Mean= 140.45) took shorter time to respond than age matched TDC (Mean= 412.41). In the 11-12 years age group LD16 (Mean= 2274.88), LD17 (Mean= 1910.44), LD18 (Mean= 978.05), LD15 (Mean= 926.27) took

longer time to respond than age matched TDC (Mean= 662.70). LD14 (Mean= 482.31) took shorter time to respond than age matched TDC (Mean= 662.70).

Case markers

On accuracy measure, in the 6-7 year age group, LD1 (Mean=1.00) and LD2 (Mean=3.00) performed poorer than age matched TDC (Mean=5.10). In the 7-8 year age group LD3 (Mean= 4.00) performed poorer whereas LD4 (Mean= 8.00) performed better than age matched TDC (Mean=5.10). In the 8-9 year age group, LD6 (Mean=3.00) performed poorer whereas LD5 (Mean=7.00) performed better than age matched TDC (Mean= 5.78). In the 9-10 year age group, LD8 (Mean=4.00) performed poorer whereas LD7 (Mean= 7.00) performed better than age matched TDC (Mean=4.90). In the 10-11 year age group, LD12 (Mean=1.00) performed poorer whereas LD13 (Mean=4.00), LD11 (Mean=4.00), LD9 (Mean=5.00) and LD10 (Mean=8.00) performed better than age matched TDC (Mean=3.70) . In the 11-12 year age group, LD14 (Mean=4.00) and LD18 (Mean=4.00) performed poorer whereas LD16 (Mean=7.00) performed better than age matched TDC. LD17 (Mean=5.00) performed as well as age matched TDC. Errors were found on sentences like /huduganige helidhe/ and /melakke gombe/ (See appendix).

On RT measure in the 6-7 years age group, both LD2 (Mean= 2720.50) and LD1 (Mean= 2047.07) took longer time to respond than age matched TDC (Mean= 1153.33). In the 7-8 years age group, LD4 (Mean= 1573.34) took longer time whereas LD3 (Mean= 372.05) took shorter time to respond than age matched TDC (Mean= 1069.96). In the 8-9 years age group both LD5 (Mean= 1869.56) and LD6 (Mean= 1149.63) took longer time to respond than age matched TDC (Mean= 923.92). In the 9-10 years age group, both

LD7 (Mean= 976.95) and LD8 (Mean= 961.61) took longer time to respond than age matched TDC (Mean= 804.66). In the 10-11 years age group LD10 (Mean= 1709.25), LD9 (Mean= 604.09), LD12 (Mean= 572.59) and LD13 (Mean= 469.99) took longer time to respond than age matched TDC (Mean= 320.64). LD11 (Mean= 305.31) took shorter time to respond than age matched TDC (Mean= 320.64). In the 11-12 years age group LD15 (Mean= 0) performed the poorest, LD17 (Mean= 1738.32), LD16 (Mean= 1721.22) took longer time to respond than age matched TDC (Mean= 730.63). LD14 (Mean= 721.92) and LD18 (Mean= 542.32) took shorter time to respond than age matched TDC (Mean= 730.63).

Transitives, intransitives and causatives

On accuracy measure, in the 6-7 year age group, LD2 (Mean= 2.00) and LD1 (Mean= 4.00) performed poorer than age matched TDC (Mean=6.90). In the 7-8 year age group, both LD3 (Mean= 7.00) and LD4 (Mean= 6.00) performed better than age matched TDC (Mean=5.40). In the 8-9 year age group, LD6 (Mean=3.00) performed poorer whereas LD5 (Mean=8.00) performed better than age matched TDC (Mean= 6.78). In the 9-10 year age group, LD7 (Mean=7.00) and LD8 (Mean= 8.00) performed better than age matched TDC (Mean=6.00). In the 10-11 year age group, LD9 (Mean=7.00), LD10 (Mean= 7.00), LD11 (Mean= 5.00), LD12 (Mean= 7.00) and LD13 (Mean=8.00) performed better than age matched TDC (Mean=3.90). In the 11-12 year age group, LD14 (Mean=4.00) and LD15 (Mean=1.00) performed poorer whereas LD16 (Mean=9.00) and LD17 (Mean=7.00) performed better than age matched TDC

(Mean=5.30). LD18 (Mean=5.00) performed as well as age matched TDC. Errors were found on sentences such as /halige niru beresabeda/ and /akkasaali maaduthane/.

On RT measure, in the 6-7 years age group, both LD2 (Mean= 2622.57) and LD1 (Mean= 1482.11) took longer time to respond than age matched TDC (Mean= 1281.71). In the 7-8 years age group, LD4 (Mean= 738.42) and LD3 (Mean= 898.60) took shorter time to respond than age matched TDC (Mean= 1290.77). In the 8-9 years age group both LD5 (Mean= 1799.91) and LD6 (Mean= 1811.31) took longer time to respond than age matched TDC (Mean= 1054.56). In the 9-10 years age group, both LD7 (Mean= 1259.93) and LD8 (Mean= 1964.18) took longer time to respond than age matched TDC (Mean= 647.04). In the 10-11 years age group LD10 (Mean= 1565.08), LD9 (Mean= 1609.42), LD12 (Mean= 1408.83) and LD13 (Mean= 1169.54) took longer time to respond than age matched TDC (Mean= 523.74). LD11 (Mean= 426.83) took shorter time to respond than age matched TDC (Mean= 523.74). In the 11-12 years age group LD16 (Mean= 2139.53), LD17 (Mean= 1445.16) took longer time to respond than age matched TDC (Mean= 902.45). LD14 (Mean= 437.45), LD15 (Mean= 429.36) and LD18 (Mean= 778.92) took shorter time to respond than age matched TDC (Mean= 902.45).

Sentence types

On accuracy measure, in the 6-7 year age group, LD2 (Mean= 3.00) and LD1 (Mean= 4.00) performed poorer than age matched TDC (Mean=5.90). In the 7-8 year age group, both LD3 (Mean= 6.00) and LD4 (Mean= 6.00) performed as well as age matched TDC (Mean=6.30). In the 8-9 year age group, LD6 (Mean=5.00) performed poorer whereas LD5 (Mean=7.00) performed as well as age matched TDC (Mean= 7.33). In the

9-10 year age group, LD7 (Mean=6.00) performed poorer whereas LD8 (Mean= 8.00) performed better than age matched TDC (Mean=7.00). In the 10-11 year age group, LD9 (Mean=2.00) and LD12 (Mean= 2.00) performed poorer whereas, LD10 (Mean= 9.00), LD11 (Mean= 5.00), and LD13 (Mean=9.00) performed better than age matched TDC (Mean=4.60). In the 11-12 year age group, LD15 (Mean=2.00) and LD18 (Mean=5.00) performed poorer whereas LD14 (Mean=7.00), LD16 (Mean=9.00) and LD17 (Mean=8.00) performed better than age matched TDC (Mean=6.40). Errors were found on sentences such as /idhu bengaluuru alla/ /avara java:bda:ri naave no:dikolluththare/ (See appendix).

On RT measure, in the 6-7 years age group, LD2 (Mean=1847.52) took longer time to respond than age matched TDC (Mean= 1489.51). LD1 (Mean= 1328.41) took shorter time to respond than age matched TDC. In the 7-8 years age group, LD4 (Mean= 695.54) and LD3 (Mean= 1187.20) took shorter time to respond than age matched TDC (Mean= 1262.20). In the 8-9 years age group LD5 (Mean= 3066.86) took longer time to respond than age matched TDC (Mean= 1023.54). LD6 (Mean= 979.10) took shorter time to respond than age matched TDC (Mean= 1023.54). In the 9-10 years age group, LD8 (Mean= 1710.41) took longer time to respond than age matched TDC (Mean= 897.52). LD7 (Mean= 1259.93) took shorter time to respond than age matched TDC (Mean= 897.52). In the 10-11 years age group LD10 (Mean= 1183.87), LD13 (Mean= 1069.22) and LD11 (Mean= 580.46) took longer time to respond than age matched TDC (Mean= 557.45). LD9 (Mean= 546.00) and LD12 (Mean= 314.16) took shorter time to respond than age matched TDC (Mean= 557.45). In the 11-12 years age group LD16 (Mean= 2037.55), LD18 (Mean= 1780.15), LD17 (Mean= 1446.81) took longer time to

respond than age matched TDC (Mean= 755.91). LD14 (Mean= 746.52) and LD15 (Mean= 434.16) took shorter time to respond than age matched TDC (Mean= 755.91).

Predicates

On accuracy measure, in the 6-7 year age group, LD2 (Mean= 4.00) and LD1 (Mean= 4.00) performed poorer than age matched TDC (Mean=5.00). In the 7-8 year age group, LD4 (Mean= 7.00) performed as well as age matched TDC (Mean=6.80). LD3 (Mean= 8.00) performed better than age matched TDC. In the 8-9 year age group, LD6 (Mean=2.00) performed poorer whereas LD5 (Mean=8.00) performed as well as age matched TDC (Mean= 7.44). In the 9-10 year age group, LD7 (Mean=7.00) performed poorer whereas LD8 (Mean= 8.00) performed better than age matched TDC (Mean=5.70). In the 10-11 year age group, LD9 (Mean=2.00) and LD12 (Mean= 2.00) performed poorer whereas , LD10 (Mean= 9.00), LD11 (Mean= 5.00), and LD13 (Mean=9.00) performed better than age matched TDC (Mean=4.60) . In the 11-12 year age group, LD15 (Mean=2.00) and LD18 (Mean=5.00) performed poorer whereas LD14 (Mean=7.00), LD16 (Mean=9.00) and LD17 (Mean=8.00) performed better than age matched TDC (Mean=6.40). Errors were found on sentences such as e: langa kamala/.

On RT measure, in the 6-7 years age group, both LD2 (Mean=1393.14) and LD1 (Mean=1151.75) took longer time to respond than age matched TDC (Mean= 1026.98). In the 7-8 years age group, LD3 (Mean= 886.50) and LD4 (Mean= 814.15) took shorter time to respond than age matched TDC (Mean= 1276.47). In the 8-9 years age group LD5 (Mean= 1911.14) took longer time to respond than age matched TDC (Mean= 750.21). LD6 (Mean= 32.21) took shorter time to respond than age matched TDC

(Mean= 750.21). In the 9-10 years age group,both LD7 (Mean= 1081.06) and LD8 (Mean= 1031.05) took longer time to respond than age matched TDC (Mean= 596.43). In the 10-11 years age group LD12 (Mean= 1488.37), LD9 (Mean= 1157.08), LD10 (Mean= 973.80) and LD13 (Mean= 652.31) took longer time to respond than age matched TDC (Mean= 587.62). LD11 (Mean= 534.69) took shorter time to respond than age matched TDC (Mean= 587.62). In the 11-12 years age group LD18 (Mean= 1800.91), LD16 (Mean= 1340.97), LD17 (Mean= 1439.78), LD15 (Mean= 1065.00) took longer time to respond than age matched TDC (Mean= 634.67). LD14 (Mean= 415.46) and took shorter time to respond than age matched TDC (Mean= 634.67).

Conjunctions, comparatives and quotatives

On accuracy measure, in the 6-7 year age group, LD2 (Mean= 3.00) performed poorer whereas, LD1 (Mean= 6.00) performed better than age matched TDC (Mean=5.00). In the 7-8 year age group, LD4 (Mean= 4.00) performed as well as age matched TDC (Mean=4.80). LD3 (Mean= 6.00) performed better than age matched TDC. In the 8-9 year age group, LD6 (Mean=5.00) performed poorer whereas LD5 (Mean=7.00) performed better than age matched TDC (Mean= 6.33). In the 9-10 year age group, LD7 (Mean=7.00) and LD8 (Mean= 7.00) performed as well as age matched TDC (Mean=7.00). In the 10-11 year age group, LD11 (Mean= 4.00) and LD12 (Mean= 5.00) performed poorer whereas, LD10 (Mean= 6.00), and LD13 (Mean=6.00) performed as well as age matched TDC (Mean=6.00). LD9 (Mean=7.00) performed better than age matched TDC. In the 11-12 year age group, LD14 (Mean=5.00) and LD15 (Mean=5.00) performed poorer whereas LD16 (Mean=6.00), LD17 (Mean=7.00) and LD18

(Mean=7.00) performed as well as age matched TDC (Mean=6.70). Errors were seen on sentences such as nanna anna makkalu bandaru/ and /ganesha mattu ramesha ho:da:ga seeteya karakondu ho:daru/ (See appendix)

On RT measure, in the 6-7 years age group, LD2 (Mean=2580.64) took longer time to respond than age matched TDC (Mean= 1792.68). LD1 (Mean=800.16) took shorter time to respond than age matched TDC (Mean= 1792.68). In the 7-8 years age group, LD3 (Mean= 2535.76) took longer time to respond than age matched TDC (Mean= 1595.27). LD4 (Mean= 1459.37) took shorter time to respond than age matched TDC. In the 8-9 years age group LD5 (Mean= 2737.33) took longer time to respond than age matched TDC (Mean= 1356.37). LD6 (Mean= 762.99) took shorter time to respond than age matched TDC (Mean= 1356.37).

In the 9-10 years age group,both LD7 (Mean= 1706.49) and LD8 (Mean= 1905.89) took longer time to respond than age matched TDC (Mean= 1309.45). In the 10-11 years age group LD12 (Mean= 2674.18), LD13 (Mean= 1868.57) and LD9 (Mean= 1214.26) took longer time to respond than age matched TDC (Mean= 1202.35). LD10 (Mean= 981.44) and LD11 (Mean= 646.01) took shorter time to respond than age matched TDC (Mean= 1202.35). In the 11-12 years age group LD17 (Mean= 2694.36), LD16 (Mean= 2471.69), LD18 (Mean= 1996.32) took longer time to respond than age matched TDC (Mean= 1223.90). LD14 (Mean= 652.63) and LD15 (Mean= 526.33) took shorter time to respond than age matched TDC (Mean= 1223.90).

Conditional clauses

On accuracy measure, in the 6-7 year age group, LD1 (Mean= 4.00) and LD2 (Mean= 4.00) performed poorer than age matched TDC (Mean=4.90). In the 7-8 year age group, LD3 (Mean= 5.00) and LD4 (Mean= 5.00) performed better than age matched TDC (Mean=4.40). In the 8-9 year age group, LD5 (Mean=1.00) and LD6 (Mean=4.00) performed poorer than age matched TDC (Mean= 6.44). In the 9-10 year age group, LD7 (Mean=8.00) and performed better than age matched TDC (Mean=7.10). LD8 (Mean= 7.00) performed as well as age matched TDC. In the 10-11 year age group, LD12 (Mean= 3.00) performed poorer whereas, LD11 (Mean= 5.00) performed as well as age matched TDC (Mean= 5.30). LD9 (Mean=6.00), LD10 (Mean=9.00), LD13 (Mean= 7.00) performed better than age matched TDC. In the 11-12 year age group, LD15 (Mean=5.00) performed poorest, LD16 (Mean=6.00), LD17 (Mean=7.00) and LD18 (Mean=7.00) also performed poorer than age matched TDC (Mean=8.00). LD14 (Mean=8.00) performed as well as age matched TDC. Errors were seen on sentences such as ni:nu be:ga ho:daru: bassu siguththiralilla/ and /ni:nu tinna iddare doddavana:guvudilla/ (See appendix).

On RT measure, in the 6-7 years age group, LD2 (Mean=3794.59) took longer time to respond than age matched TDC (Mean=2074.20). LD1 (Mean=1773.46) took shorter time to respond than age matched TDC (Mean=2074.20). In the 7-8 years age group, LD3 (Mean= 2876.99) took longer time to respond than age matched TDC (Mean= 2183.34). LD4 (Mean= 1961.02) took shorter time to respond than age matched TDC (Mean= 2183.34). In the 8-9 years age group both LD6 (Mean= 2344.23) and LD5

(Mean= 2060.17) took longer time to respond than age matched TDC (Mean= 2038.66). In the 9-10 years age group, both LD7 (Mean= 2454.77) and LD8 (Mean= 2427.04) took longer time to respond than age matched TDC (Mean= 1739.63). In the 10-11 years age group LD13 (Mean= 2564.19), LD10 (Mean= 2400.80) and LD12 (Mean= 2205.93) took longer time to respond than age matched TDC (Mean= 1663.93). LD11 (Mean= 1615.86) and LD9 (Mean= 1601.78) took shorter time to respond than age matched TDC (Mean= 1663.93). In the 11-12 years age group LD16 (Mean= 3675.80), LD18 (Mean= 2788.76), LD17 (Mean= 2519.53), LD14 (Mean= 2123.66) took longer time to respond than age matched TDC (Mean=1734.76). LD15 (Mean= 1551.64) took shorter time to respond than age matched TDC (Mean=1734.76).

Participial constructions

On accuracy measure, in the 6-7 year age group, LD1 (Mean= 5.00) performed as well as age matched TDC (Mean=5.30). LD2 (Mean= 6.00) performed better than age matched TDC (Mean=5.30). In the 7-8 year age group, LD3 (Mean= 6.00) and LD4 (Mean= 6.00) performed as well as age matched TDC (Mean=5.60). In the 8-9 year age group, LD5 (Mean=5.00) and LD6 (Mean=5.00) performed poorer than age matched TDC (Mean= 6.11). In the 9-10 year age group, LD7 (Mean=7.00) and LD8 (Mean= 6.00) performed as well as age matched TDC (Mean=6.90). In the 10-11 year age group, LD9 (Mean= 5.00), LD12 (Mean= 5.00) and LD10 (Mean= 6.00) performed poorer whereas, LD11 (Mean= 7.00) and LD13 (Mean= 7.00) performed as well as age matched TDC (Mean= 6.60). In the 11-12 year age group, LD16 (Mean= 5.00) and LD18 (Mean= 6.00) performed poorer than age matched TDC (Mean= 6.70). LD14 (Mean=8.00), LD17

(Mean=8.00) and LD15 (Mean=7.00) performed better than age matched TDC (Mean= 6.70). Errors were seen on sentences such as /ninnannu no:dade bahala dinava:yithu/ and /na:nu ivaththu ka:fi kudi thindi thinde/ (See appendix).

On RT measure, in the 6-7 years age group, LD2 (Mean=2740.42) took longer time to respond than age matched TDC (Mean=1798.42). LD1 (Mean=1554.06) took shorter time to respond than age matched TDC (Mean=1798.42). In the 7-8 years age group, LD3 (Mean= 1684.79) and LD4 (Mean= 1590.62) took shorter time to respond than age matched TDC (Mean= 1934.52). In the 8-9 years age group LD5 (Mean= 1781.71) took longer time to respond than age matched TDC (Mean= 1529.65). LD6 (Mean= 1305.24) took shorter time to respond than age matched TDC (Mean= 1529.65). In the 9-10 years age group, both LD7 (Mean= 2069.59) and LD8 (Mean= 1944.03) took longer time to respond than age matched TDC (Mean= 1307.78). In the 10-11 years age group LD13 (Mean= 3194.02), LD9 (Mean= 2039.71), LD10 (Mean= 2012.44) and LD12 (Mean= 1747.14) took longer time to respond than age matched TDC (Mean= 1268.23). LD11 (Mean= 1230.92) took shorter time to respond than age matched TDC (Mean= 1268.23). In the 11-12 years age group LD18 (Mean= 2749.18), LD17 (Mean= 2361.52), LD16 (Mean= 2317.82) and LD14 (Mean= 1373.72) took longer time to respond than age matched TDC (Mean=1291.87). LD15 (Mean= 1262.12) took shorter time to respond than age matched TDC (Mean=1291.87).

CHAPTER V

DISCUSSION

The results of the study are discussed in terms of comparison of performance of children with LD and TDC on RT and accuracy measures on sentence comprehension tasks.

5.1 Comparison of overall performance of children with LD and TDC on RT and accuracy measures

The findings of the present study revealed that children with LD performed poorer than TDC. This indicates that they produced fewer accurate responses for grammaticality judgement and took longer time to judge whether the sentence was correct or incorrect. Analysis of results across age groups also revealed that children with LD performed poorer than their age matched typically developing peers (see Figures 4.2.2.1 and4.2.2.2) from 6-7 years upto 11-12 years. On specific analysis of each sentence category for LD and TDC on accuracy measures, (see Table 4.2.3.1), it was found that there was no significant difference between the overall performance of the two groups for all the sentence categories (PNG markers; Case markers; Transitives, intransitives & causatives; Sentence types; Predicates; Conjunctions, comparatives & quotatives; Conditional clauses; Participial constructions) except Tenses ($Z=-2.163$, $p<0.05$). But on qualitative analysis it was found that children with LD performed poorer on accuracy when compared to age matched TDC.

Analysis of results revealed that the children with LD took longer time compared to TDC across sentence categories. However, the results indicated a significant difference in the performance of children with LD and TDC on RT for the following sentence categories: Tenses, PNG markers, Transitives, intransitives & causatives; Predicates and Conditional clauses. Results also showed that there was no significant difference in the performance of children with LD and TDC on RT for the sentence categories Case markers, Sentence types, Conjunctions, comparatives & quotatives and Participial constructions between the two groups.

Analysis of results showed that on grammaticality judgement tasks used in the present study, children with LD in general showed poor agreement in terms of subject-verb. This was commonly observed for almost all the sentence categories such as tenses, conditional clauses, comparatives, causatives, etc. And thus indicated that children with LD were less sensitive to subject-verb agreement in comparison to TDC.

The present study is thus in agreement to various other studies who report that linguistic deficits (Mann ,1984; Mann & Ditunno,1990; Stuart & Coltheart ,1988; Lefly & Pennington, 1996; Byrne et al,1997; Elbro et al ,1998; Scarborough ,1990;Scarborough & Dobrich, 1991; Gallagher et al,2000; Lyytinnen Lyytinnen et al, 2001 ; Rispens, 2004) are found to be core underlying deficits in subgroups of LD such as LLD or LLI or in cases where LD follows as a continuum for SLI. Linguistic deficits to LD at various levels in the present study can be attributed to theories proposed in literature. A phonological deficit explanation to LD implies that children with LD have a phonological processing or awareness deficit as an underlying problem to semantic and syntactic deficits. For example phoneme awareness which function at the representation, retrieval,

or metalinguistic analysis of phonological information is said to be less well developed in children with LD than the normal peers (Mann, 1984; Mann & Ditunno, 1990; Stuart & Coltheart, 1988) .Yet another explanation for this could be the deficit at verbal short-term memory often seen in children with LD. According to Snowling (2001) poor verbal short term memory and slow automatic naming could be responsible for a basic phonological deficit. The existence of phonological problems in dyslexia is argued to represent only one facet of a more general disorder. Supporters of the phonological deficit theory believe that phonology has a central and causal role in dyslexia, suggesting a straightforward link between a cognitive deficit and the behavioral problem.

Other researchers view the syntactic limitations observed in dyslexic children independently from possible phonological deficits. The so-called 'structural lag' hypothesis suggests that dyslexic children are delayed in their development of grammatical knowledge (Byrne, 1981), thus pinpointing the mechanism underlying the poorer syntactic performance of dyslexic children compared to TDC within the grammatical system, rather than to processing limitations. Another issue is whether syntactic skills actually contribute to reading ability independently from phonological skills. Catts et al. (1999) support the latter assertion. They showed that a composite score of several oral language measures contributed a small but significant amount of unique variance to word recognition. Catts et al. (1999) recognize the role of oral language with respect to the development of word recognition skills especially in contextual facilitation. An impairment in oral language may prevent a child from using word context to facilitate word recognition which in turn affects the building up of fully developed representations for printed words.

Similarly, Gallagher et al. (2000), Snowling (2000) and Catts et al., (1999) have suggested such a relationship between grammatical and literacy skills. They propose that good linguistic skills (both semantic and syntactic) enable a child to use the context of the words a child is trying to decode. Tunmer, Nesdale and Wright (1987) also underline the role of syntactic skills (labeled as 'syntactic awareness') with respect to the development of decoding skills. They suggest that syntactic awareness may influence the development of word decoding by allowing children to combine knowledge of the constraints of sentential context with incomplete phonological information to identify unfamiliar words correctly. Such contextual facilitation does not only help on a short-term basis (the decoding of a word within a given context), but also facilitates word decoding on a more long term basis as with each word correctly identified, a child increases his or her knowledge of sound to letter correspondences. Furthermore, Tunmer, Herriman and Nesdale (1988) propose that contextual facilitation may be especially important for learning more complex rules, such as those whose application depends on the position of the letter in the word. For instance, learning to read irregular spelled words may be facilitated by syntactic (and semantic) awareness.

The present study is in support of Tunmer et al. (1987; 1988) who opined that sensitivity to the structure of a phonological representation is needed to build up morphosyntactic paradigms (for tense and agreement marking). Morphosyntactic rule formation depends at least partly on structural phonological analysis as the verb stem needs to be phonologically combined with agreement/tense marking morphemes. A good storage and processing system is needed in order to keep traces of such phonological representations 'alive'. If traces of phonological representations fade too quickly,

automatisation of recognizing the different verb forms will take much longer to establish. Furthermore, subject-verb agreement marking expresses the structural relationship between a verb and the subject of the sentence. This means that the number and person features of a subject need to be held in memory for accurate processing of the agreement features of the verb. In this way limited storage or processing capacity affect building up morphosyntactic paradigms.

5.2 Comparison of performance of children with LD and TDC on RT and accuracy measures across sentence categories

It has been found and reported in literature that children with LD have sentence comprehension difficulties which may also be reflected in all or a few sentence categories. These sentence difficulties may be attributed to be due to various mechanisms in cognitive processing of children with LD. These difficulties may be explained through various hypotheses such as Agreement and Tense Omission model -ATOM (Wexler et al., 1998) , missing agreement hypothesis (Clahsen,1989), Missing feature hypothesis (Gopnik, 1990a, 1990b), Implicit rule deficit hypothesis (Gopnik & Crago, 1991), Phonological deficit hypothesis (Ramus, Rosen, Dakin, Day, Castellote, White & Frith, 2003), Temporal deficit hypothesis (Tallal, 1980), Limited processing hypothesis (Baddeley, 1986, 1996; Bloom,1993; Bock & Levelt, 1994; Just & Carpenter, 1992), Optional movement hypothesis (Rice, Wexler & Cleave, 1995), Verbal working memory limitation (Gathercole & Baddeley, 1993)

Tenses

The findings of the present study revealed that children with LD showed significant poorer performance than TDC especially on the sentence category 'tenses' (see Table 4.2.3.2). Errors were found to be greater on 'tenses' when compared to other sentence categories. For example, sentences with 'tenses' such as

Incorrect sentences (as used in the present study)	Correct sentence	Tense
/avaru na:Le *bandaru*/	/avaru na:Le *barutta:re*/	Future
/ni:nu i:ga tha:ne *baruve* /	/ni:nu i:ga tha:ne *bandhe*/	Past

It was found that in the above sentences, though the sentences are grammatically incorrect, children with LD considered it as correct and responded likewise. This error could be explained by the Missing feature hypothesis (Gopnik,1990a,1990b) or Implicit Rule Deficit Hypothesis (Gopnik & Crago, 1991) which states that the morphosyntactic rules that specify features such as tense are omitted in the underlying representation of children with LD. In this account, the grammatical problems of children with LD could stem from such features missing in their underlying representation of grammatical rules or Morphosyntactic rules. Gopnik (1990a, 1990b) considered this problem as *feature blindness* i.e, the features of 'tense' may be missing from the underlying processes that are essential for understanding Morphosyntactic rules specific to a language. This was originally explained to understand feature blindness of children with SLI. For example in the sentences quoted in the above table, it was found that children with LD could have missed the feature of 'future tense' in /avaru na:Le *bandaru*/ which is marked by the subject /na:Le/ explaining the time of occurrence of the feature dependent on the verb /bandaru/.

Incorrect sentences (as used in the present study)	Correct sentence	Tense
/ni:nu i:ga tha:ne *baruve* /	/ni:nu i:ga tha:ne *bandhe*/	Present

This error could also be explained more specifically with the implicit rule deficit hypothesis (Gopnik & Crago, 1991) which purports that children with LD are unable to apply certain Morphosyntactic rules, often observed to be greater on 'tenses'. Further, the 'Optional movement' hypothesis (Rice, Wexler & Cleave, 1995), could explain that it is not the rule per se that is missing from the grammar, but that the implementation of the rule is not 'automatic' and compulsory. This may be true for grammatical understanding in children with LD. Literature also suggests that impaired 'tense' formation in developmental dyslexia can be due to difficulties at the level of phonological processing or awareness skills. Joanisse et al. (2000) discussed impaired tense formation in developmental dyslexia in the light of phonological segmentation limitations and speech perception deficits which may interfere with building up a stable inflectional paradigm. They found that dyslexic children with impaired phonological awareness had more trouble with inflecting verbs for the past tense than normally reading children matched on reading level, but that dyslexic children who in addition to decreased phonological awareness, showed impaired speech perception displayed more severe deficits in inflectional morphology. Thus, impairments in the ability to segment off sounds within phonological representations seem to impact on the ability to manipulate the phonological representations of verbs to mark them or to recognize the morphemes that mark them for tense.

The selection of a tense marker depends on the phonological features of the phoneme in the coda position of the verb stem (/ho:daLu/, /surijitu/). Thus, speech perception problems may lead to 'fuzzy' phonological representations, which in turn may interfere with morphosyntactic rule learning.

Like marking a verb for tense, marking a verb for agreement with the subject has a phonological component. Children need to realize that certain phonemes are added to a stem of the verb to mark agreement. Thus, when processing speech, a child does not only need to be able to perceive the different phonemes of the verb, but also has to realize that the perceived verb forms consist of fixed stems on which agreement marking phonemes may be added. This process may be advanced if a child is able to segment off and manipulate the syllables and or phonemes a word consists of.

PNG Markers

In Indian languages such as Kannada, gender marker based sentences exist unlike languages like English. For example, sentences with PNG markers such as,

Incorrect sentences (as used in the present study)	Correct sentence	Marker
/si:the no:Duvanu/	/si:the no:duvaLu/	Gender marker /-Lu/
/ninu baruta:ne/	/ni:nu baruti:ja/	Person marker /-ja/
/avaru o:Dida/	/avaru o:Didaru/	Number marker /-ru/

could be explained by the Missing feature hypothesis (Gopnik,1990a,1990b) or Implicit Rule Deficit Hypothesis (Gopnik & Crago, 1991) which states that the morphosyntactic rules that specify features such as 'number' and 'person', in the present context 'gender

marker' are omitted in the underlying representation of children with LD. Explaining the above error with respect to *feature blindness* as explained by Gopnik (1990a, 1990b) it could be possible that the children with LD lack features for 'person', 'number' and 'gender' in their underlying process in Kannada and hence find it to inflect a sentence for PNG markers. Similar to 'tenses' it could be possible that poor verbal working memory (WM) (Gathercole & Baddeley, 1993) which is likely to be affected in children with LD could implicate for an overall difficulty during the process of learning. Agreement marking of the verb has a dependency relationship with the subject of the sentence. Accordingly so, the surface form of the verb depends on the subject. The features 'number' and 'person' of the subject of the sentence therefore need to be kept active long enough in memory in order to link the verb to the subject. If verbal WM is limited, regardless of whether this is due to the quality of the phonological representation or to a limitation of the system itself, it can be envisaged that an impairment in the activation of the linguistic information of the subject (**number, gender and person features**), affects the ability to mark a verb for agreement with the subject of the sentence. In the present study, PNG markers were found to be less difficult for children with LD than 'tenses' (See Table 4.2.3.2).

Case markers

On case markers, analysis of results revealed that there was no significant difference in the performance of children with LD and TDC. However, the mean scores showed that the children with LD performed poorly in comparison to TDC. For example on sentences such as,

Incorrect sentences (as used in the present study)	Correct sentence	Marker
/iTTigejinda manejalli kaTTisidaru/	/iTTigejinda mane*jannu* kattisidaru/	/-jannu/

The case marker /-jalli/ which appeared at the end of the word in /manejalli/ was considered as correct by children with LD. It is evident from the errors that children seem to be wither unaware of the feature 'case marker' or find it difficult to process information when the sentences and information to be processed is lengthier or greater. It is often observed that children with LD tend to perform poorly on lengthier sentences when compared to shorter sentences. In the present study, children with LD tended to perform better on case markers than 'tenses' but poorer than their performance on PNG markers (See Table 4.2.3.2)

Transitives, Intransitives and causatives

The findings of the present study revealed that children with LD made errors on sentences such as,

Incorrect sentences (as used in the present study)	Correct sentence	Marker
/avaru namminda kelasa ma:Dutta:re/	/avaru nammindha kelasa ma:DI*su*tta:re/	Causative /-Isu/
/avanu maguvige tinnuta:ne/	/avanu maguvige tinni*su*tta:ne/	Transitive verb /-Isu/
/magu nidde malaguttade/	/magu nidde *ma:Duttade*/	Intransitive verb /- a:Du/

A sentence embedded with ‘transitives’ showed no agreement between subject and the verb /thinnuthane / in the sentence /avanu maguvige tinnuta:ne/ was considered as correct in children with LD. On, sentences with ‘intransitives’ there appeared that children with LD could not comprehend the agreement between subject and verb in sentence /magu nidde malaguttade/. Similarly, for ‘causatives’ the sentence /avaru namminda kelasa ma:Dutta:re/ showed no agreement between the subject /avaru/ and the causative verb /ma:Dutta:re/ yet the sentence was considered as correct by children with LD . This could be due to the missing agreement hypothesis proposed by Clahsen (1989). Clahsen posits that children with LD exhibit deficit in understanding the structural relationships of grammatical agreement. In the above example, in the present study, children did not perceive the sentence as erroneous as they missed information on considering the causative verb agreement with the subject. In the above example, the error may also be due to the presentation of a lengthy sentence auditorily. Generally, it is found that children with LD perform poorly on higher task demands which involve lengthy sentences due to poor working memory. Literature has suggested that a potential problem in examining argument-structure complexity effects is that the more complex the argument structure of a verb, the greater the length of a sentence and greater the difficulty for children with LD. This could be attributed to deficient temporal processing in children with LD (Tallal, 1980). This could also be attributed to poor verbal short term memory in such children since processing of such long sentences requires an efficient verbal working memory (Gathercole & Baddeley, 1993). However, children with LD tended to perform better on Transitives, Intansitives and Causatives than Case markers and tenses.

Children with LD performed almost equally in their performance on Transitives, Intansitives and Causatives and PNG markers (See Table 4.2.3.2).

Sentence types

The findings of the present study revealed that children with LD made errors on sentences such as,

Incorrect sentences (as used in the present study)	Correct sentence	Interrogative
/ba:vijalli ni:ru allava:?/	/ba:vijalli ni:ru illava:?/	Interrogative marker /-Illava/

Children with LD made greater errors on sentence embedded to investigate 'interrogatives'. In the sentence /ba:vijalli ni:ru allava:?/, the children seemed to miss out on the feature of which interrogative form need to be used (Missing feature hypothesis ,Gopnik, 1990). This can be accounted to inappropriate or missing feature of 'the word form' that needs to be used for interrogative sentences. This could also be attributed to the implicit rule deficit hypothesis (Gopnik and Crago, 1991), when children with LD tend to make errors when they have to apply a particular morpho-syntactic rule in a particular context. This could also support the *feature blindness* (Gopnik, 1990a, 1990b) generally seen and observed in children with SLI and in the present study similar deficits seen in children with LD. In the present study, performance of children with LD on sentence types was better than on tenses and case markers but poorer than on 'Transitives, Intransitives and Causatives (See Table 4.2.3.2).

Predicates

In the present study, it was found that children with LD made errors on sentences such as,

Incorrect sentences (as used in the present study)	Correct sentence	Predicate Marker
/a: bekku ʧikka/	/a: bekku ʧikkadu/	/-du/

Such errors could be explained by the Missing feature hypothesis (Gopnik,1990) which states that the morphosyntactic rules that specify features such as 'Predicates' (in the present context 'predicate marker') are omitted in the underlying representation of children with LD. Thus in the present context, children with LD may have missing morphosyntactic feature /-du/ in the sentence /a: bekku ʧikkadu/. Explaining the above error with respect to *feature blindness* as explained by Gopnik (1990a, 1990b) it could be possible that the children with LD lack features for 'Predicates' in their underlying process in Kannada and hence find it to inflect a sentence for a Predicate marker /-du/. The same error can also be explained with respect to the phonological deficit hypothesis (Ramus, 2003) which could imply that children with LD have deficient phonological skills such as phonemic awareness. In this context, children may not be aware of the predicate marker /-du/ due to lack of phonological skills. In the present study, performance of children with LD on Predicates was better than on tenses, case markers and sentence types. Their performance on Predicates was equal to that of 'PNG markers' and 'Transitives, Intransitives and Causatives' (See Table 4.2.3.2).

Conjunctions, comparatives and quotatives

In the literature it has been suggested that in children with LD there could be a delayed or deviant phonological development. The 'delayed development' account suggests that as seen in children with SLI, children with LD would go through the same stages as a typically developing child but only delayed in time. The 'deviant development' account suggests that the phonological development in such children with LD could be deviant from TDC in terms of errors of omission or commission. The errors of omission involves omitting mandatory inflections such as /-indha/ and /-alli/ in the sentence: /pennina kagada bari/. Children with LD made errors in such aforementioned sentences in the present study. Errors of commission would involve overgeneralization of morphosyntactic rules.

In the present study, children with LD made errors in the sentence category Conjunctions, comparatives and quotatives. An illustration of such errors is given below. In the following sentence the comparative marker /-gintha/ has been omitted:

Incorrect sentences (as used in the present study)	Correct sentence	Marker
/sud^{h}a:ge lalita uddava:gidda:le/	/sud^{h}a:gintha lalita uddava:gidda:le/	Comparative /-gintha/
/b^{h}a:rati sandʒe maLe baruttade he:LidaLu/	/b^{h}a:rati sandʒe maLe baruttade anta he:LidaLu/	Quotative /-anta/
/gane:ʃa mattu rame:ʃa ho:da:ga si:teja karakonDu ho:daru/	/gane:ʃa mattu rame:ʃa ho:da:ga si:tejannu karedukondu ho:daru/	Conjunction /-annu/

This could be due to verbal STM deficit (Gathercole & Baddeley, 1993) in children with LD due to which they are unable to perceive that the comparative marker which seems to be missing in the above mentioned sentence. This could also be attributed

to the missing feature hypothesis (Gopnik, 1990a,1990b) and the limited processing hypothesis (Baddeley, 1986, 1996; Bloom,1993; Bock & Levelt, 1994; Just & Carpenter, 1992). Missing feature hypothesis is indicative that children with LD do not possess the skill to identify markers which mark 'comparitives', for eg., /-gintha/ in Kannada. Limited processing hypothesis is indicative of the fact that limited capacity in children with LD to process information posing higher demand would lead to more erroneous responses and /or longer time to process the sentence category. Conjunctions are yet other sentence category wherein errors are observed in children with LD. In the above example for conjunctions, /gane:ʃa mattu rame:ʃa ho:da:ga si:teja karakonDu ho:daru/ it was found that children with LD missed the feature /-annu/ which could be attributed to an agreement error and also due to a missing feature as speculated in literature (Missing feature hypothesis, Gopnik, 1990). Similar explanation *feature blindness* (Gopnik, 1990a, 1990b) can be hypothesised in children with LD. Lack of information of how to use and where to use conjunctions may lead to processing information inaccurately. Quotatives are relatively unexplored sentence categories in children with LD. In the present study, children with LD were found to show poorer performance on quotatives. The 'missing feature' /-anta/ in the sentence /b^{h}a:rati sandʒe maLe baruttade he:LidaLu/ can be attributed to the complexity of the sentence as well as the length of the sentence which is posing a demand on verbal working memory of children with LD. It was found that children with LD performed better on Conjunctions, comparatives and quotatives than tenses, case markers and poorer than PNG markers and Predicates (See Table 4.2.3.2).

Conditional clauses

In the present study, children with LD made errors on sentences such as

Incorrect sentences (as used in the present study)	Correct sentence	Marker
/angaDijavanige haNa ko*TTu* avanu pustaka koDutta:ne/	/angaDijavanige haNa koTTa*re* avanu pustaka koDutta:ne/	Conditional marker /-re/
/na:nu be:lu:rige ho:da shila:ba:likejannu no:Dalilla/	/na:nu be:lu:rige ho:daru: shila:ba:likejannu no:Dalilla/	Conditional marker /-ru:/

the conditional marker /-re/ is omitted (ATOM, Wexler et al., 1998). This can be accounted to inappropriate or missing feature (Missing feature hypothesis, Gopnik 1990), of 'the word form' that needs to be used for interrogative sentences. This could also be attributed to the implicit rule deficit hypothesis (Gopnik and Crago, 1991), when children with LD tend to make errors when they have to apply a particular morpho-syntactic rule in a particular context. This could also support the *feature blindness* (Gopnik, 1990a, 1990b) generally seen and observed in children with SLI and in the present study similar deficits seen in children with LD.

This could be attributed to deficient temporal processing in children with LD (Tallal, 1980). This could also be attributed to poor verbal short term memory in such children since processing of such long sentences requires an efficient verbal working memory (Gathercole & Baddeley, 1993). The main idea of this theory is that dyslexia is the result of a perturbation of *auditory language processing in the temporal domain*. The consequence of a 'temporal processing deficit' is that children are not fully capable of perceiving and processing short or rapidly varying acoustic events, including those

crucial to the recognition of speech sounds (Tallal et al., 1996). According to Tallal et al. (1993, 1996) a failure to correctly represent short sounds and fast transitions would cause further difficulties; in particular when such acoustic events are cues to phonemic contrasts. This claim is compatible with various indications that dyslexic children have deficient speech sound representations (Liberman, 1973; Lyytinen et al. 1992).The auditory processing deficit is further supported by findings of Tallal and her colleagues that dyslexics perform poorly on auditory tasks like tone discrimination and temporal order judgment as well as on backward masking. It was found that children with LD performed on conditional clauses better than on tenses and case markers and poorer than on Transitives, intransitives & causatives; Sentence types ; Predicates ;Conjunctions, comparatives & quotatives (See Table 4.2.3.2).

Participial constructions

In the present study, children with LD made errors on sentences such as,

Incorrect sentences (as used in the present study)	Correct sentence	Participial Construction
/idu na:nu o:du: schoolu/	/idu na:nu o:du:va sku:lu/	/-va/

In the above sentence, the participial construction marker /-va/ is omitted. This can be accounted to inappropriate or missing feature (Missing feature hypothesis, Gopnik 1990) of 'the word form' that needs to be used for interrogative sentences. This could also be attributed to the implicit rule deficit hypothesis (Gopnik and Crago, 1991), when children with LD tend to make errors when they have to apply a particular morpho-syntactic rule in a particular context. This could also support the *feature blindness*

(Gopnik, 1990a, 1990b) generally seen and observed in children with SLI and in the present study similar deficits were seen in children with LD.

Thus the findings of the present study indicated that children with LD performed poorer than TDC across sentence categories. The reasons for poor understanding of morpho-syntactic rule structure even in language such as Kannada were discussed in terms of various theories and hypotheses, a few of whom were adopted from explanations of grammatical deficits seen in children with SLI.

The present study also supported the notion that Morphosyntactic rule formation depends at least partly on structural phonological analysis as the verb stem needs to be phonologically combined with agreement/tense marking morphemes. A good storage and processing system is required in order to keep traces of such phonological representations working and active. If traces of phonological representations fade too quickly, automatisation of recognizing the different verb forms will take much longer to establish. Furthermore, subject-verb agreement marking expresses the structural relationship between a verb and the subject of the sentence. This means that , for example, the number, person and gender features of a subject need to be held in memory for accurate processing of the agreement features of the verb. In this way limited storage or processing capacity affect building up morphosyntactic paradigms in children with LD.

Poor verbal working memory (WM) which is likely to be affected in children with LD could implicate for an overall difficulty during the process of learning. Agreement marking of the verb has a dependency relationship with the subject of the sentence. If verbal WM is limited, regardless of whether this is due to the quality of the phonological representation or to a limitation of the system itself, it can be expected that an impairment

in the activation of the linguistic information of the subject affects the ability to mark a verb for agreement with the subject of the sentence.

Impaired tense formation in developmental dyslexia was discussed in the light of phonological segmentation limitations and speech perception deficits which may interfere with building up a stable inflectional paradigm in children with LD. The selection of a tense marker depends on the phonological features of the phoneme in the coda position of the verb stem. Thus, speech perception problems often described in children with LD may lead to 'fuzzy' phonological representations, which in turn may interfere with morphosyntactic rule learning.

Yet, other explanation of grammaticality judgment errors in children with LD was given using the Missing feature hypothesis (Gopnik,1990a,1990b) or Implicit Rule Deficit Hypothesis (Gopnik & Crago, 1991) which states that the morphosyntactic rules that specify features such as tense are omitted in the underlying representation of children with LD. In this account, the grammatical problems of children with LD could stem from such features missing in their underlying representation of grammatical rules or Morphosyntactic rules. Gopnik (1990a, 1990b) considered this problem as *feature blindness* i.e, the features of 'tense' may be missing from the underlying processes that are essential for understanding Morphosyntactic rules specific to a language also true for Indian languages like Kannada.

CHAPTER VI

SUMMARY AND CONCLUSION

Evidence of an association between learning disabilities (LD) and language impairments comes from investigations of language abilities of poor readers. This work has shown that children with reading/learning disabilities often have deficiencies in vocabulary, morphology, and syntax (Scarborough, 1990). Catts, Fey, Zhang and Tomblin (1999) found that children at risk for LD (kindergartners) showed deficits at the level vocabulary, grammar, and narrative skills. And more than half of the poor readers had language impairment compared peers. These findings show that poor readers may have more widespread deficiencies in basic language abilities.

Learning disability (LD) is characterized by a discrepancy between non verbal intelligence and academic performance. The mechanisms underlying these deficits are still controversial despite an accumulating body of research. Previous studies have revealed that children with LD exhibited syntactic deficits which has been attributed various theories such as Agreement and Tense Omission model -ATOM (Wexler et al., 1998) , missing agreement hypothesis (Clahsen,1989), Missing feature hypothesis (Gopnik, 1990a,1990b), Implicit rule deficit hypothesis (Gopnik & Cargo, 1991), phonological deficit hypothesis (Ramus,2003), temporal deficit hypothesis (Tallal, 1980), limited processing hypothesis (Baddeley, 1986, 1996; Bloom,1993; Bock & Levelt, 1994; Just & Carpenter, 1992), optional movement hypothesis (Rice ,Wexler & Cleave 1995), verbal working memory limitation (Gathercole & Baddeley, 1993) etc.

Although there is much evidence in support of the strong relationship between phonological deficits and reading failure in children with dyslexia, less attention has been devoted to whether these children also have language deficits at the level of syntax. The language difficulties of such children being subtle go unnoticed or unassessed by professionals who focus only on their academic skills. Thus the present study attempted to investigate the sentence comprehension abilities in children with learning disabilities and comparing them with age matched TDC using a grammaticality judgment task.

Two groups of participants were included in the study. Group 1 children with LD in the age range of 6-12 years and Group 2 consisted of sixty TDC in the matched age. All the children studied in the state syllabus schools with Kannada as their mother tongue and English as medium of instruction. The sentence stimuli of LPT in Kannada (Karanth, Ahuja, Nagaraja, Pandit & Shivashankar, 1991) were used for assessment using the DMDX software.

The findings of the present study revealed that children with LD differed from TDC in their performance both in terms of RT accuracy measures. Children with LD were both slower to respond and less accurate in their responses. Children with LD found the sentence category 'Tenses' the most difficult hence made more errors compared to TDC. Children with LD took longer time to respond to the following sentence categories: Tenses; PNG markers; Transitives, intransitives & causatives; Predicates and Conditional clauses. This may implicate slower processing speed in children with LD when compared to age matched TDC.

The findings of the present study revealed that on grammaticality judgment tasks used in the present study, children with LD in general showed poor agreement in

terms of subject-verb. This was commonly observed for almost all the sentence categories such as tenses, conditional clauses, comparatives, causatives, etc. thus indicating that children with LD were less sensitive to subject-verb agreement in comparison to TDC. The morpho-syntactic deficits in children with LD in comparison to TDC were explained with the aid of various hypotheses and theories speculated for syntactic errors in LD. These difficulties may be explained through various hypotheses such as Agreement and Tense Omission model -ATOM (Wexler et al., 1998), Missing agreement hypothesis (Clahsen,1989), Missing feature hypothesis (Gopnik, 1990a,1990b), Implicit rule deficit hypothesis (Gopnik & Cargo, 1991), Phonological deficit hypothesis (Ramus,2003), Temporal deficit hypothesis (Tallal, 1980), Limited processing hypothesis (Baddeley, 1986,1996; Bloom,1993; Bock & Levelt, 1994; Just & Carpenter, 1992), Optional movement hypothesis (Rice & Wexler, 1995), Verbal working memory limitation (Gathercole & Baddeley, 1993)

The present study also supported the notion that morphosyntactic rule formation depends at least partly on structural phonological analysis as the verb stem needs to be phonologically combined with agreement/tense marking morphemes. Poor verbal working memory (WM) which is likely to be affected in children with LD could implicate for an overall difficulty during the process of learning.

Yet, other explanation of grammaticality judgment errors in children with LD was given using the Missing feature hypothesis (Gopnik,1990a,1990b) or Implicit Rule Deficit Hypothesis (Gopnik & Cargo, 1991) which states that the morphosyntactic rules that specify features such as tense are omitted in the underlying representation of children with LD. Gopnik (1990a, 1990b) considered this problem as *feature blindness* i.e, the features of 'tense' may be missing from the

underlying processes that are essential for understanding Morphosyntactic rules specific to a language also true for Indian languages like Kannada.

Implications of the study

- The present study would help us to understand the sentence comprehension and processing deficits in children with LD apart from the well known phonological deficits reported in literature. The present study supports various hypotheses speculated for children with LD and a few which explain language impairment in SLI. A few of these hypothesis include ATOM model (Wexler et al 1998), Missing agreement hypothesis (Clahsen,1989), Missing feature hypothesis (Gopnik, 1990a, 1990b), Implicit rule deficit hypothesis (Gopnik and Crago, 1991), Phonological deficit hypothesis (Ramus,2003), Temporal deficit hypothesis (Tallal, 1980), Limited processing hypothesis (Baddeley, 1986,1996; Bloom,1993; Bock & Levelt, 1994; Just & Carpenter, 1992), Optional movement hypothesis (Rice & Wexler, 1995), Verbal working memory limitation (Gathercole & Baddeley, 1993)
- Clinically the present study will help us to understand which among the different categories of sentences are difficult for children with LD to process. The test battery used in the present study would also help us to screen out those children with LD who have a LLD (Language Learning Disability) from those who do not.
- This would also give us a hint on understanding whether to begin an intervention program right from basic sentence comprehension skills and gradually move on to reading comprehension skills or directly plan on other aspects of reading skills such as word recognition skills.

Limitations of the study

The present study had the following limitations

1. Small sample size : A larger sample size would have been helpful in observing the developmental trends for the sentence categories
2. Lack of sub grouping: Since LD is a very heterogeneous group; lack of sub grouping may have led to the diverse responses for the sentence categories.

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Tenses

1. ನೀವು ಬರುತ್ತಾ ಇರಿ.
   /ni:vu barutta: IrI/

2. ಅವರು ನಾಳೆ ಬಂದರು.
   /avaru na:Le bandaru/

3. ಶಂಕರ ನಿನ್ನೆ ಹೋದ.
   /ʃankara nInne ho:da/

4. ನೀನು ಈಗ ತಾನೆ ಬರುವೆ.
   /ni:nu i:ga ta:ne baruve /

5. ಅಮ್ಮ ನಾಳೆ ಇಷ್ಟು ಹೊತ್ತಿಗೆ ಬಂದಿದ್ದರು.
   /amma na:Le IʃTu hottIge bandIddaru/

6. ನಾನು ಸ್ಕೂಲಲ್ಲಿ ಇದ್ದೇನೆ.
   /na:nu sku:lallI Idde:ne/

7. ಅವನು ಕಳೆದ ವಾರ ಬಂದಿದ್ದ.
   /avanu kaLeda va:ra bandIdda/

8. ಸೀತೆ ಮೊನ್ನೆ ಬರುತ್ತಾಳೆ.
   /si:te monne barutta:Le/

9. ನಾನು ಸ್ಕೂಲಲ್ಲಿ ಇರುತ್ತಾ ಇರುತ್ತೇನೆ.
   /na:nu sku:lallI Irutta: Irutte:ne/

10. ನಾನು ನಾಳೆ ಮನೆಯಲ್ಲಿ ಇರುತ್ತೇನೆ.
   /na:nu na:Le manejallI Irutte:ne/

PNG markers

11. ನೀನು ಮಲಗವೆ.
   /ni:nu malaguve/

12. ಕಮಲ ಬರುತ್ತಾಳೆ.
   /kamala barutta:Le/

13. ಅವರು ಓಡಿದ.
/avaru o:DIda/

14. ಹಸು ಬರುತ್ತಾನೆ
/hasu barutta:ne/

15. ಅವು ಮಲಗಿದವು
/avu malagIdavu/

16. ನಾವು ನೋಡುವಳು
/na:vu no:DuvaLu/

17. ಅವರು ಹೋಗುತ್ತಾರೆ
/avaru ho:gutta:re/

18. ನೀನು ಬರುತ್ತಾನೆ
/ni:nu barutta:ne/

19. ಅದು ಮಲಗಿತು
/adu malagItu/

20. ಗಣೇಶ ಓಡಿದಳು
/gaNe:ʃa o:DIdaLu/

21. ಅವು ಹೋಗುತ್ತೀರಿ
/avu ho:gutti:rI/

22. ನೀವು ನೋಡುವರು
/ni:vu no:Duvaru/

23. ನೀನು ಓಡಿದೆ
/ni:nu o:DIde/

24. ನಾವು ಮಲಗಿದಿರಿ
/na:vu malagIdirI/

25. ನೀವು ಹೋಗುತ್ತೀಯೆ?
/ni:vu ho:gutti:je?/

26. ಸೀತೆ ಓಡಿದಳು
/si:te o:DIdaLu/

27. ಅದು ನೋಡುವುದು
/adu no:Duvudu/

28. ನಾನು ಬರುತ್ತೇನೆ
/na:nu barutte:ne/

29. ನಾವು ಹೋಗುತ್ತೇವೆ
/na:vu ho:gutte:ve/

30. ಸೀತೆ ನೋಡುವನು
/si:te no:Duvanu/

Case markers

31. ಹುಡುಗನಿಗೆ ಹೇಳಿದೆ
/huDuganIge he:LIde/

32. ಮೇಳಕ್ಕೆ ಗೊಂಬೆ
/me:Lakke gombe/

33. ಪೆನ್ನಿನ ಕಾಗದ ಬರಿ
/pennIna ka:gada barI/

34. ಅಂಗಡಿಯಿಂದ ತಂದದ್ದು
/aŋaDIjInda tandaddu/

35. ಕೆಲಸದ ಹುಡುಗ
/kelasada huDuga/

36. ಇಟ್ಟಿಗೆಯಿಂದ ಮನೆಯಲ್ಲಿ ಕಟ್ಟಿಸಿದರು
/ITTIgejInda manejallI kaTTIsIdaru/

37. ಪುಸ್ತಕ ಅಣ್ಣನನ್ನು ಕೊಟ್ಟೆ
/pustaka aNNanannu koTTe/

38. ಮರವನ್ನು ಉರುಳಿಸು
/maravannu uruLIsu/

39. ಊರಿನಲ್ಲಿ ಇದ್ದೆ
/u:rInallI Idde/

40. ಬಸ್ಸಿನಿಂದ ಹೋದೆ.

/bassInInda ho:de/

Transitives, Intransitives and causatives

41. ಹಾಲಿಗೆ ನೀರು ಬೆರಸಬೇಡ.
/ha:lIge ni:ru beresabe:Da/

42. ಅಕ್ಕಸಾಲಿ ಮಾಡುತ್ತಾನೆ
/akkasa:lI ma:Dutta:ne/

43. ಹುಡುಗಿ ಓದುತ್ತಾಳೆ.
/huDugI o:dutta:Le/

44. ನಾನು ಹಣ್ಣನ್ನು ತಿನ್ನುತ್ತೇನೆ.
/na:nu haNNannu tInnutte:ne/

45. ಅಜ್ಜಿ ಕಡೆಯುತ್ತಾಳೆ.
/adzdzI kaDejutta:Le/

46. ಮಗು ನಿದ್ದೆ ಮಲಗುತ್ತದೆ.
/magu nIdde malaguttade/

47. ಅವರು ನಮ್ಮಿಂದ ಕೆಲಸ ಮಾಡುತ್ತಾರೆ
/avaru nammInda kelasa ma:Dutta:re/

48. ಮಗುವನ್ನು ಮಲಗಿಸು.
/maguvannu malagIsu/

49. ನಾವು ನಿಮ್ಮಿಂದ ಪಾಠ ಓದಿಸುತ್ತೇವೆ.
/na:vu nImmInda pa:t^{h}a o:dIsutte:ve/

50. ಅವನು ಮಗುವಿಗೆ ತಿನ್ನುತ್ತಾನೆ.
/avanu maguvIge tInnutta:ne/

Sentence types

51. ಇದು ಬೆಂಗಳೂರು ಅಲ್ಲ.
/Idu bengaLu:ru alla/

52. ಅವರ ಜವಾಬ್ದಾರಿ ನಾವೇ ನೋಡಿಕೊಳ್ಳುತ್ತಾರೆ.
/avara dzava:bda:rI na:ve: no:DIkoLLutta:re/

53. ಅವನು ಸಿನಿಮಾಗೆ ಹೋಗೋಣ
/avanu sInIma:ge ho:go:Na/

54. ಇದು ನನ್ನ ಶಾಲೆ.
/Idu nanna ʃa:le/

55. ನೀನು ಆ ಕೆಲಸ ಮಾಡಬಾರದು.
/ni:nu a: kelasa ma:Daba:radu/

56. ನಾವು ಹಾಡು ಹೇಳಲಿ.
/na:vu ha:Du he:LalI/

57. ಅವಳು ಕೋತಿಯನ್ನು ನೋಡಿ ನಕ್ಕಳು.
/avaLu ko:tIjannu no:DI nakkaLu/

58. ಬಾವಿಯಲ್ಲಿ ನೀರು ಅಲ್ಲವಾ?
/ba:vIjallI ni:ru allava:?/

59. ನಿ ಮಗೆ ಕನ್ನಡ ಗೊತ್ತಾ?
/nImage kannaDa gotta:?/

60. ಅವನು ಕಾಫಿ ಕುಡಿ.
/avanu ka:p^{h}I kuDI/

Predicates

61. ಈ ಪುಸ್ತಕ ನನ್ನದು.
/i: pustaka nannadu/

62. ಈ ಲಂಗ ಕಮಲ.
/i: laŋa kamala/

63. ನಿನ್ನ ಕೋಣೆ ಯಾವ?
/nInna ko:Ne ya:va?/

64. ಅವರ ನಾಯಿ ದೊಡ್ಡದು.
/avara na:jI doDDadu/

65. ಆ ಪೆನ್ನು ಅವನ.
/a: pennu avana/

66. ಜೋರಾಗಿ ಓಡಿ ಅವರ ಕುದುರೆ.
/dzo:ra:gI o:DI avara kudure/

67. ನಿನ್ನೆ ಹಾಡಿದ್ದು ನನ್ನ ತಂಗಿ.
/nInne ha:DIddu nanna taŋI/

68. ಅವರ ಮನೆ ಯಾವುದು?
/avara mane ja:vudu?/

69. ಆ ಬೆಕ್ಕು ಚಿಕ್ಕ.
/a: bekku ʧIkka/

70. ಆ ಸೀರೆ ಅಮ್ಮನದು.
/a: si:re ammanadu/

Conjunctions, comparitives and quotatives

71. ರಾಮನೂ ಶಂಕರನೂ ಸ್ಕೂಲಿಗೆ ಹೋದರು.
/ra:manu: ʃankaranu: sku:lIge ho:daru/

72. ನನ್ನ ಅಣ್ಣ ಮಕ್ಕಳು ಬಂದರು.
/nanna aNNa makkaLu bandaru/

73. ಗಣೇಶ ಮತ್ತು ರಮೇಶ ಹೋದಾಗ ಸೀತೆಯ ಕರಕೊಂಡು ಹೋದರು.
/gaNe:ʃa mattu rame:ʃa ho:da:ga si:teja karakonDu ho:daru/

74. ಪೆನ್ಸಿಲ್ ಅಥವಾ ಪೆನ್ನು ಕೊಡು.
/pensIl at^{h}ava: pennu koDu/

75. ಗಿರೀಶ ಸುರೇಶನಿಗಿಂತ ಚಿಕ್ಕವನು.
/gIri:ʃa sure:ʃanIgInta ʧIkkavanu/

76. ಸುಧಾಗೆ ಲಲಿತ ಉದ್ದವಾಗಿ ದ್ದಾಳೆ.
/sud^{h}a:ge lalIta uddava:gIdda:Le/

77. ಮೇಷ್ಟ್ರು ಪಾಠ ಮಾಡುತ್ತೇನೆ ಅಂಥ ಹೇಳಿದರು.
/me:ʃTru pa:t^{h}a ma:Dutte:ne anta he:LIdaru/

78. ಈ ರಾಜ್ಯಕ್ಕೆ ಮೈಸೂರು ಹೆಸರಿತ್ತು.
/i: ra:dzjakke maisu:ru hesarIttu/

79. ಭಾರತಿ ಸಂಜೆ ಮಳೆ ಬರುತ್ತದೆ ಹೇಳಿದಳು.
/b^{h}a:ratI sandze maLe baruttade he:LIdaLu/

80. ಲಕ್ಷ್ಮೀ ಎಂಬುವಳು ಬಂದಿದ್ದಳು

/lakʃmi: embuvaLu bandIddaLu/

Conditional clauses

81. ನೀನು ಬೇಗ ಹೋದರೂ ಬಸ್ಸು ಸಿಗುತ್ತಿರಲಿಲ್ಲ.
/ni:nu be:ga ho:daru: bassu sIguttIralIlla/

82. ನೀನು ತಿನ್ನ ಇದ್ದರೆ ದೊಡ್ಡವನಾಗುವುದಿಲ್ಲ.
/ni:nu tInna Iddare doDDavana:guvudIlla/

83. ಅವನು ಮನೆಗೆ ಬಂದರೆ ದುಡ್ಡು ಕೊಡುತ್ತೇನೆ.
/avanu manege bandare duDDu koDutte:ne/

84. ಅಂಗಡಿಯವನಿಗೆ ಹಣ ಕೊಟ್ಟು ಅವನು ಪುಸ್ತಕ ಕೊಡುತ್ತಾನೆ.
/aŋaDIjavanIge haNa koTTu avanu pustaka koDutta:ne/

85. ನೀವು ಹೇಳಿದರೆ ಅವರು ಮಾಡಿದರು.
/ni:vu he:LIdare avaru ma:DIdaru/

86. ಇವತ್ತು ದುಡ್ಡು ಸಿಕ್ಕಿದರೆ ನಾವು ಮಾರ್ಕೆಟ್ಟಿಗೆ ಹೋಗುತ್ತೇವೆ.
/Ivattu duDDu sIkkIdare na:vu markeTTIge ho:gutte:ve/

87. ಅವರು ಮೊದಲೇ ಹೇಳಿದ್ದರೆ ಮಾಡಬಹುದಿತ್ತು.
/avaru modale: he:LIddare ma:DabahudIttu/

88. ನೀನು ಮನೆಗೆ ಬಂದ ಹಣ್ಣು ಕೊಡುತ್ತಿದೆ.
/ni:nu manega banda haNNu koDuttIdde/

89. ನಾನು ಬೇಲೂರಿಗೆ ಹೋದ ಶಿಲಾಬಾಲಿಕೆಯನ್ನು ನೋಡಲಿಲ್ಲ.
/na:nu be:lu:rIge ho:da ʃIla:ba:lIkejannu no:DalIlla/

90. ಭಾರತಿ ಬರದೆ ಇದ್ದರೆ ನಾನು ಬೆಂಗಳೂರಿಗೆ ಹೋಗುವುದಿಲ್ಲ.
/b^{h}a:ratI barade Iddare na:nu bengaLu:rIge ho:guvudIlla/

Participle constructions

91. ನಿನ್ನನ್ನು ನೋಡದೆ ಬಹಳ ದಿನವಾಯಿತು.
/nInnannu no:Dade bahaLa dInava:jItu/

92. ನೀನು ಫೇಲಾಗದ ಹುಡುಗನಾ?
/ni:nu p^{h}e:la:gada huDugana:?/

93. ಬಟ್ಟೆ ಒಗೆಯ ಅಗಸ.

/baTTe ogeja agasa/

94. ನಾನು ಇವತ್ತು ಕಾಫಿ ಕುಡಿ ತಿಂಡಿ ತಿಂದೆ.
/na:nu Ivattu ka:p^{h}I kuDI tInDI tInde/

95. ಇದು ನಾನು ಓದೂ ಸ್ಕೂಲು.
/Idu na:nu o:du: sku:lu/

96. ಬೇಸಾಯ ಮಾಡುವವರು ರೈತರು.
/be:sa:ja ma:Duvavaru raitaru/

97. ಅವಳು ಮೈಸೂರಿಗೆ ಬಂದು ಕನ್ನಡ ಕಲಿಯತ್ತಾಳೆ.
/avaLu maisu:rIge bandu kannaDa kalIjutta:Le/

98. ಔಷಧಿ ಕುಡಿದೆ ಜ್ವರ ಹೋಗುವುದಿಲ್ಲ.
/auʃad^{h}I kuDIde dzwara ho:guvudIlla/

99. ನಾನು ಇಷ್ಟ ಪಟ್ಟ ಸಿನೇಮಾ ಶಂಕರಾಭರಣ.
/na:nu IʃTa paTTa sInema: ʃankara:b^{h}araNa/

100. ರಾಮಣ್ಣ ಯಾವತ್ತಾ ಬಂದವನು ಇವತ್ತು ಯಾಕೆ ಬಂದ?
/ra:maNNa ja:vatta: bandavanu Ivattu ja:ke banda?/