

# **MOTHER CHILD INTERACTION IN AUTISM**

Neethu Yasodharan P  
Register No. 12SLP017



Dissertation submitted in part fulfilment for the Degree of  
Master of Science (Speech-Language Pathology)  
University of Mysore, Mysore.

**ALL INDIA INSTITUTE OF SPEECH AND HEARING**  
**MANASAGANGOTHRI**  
**MYSORE-570 006**  
**May, 2014**

**DEDICATED**  
**TO**  
**LORD KRISHNA AND**  
**TO MY BELOVED ONES**

## **CERTIFICATE**

This is to certify that this dissertation entitled “**Mother Child Interaction in Autism**” is a bonafide work submitted in part fulfilment for the Degree of Master of Science (Speech Language Pathology) of the student (Registration No.: 12SLP017). This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any of the University for the Award of any other Diploma or Degree.

Mysore

May, 2014

**Dr. S. R. Savithri**

*Director*

All India Institute of Speech and Hearing

Manasagangothri

Mysore -570006.

## **CERTIFICATE**

This is to certify that this dissertation entitled “**Mother Child Interaction in Autism**” has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier in other University for the award of any Diploma or Degree.

Mysore

May, 2014

**Dr.Shyamala.K.C**

*Guide*

Professor & HOD in Department of Speech -

Language Pathology

All India Institute of Speech and Hearing

Manasagangothri

Mysore - 570 006.

## **Declaration**

This dissertation entitled “**Mother Child Interaction in Autism**” is the result of my own study under the guidance of Dr. Shyamala. K.C., Professor and HOD Department of Speech Language Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other University for the award of any Diploma or Degree.

Mysore

May, 2014

Register No. 12SLP017

## ACKNOWLEDGEMENT

*My numerous thanks to my guide, Dr. Shyamala. K.C , Professor and HOD of Department of Speech Language Pathology , All India Institute of Speech and Hearing, Mysore for her instantaneous support, encouragement and also for her valuable suggestions in which she provided the intangibles that helped me finished the study.*

*Once again I thank her for her helpful comments and critiques which have greatly influenced this study.*

*I am grateful to Dr. S.R. Savithri, Director, AIISH, Mysore for permitting me to carry out this dissertation.*

*My sincere thanks to Dr. Vasanthalakshmi & Mr. Santhosh , who has provided statistical advice all the times. Thank you so much ma'am & sir for patiently analyzing my data.*

*I thank my lovely family for giving lots of constant support and motivation in all my endeavors of life. A special thanks to my **amma**.*

*A special thanks to **all my classmates** who helped me all the times during my research work. I have learnt a lot from them.*

*I thank all my staff who helped me for my dissertation.*

*I thank my friends Helna, Rajini, Vani, Anjali, Mercy, Krishna and Sandhya who helped me all the way while doing dissertation.*

*Last but not the least I thank all my participants who cooperated with me and spend their valuable time with me.*

## LIST OF CONTENTS

<b>Sl. No</b>	<b>Chapters</b>	<b>Page no.</b>
1.	Introduction	1-8
2.	Review of Literature	9-32
3.	Method	33-43
4.	Results & Discussion	44-73
5.	Summary & Conclusion	74-78
6.	References	
7	Appendix	



## LIST OF TABLES

<i>Table Number</i>	<i>Title of Table</i>	<i>Page Number</i>
1	<i>Demographic data, language age, social age, therapy duration, mothers education of clinical group</i>	35-36
2	<i>Demographic data, language age, social age, mothers education of TDC group</i>	36-37
3	<i>Mean Rank for invitation to vocalize of mothers of two groups in Man Whitney test</i>	53
4	<i>Mean Rank for self-repetition of mothers of two groups in Man Whitney test</i>	54
5	<i>Mean Rank for Imitation of mothers of two groups in Man Whitney test</i>	55
6	<i>Mean Rank for Expansion of mothers of two groups in Man Whitney test</i>	56
7	<i>Mean Rank for Yes/No Reply of mothers of two groups in Man Whitney test</i>	57
8	<i>Mean Rank for Other Reply of mothers of two groups in Man Whitney test</i>	58
9	<i>Mean Rank for Interrogatives of mothers of two groups in Man Whitney test</i>	59
10	<i>Mean Rank for Imperatives of mothers of two groups in Man Whitney test</i>	59
11	<i>Mean Rank for Accompaniments of mothers of two groups in Man Whitney test</i>	60
12	<i>Mean Rank for Informatives of mothers of two groups in Man Whitney test</i>	61
13	<i>Mean Rank for Child controlled events of mothers of two groups in Man Whitney test</i>	62
14	<i>Mean Rank for Care giver controlled events of mothers of two groups in Man Whitney test</i>	63
15	<i>Mean Rank for people object/present of mothers of two groups in Man Whitney test</i>	64
16	<i>Mean Rank for non-immediate of mothers of two groups in Man Whitney test</i>	65
17	<i>Mean Rank for Topic Initiation of mothers of two groups in Man Whitney test</i>	66
18	<i>Mean Rank for Topic Maintenance of mothers of two groups in Man Whitney test</i>	67
19	<i>Mean Rank for Request Action object of mothers of two groups in Man Whitney test</i>	68
20	<i>Mean Rank for Stylistic variation of mothers of two groups in Man Whitney test</i>	69
21	<i>Mean Rank for Turn Taking variation of mothers of two groups in Man Whitney test</i>	70

## LIST OF FIGURES

<i>Figure Number</i>	<i>Title of Figure</i>	<i>Page Number</i>
<i>1</i>	<i>Mean &amp; SD of Communicative functions of mothers of clinical group</i>	<i>45</i>
<i>2</i>	<i>Mean &amp; SD of Communicative functions of mothers of TDC group</i>	<i>50</i>
<i>3</i>	<i>Response patterns for Child controlled events in chi-square test for both groups</i>	<i>62</i>
<i>4</i>	<i>Response patterns for Care giver controlled events in chi-square test for both groups</i>	<i>63</i>
<i>5</i>	<i>Response patterns for Non immediate events in chi-square test for both groups</i>	<i>65</i>
<i>6</i>	<i>Response patterns for Request action and object events in chi-square test for both groups</i>	<i>68</i>
<i>7</i>	<i>Response patterns for Stylistic variation events in chi-square test for both groups</i>	<i>69</i>
<i>8</i>	<i>Response patterns for Turn Taking events in chi-square test for both groups</i>	<i>70</i>

## INTRODUCTION

Communication is the primary factor that accepts human-being as social. Animals also communicate but through nonverbal mode. Communication can be defined as a process wherein one individual gives and receives information about personal needs, knowledge, or emotional states. This may be intentional or unintentional, may take linguistic or non-linguistic forms, and may occur through any modes. Shames, Wiig & Secord, (1998) said that communication is a process in that we exchange information, ideas, and feelings. In humans most of the communication is attained through speech, and this can be enhanced by the use of facial expressions, and body language. The communication demands differ across different age group and situations. Language acquisition is the most important achievement in human development

Communication is developed in infants as a result of early interaction between infant and caregiver (Alexander, Wetherby, Prizant, 1997). Proto-conversations between caregiver and baby has studied by different authors, they assessed caregiver's ability to regulate interaction by selectively responding to baby's intentions (Bateson, 1975). These stages of conversations between mothers and infants ranged from 0-18 months. In Typically developing children communication pattern observed is preintentional stage of communication followed by intentional stage of communication during first year period (Bates, Benigni, Camaioni & Volterra (1975). Intentional communication is easier to interpret and hence elicits more contingent responses from mothers (Yoder & Warren, 1999). Communication development is molded and enhanced by the repeated experience of the interaction between a parent and child.

The language development in children is evaluated by giving emphasis to possible interdependence between language acquisition and two other factors: language output and the linguistic environment of the child. Interactions of parents with their child facilitate child's social, language and cognitive skills and positive relationships between all these aspects (Kochanska, G., 1997; Landry, S. H., Smith, K. E., & Swank, P. R., 2006). Through exposure to input language, the child configures his/her language to adapt with the pattern of the maternal language. This mechanism takes place in ease and relatively automatic manner. We know that adults change their way of speaking when conversing to young children. This phenomenon is known as Motherese/ Child directed speech.

The term used by different authors varied in literature. The most used terms in literature are : baby talk (Lukens, 1894); nursery talk (Jakobson, 1941/1968); verbal stimuli (Skinner, 1957); primary linguistic data (Chomsky, 1965); motherese (Newport, 1975); caretaker talk (Schachter, Fosha, Stemp, Brotman & Ganger, 1976); linguistic input (Schlesinger, 1977); caregiver speech (Ochs,1982); Child Directed Speech (Warren-Leubecker & Bohannon, 1984); input language (Ninio, 1986); Infant Directed Speech (Cooper & Aslin, 1990); and exposure language (Gleitman & Lederer, 1999). Child directed speech (CDS) is most popular and useful of the terms that used by the researchers.

Natureof child-directed speech and its role in the acquisition of language have been questioned by Linguists and child behaviorists. Over the years, many linguistic scholars have realized the importance of activation of innate mechanisms on appropriate stimulation. Child-

directed speech and the social interactions that accompany it seem to account for this stimulation. We can assume that it is a process that naturally belongs to teaching of children for their developmental aspects.

This unique type of speaking style which caregiver exhibit is referred to as child-directed speech or motherese etc. by linguists. These unique characteristics of child directed speech distinguishes it from adult-directed speech. Child-directed speech (CDS) is characterized by distinct features at different levels of linguistic processing. They features are slower rate, wider pitch range, and fewer dysfluencies. It is syntactically simpler and less ungrammatical, and it uses limited vocabulary, which is restricted to the child's interests and focus of attention (Saxton 2010).

Proponents of motherese hypothesis, the strongest version says that, language given to children plays an important role in their language acquisition (Furrow, Nelson and Benedict, 1979). The weakest version says that by listening to mothers child also determines what is to be learned (Shatz 1982). On the other hand Anti-motherese hypothesis gives little importance to external language input and language learning. Child directed speech has important aspects such as prosodic, syntactic, semantic and discourse aspects that in turn help an infant to responds to speech and develop speech and language at various stages of initial years.

Phonological features: higher pitch, slower rate of speech, greater range of frequencies, emphasis on words in a sentence, accentuation and special pronunciations of words.

Lexical features: diminutives, substitutions of simple words, semantically inappropriate words from child's nonce forms.

Syntactic features: Use of more nouns for pronouns, plural pronouns in place of singular ones, ungrammatical usage intentionally, grammatically simple phrases & sentences, and shorter phrases & sentences.

Conversational features: more repetitions of own utterances, fewer declaratives, restricted topics, more questions, questions and answers by adult, and repetitions, expansions, and rephrasing of child's utterances (Baron 1822).

Recently emerged aspect in language development is pragmatics, wherein we assess the use of language in different context. Then many authors found that pragmatics is another important aspect which helps in early language acquisition. Functional contextual model given by Friel-Patti & Conti-Ramsden, 1984 is one such model that explains the importance of language use in society. Pragmatics consists of conversational & discourse aspects and the association of that to other aspects of language. Infants also show nonverbal aspects of pragmatic skills during early development. Joint engagement and attention is one of those factors that shown to be an important factor for language learning in infants. The episodes of joint engagement between mother-child dyad have been directly associated or correlated with language growth in both typically developing and children with developmental delay. In typically developing children, language development is directly associated to the joint engagement duration between mother and child (Tomasello, Mannle, & Kruger, 1986), labeling of objects within the child's focus by mothers (Carpenter *et al.*, 1998). Research carried out in typically developing children has shown that the infant-caregiver interaction

play an important role in the language development and emerging of social behaviors. Carpenter et al. (1983) had also reported about early speech aspects in infants and categorized these features into commenting on action or object, protest for any item or situation and other nonverbal parameters.

Parent's verbal responsiveness can facilitate early language milestones in children. This can be achieved by responding predictably and immediately to child's signals, providing verbal input that is relevant to the activity, and following the child's focus of attention (Spiker, Boyce, & Boyce, 2002). Children make associations between a referent that is given by a communicative partner and the object, action, or event then they acquiring the meaning of required words (Carey & Bartlett, 1978).

The term 'Autism' was first coined by Kanner (1943). Autism spectrum disorders are characterized by abnormalities in reciprocal social interactions, limited and abnormal patterns of communication, and a restricted, stereotyped, repetitive repertoire of behaviors, interests and activities. Autism is a clinical syndrome evident after two years and especially diagnosed after third year of life, information regarding features of autism in the first two years was lacking till 1990's (Short and Schopler, 1988; Stone et al., 1994; Sullivan et al., 1990) but nowadays so many home video studies focused on this aspect.

Communication is a major area of concern in children with autism and most frequent symptom reported by parents from initial stage. The nonverbal communication in autism is characterized by a lack of joint attention that is behaviors used to direct the attention of another

person to an event or object of interest. These children show less attempts to direct the attention of another person to an object or event (Mundy, Sigman, Ungerer, & Sherman, 1986). The language aspect of children with autism also varies drastically, some children may be completely nonverbal with fair social interaction, but others may be verbal along with poor or fair social interaction. Linguistic skills in children with autism spectrum disorders are that comprehension and expression will be affected. Most often we can see delay or regression in speech and language development. The language differences seen in these children can be attributed to their lack of linguistic and social experiences and opportunities (Merrin, Vest, & Kelly, 1983).

However, the specific communication deficits of children with autism may impact on some aspects of parental responses to the child as suggested by Dawson et al. (1990). Deficits in verbal communication are more obvious in children with autism. Most children with autism develop language at later stage but at significantly slower rates as compared to peers (Lord & Rhea, 1997). Striking feature about the language development in children with autism is that its heterogeneous meaning to say that some children acquire good language skills and others remain relatively nonverbal throughout life time.

Another important term is pragmatics that is use of language in different contexts and both verbal and nonverbal parameters of pragmatic will be affected in children with autism spectrum disorders. Several investigators has examined these abilities in children with autism spectrum disorders and concluded that nonverbal aspects like eye contact and gaze, joint attention and verbal aspects like topic initiation, turn taking, topic maintenance, shifting the



topic of discussion, initiating request for action/object. The findings are consistent that pragmatic aspects are severely impaired in children with autism spectrum disorders.

### **Need for the study:**

Mother-child interaction is an important factor that contributes to both linguistic and social aspects of language. In children with autism both linguistic and pragmatic aspects are affected. So there is need to study the communicative functions in mothers of children with autism while interacting with their children

Published studies that compare communicative functions in mothers of children with autism and typically developing children are very few in Indian contexts.

### **Aim**

The present cross sectional study aimed to investigate communicative functions in mothers of children with autism by comparing the same in mothers of language (comprehension) and social age matched Malayalam speaking typically developing children.

### ***Objectives***

- To examine communicative functions in the child directed speech of mothers of Malayalam speaking children with Autism from 3years to 6years of age during mother child interactions.

- To examine communicative functions in the child directed speech of mothers of Malayalam speaking language (comprehension) and social age matched typically developing children during mother child interactions.
- To compare communicative functions between mothers of Malayalam speaking typically developing children and children with Autism.

The present study adapted a semi structured mother child interaction method. A standard group comparison design was used. The caregiver interactive and pragmatic aspects in mothers of autistic children were investigated by comparing to mothers of typically developing children. Both groups of children were matched on comprehension language age and social age.

## **REVIEW OF LITERATURE**

Communication is the process of exchange of information, ideas, and desires. The process is an active one that comprises encoding, transmitting, and decoding the message between individuals (Owens, 2008). Humans communicate through specialized set of code/symbol known as language. During Initial stages infant uses more of nonverbal communication and this diminishes as they become older.

### ***2.1. Language acquisition and development in typically developing children***

The process of language acquisition in children is explained by various theories but still not clearly and satisfactory answered. According to nativist theory proposed by Chomsky (1965, 1995), innate language mechanism is there in each infant. The child is using innate language device with a universal grammar and through contingent exposure that becomes adapted and molded to a particular language (native). The other hypothesis is prosodic bootstrapping (Gleitman, Gleitman, Landau, & Wanner, 1988) wherein authors says that the prosodic nature of the speech signal has rich information regarding the syntactic structure of a language and that can help the infant in learning of language. All these has emerged when researchers have shown interest and studied how children acquire language.

Bakeman and Adamson (1984) found that in infants, before active coordination of attention, mothers make a joint focus of attention to object/action. Situations in which, infant and caregiver display similar intentional states toward an external object provide the necessary information regarding that particular object. This helps to acquire an understanding of the

“similarity between self and other.” From this we can say that other people attend to and have intentions toward outside entities (Moore, 1996; Carpenter *et al.*, 1998). The language acquisition in children depends on social environments in which the adults’ communication is made salient for the children (Bruner, 1981, 1983).

The studies found that early speech use in infants consists of social aspects rather than linguistic aspect that is speech act will be less referential. They use more of self naming of objects and vocabulary consists of main verbs and nouns. Most typical infants display all aspects of joint attention, including sharing attention, following the attention of another, and directing the attention of another by 12 months of age (Carpenter *et al.*, 1998). The infant begins to link words and sentences with objects and events through joint attention interactions along with experience (Baldwin, 1995).

## *2.2. Pragmatic development in typically developing children*

The social interaction depends on an active dialogue between parent and child. This depends on the infant's early language competencies and the mother's capacity for fine tuning that. Analysis of both mother-child interaction in the neonatal period (Brazelton *et al.*, 1975) and early communication (Condon and Sander, 1974; Stern *et al.*, 1975) have emphasized the importance of communicative and social interaction for infants’ later development. An infant can understand that he/she can use speech and language aspects in different ways to get information or full fill needs. By saying one to two word phrases child can get items that is requesting. Based on situation the way child has to perform action and conversation also changes and through experience child learn all these aspects.

Pragmatic assessment tool was developed by Thankam (2002) to check pragmatic abilities in children in Indian contexts. The parameters assessed were greetings, naming, negation, repair, stylistic variations, turn taking and proximity. Children in the age range of 3.5 to 8.5 were the participants. The results revealed developmental sequence in pragmatic skills. Culturally appropriate skills were obtained in domains like naming, proximity, and turn taking by 3.5 to 4.5 years of children. Stylistic variation was the one achieved at later stage by most of children.

Shilpashri & Shyamala (2008) studied pragmatic skills in typically developing infants. The authors investigated pragmatic skills in eight typically developing infants in the age range of 6-12 months. The pragmatic behaviors assessed were smiling, attention, eye contact, vocalization, play behavior, non verbal turn taking, giving on request, and non verbal indication of negation. Results showed that smiling, attention, eye contact, vocalization, play behavior, non verbal turn taking were present in typically developing infants at 6-12 months of age group.

### ***2.3. Role of child directed speech in typically developing children***

It has been observed that CDS is dynamic form of speech that adapts over time according to child's language developments and this process is referred to as "fine tuning" by Snow (1995). It is not understood that, whether the input to the child is adjusted to overall level of development or observed changes are the result of fine adaptations to the child's

linguistic behavior. Several authors have reported that when adults use different prosody while speaking to infants that may attract infants' attention, convey emotions, and convey language information (Hirsh, Patek et al., 1987; Fernald and Kuhl, 1987). Studies also reported that infants show selective preference for mother's infant directed speech as opposed to adult directed speech (Glenn and Cunningham, 1983; Fernald, 1985; Werker and McLeod, 1989). This prosody pattern helps to maintain the limited attention of the baby towards caregivers and objects. Motherese contains good phonetic exaggeration that is sounds that are clearer, longer, and more distinct (Kuhl et al., 1997; Burnham et al., 2002). In addition to these features the baby's reactions also accentuate the mother's voice contours (Burnham et al., 2002). According to infant's response, mothers' will change their speech pattern, which shows that in early interactions infants are active participants during conversation (Braarud and Stormark, 2008).

Research on interactions between adults and typically developing children has supported that language development is enhanced when adults follow the child's attention and verbal input related to the child's focus of attention (Chapman, 1981; Dunham, Dunham, & Curwin, 1993; Newoff & West, 1993). Tomasello and Farrar (1986) also reported positive association between adult utterances that followed the child's ongoing focus and the subsequent lexical development of child. According to Tomasello (1995), positive correlation occurs this provides a referential frame for development of linguistic skills and this is independent of the utterance function.

Brazelton and colleagues (1998) explained three hypotheses about the nature of mother–infant interaction: (1) Interactions begins when the mother positively elicits infant's attention; (2) maternal positive expression will always precedes the infant's expression; and (3) the mother will be positive until the infant again becomes disinterested. Cohn, Jeffrey, Tronick, Edward (1987) studied mother child interaction in 54 mother–infant dyads. Eighteen mother–infant dyads were video recorded for 2 min longitudinally at 3, 6 and 9 months of age. Mother and infant behaviors were coded with behavioral descriptions. They found supportive evidenced at 6 and 9 months of infants for hypothesis that interactions starts when the mother positively elicits infant's attention. Also found strong support at 3, 6, and 9 months of age for 2<sup>nd</sup> and 3<sup>rd</sup> Hypotheses, with one exception that at infant's becoming positive before the mother at 9 months of age. The results from this study suggest that to some extent the tested hypotheses describe the nature of mother–infant interaction.

Examining directive functions of adult utterances, Donahue and Watson (1976) found that the single variable was best predictor to determine whether children in the one-word stage of development would comprehend mothers' directives was the attention. Form all the variable examined attention was the more powerful predictor and other variables included were length of utterance, use of direct versus indirect directives, intonation contour, and mother's use of gestures to accompany the directives.

### ***2.3.2. Prosodic aspects of child directed speech***

Study by Nelson (2009) shows that infants' are sensitive to segmentation cues in motherese but not for adult-directed speech. Also shows that for motherese itself, infants orient to longer duration speech that has been interrupted at boundaries. This selective preference indicates that the infants are getting cues to units of speech from prosodic qualities of motherese that correspond to grammatical units of language. In the language-learning literature function of motherese has become a vital issue and authors studied the same in typically developing children and atypical population. Hirsh-Pasek, et al., (1987) showed that infants aged 7–10 months are sensitive to prosodic cues.

These prosodic cues helped them in segmentation of speech into perceptual units. Cassidy et al., (1989) studied the prosodic characteristics in motherese and the role of that in the acquisition of syntax. This study showed that infants' sensitivity to segment-marking cues in ongoing speech holds for motherese but not for adult-directed speech. In infants this is basic contribution of motherese to the learning of syntax.

### ***2.3.2. Semantic and Syntactic aspects of child directed speech***

Murray, Johnson and Petersa (1990) studied effect of utterance length on later language development in preverbal infants. The subjects for the study were 14 mother-infant pairs and they were followed longitudinally when the infants were at 3, 6, and 9 months of age. Mothers' mean length of utterance was calculated from interaction. Mothers, who provided responsive and stimulating environments, also reduced their MLU over the age range. Mother's MLU adjustments during the first year were more predictive in finding receptive language



development at 1.6years. However, expressive language abilities were predicted by child characteristics such as the infant's sex. These findings suggest that there is an association between mother's ability to 'fine-tune' linguistic input and child's later receptive language functioning. Mother's ability to adjust their early linguistic input was found to be a predictor for child's receptive language development.

Barnes, S., Gutfreund, M., Satterly, D., and Wells. G. (1983) investigated the effect of different aspects of adult's speech on child's language development. Speech samples commonly used by adults to 2-year-old children were analyzed during natural interaction. The parameters assessed were semantics, syntax, pragmatics and discourse and also found out that which one is more positively correlated with child's language development over 9 months of age. The highly correlated parameters to child's language gains were yes/no questions, directives and informative utterances.

Researchers also studied mother's utterance structure while conversing with young typically developing children. Total eleven mothers and their children in the age range of 2.5 to 3.0 years were participated. Mother's utterances were assessed on the basis of rate in topic shift and quantity of interaction. They found that the controlling of actions and correcting their action along with description and then stimulation of children to participate during conversation by mothers were very important. But they also found discrepancy between amount of controlling and the conversation interaction. A negative relationship was seen between these two parameters (McDonalda, L., and Piena, D., 1982).

The studies on relationship between mother's speech and child's language development show conflicting results. Hence Smolak, L., and Weinraub, M. (1983) studied mother's language teaching strategy in young typically developing children. Syntactic, discourse, and communicative functions of mothers' speech were examined. Mothers of children with superior and inferior language skills were examined during interaction with their children and chronological and language age matched another child. Results revealed that mothers were used same style and pattern while talking to both children and responses were consistent.

#### **2.4. Mother-child interaction in Disorder population**

In children with Down syndrome, the extent to which caregivers maintained the child's attention to child-selected toys was a predictor of the child's subsequent language development. Joint attention and topic initiation during caregiver-child interactions was examined over 13 months along with relationship of language development. Subjects were 28 children with Down syndrome and caregivers and 17 typically developing children along with Caregivers. Caregivers of children with Down syndrome spent more time in joint attention and maintained more attention towards the selected toys than the other group. In children with Down syndrome their receptive language gains were associated with caregiver's longer duration of joint attention and also with maintaining attention to child-selected toys. Negative association was found between children's language gains and caregivers redirecting attention away from child-selected toys and a frequency of joint attention. In typically developing children receptive language gains were positively correlated with joint attention episodes and caregivers maintaining attention to mother-selected toys. (Harris, Kasari, & Sigman, 1996).

Haripriya & Shyamala (1998) studied child directed speech in children with Hearing Impairment. The participants were 10 normal hearing children and linguistically matched children with Hearing Impairment. Mother-child interactions were audio recorded for 20 min and min sample was transcribed for analysis. Mothers of normal hearing children used more of self repetitions, repair devices, directives and imperatives. This was followed by closed and open questions, expansions, referential features and people/object present. Lesser percentage of imitations, continuates, accompaniments, invitation to vocalize and caregiver controlled events were observed. Mothers of children with Hearing Impairment used more of self repetitions, repair devices, directives and imperatives followed by people/object present, invitation to vocalize, continuates, accompaniments and caregiver controlled events. Lesser percentage of imitations, yes/no replay, expansions and non immediate referential feature were observed. They found that mothers of Hearing Impaired children adjusted their conversation style to suit the child's language level. But both quantitative and qualitative difference was seen in mothers discourse pattern.

Children with severe or multiple disabilities, have limited ability to use communication functions hence, the ability of the caregiver to understand these signals will be affected (Carter & Hook 1998). The caregiver will be confused at times to correctly interpret child's behaviors. The caregivers make inferences from child's behaviors on the basis of available source of information such as the context in which communication is taking place, basic understanding of the nature of the child, and previous experiences (Iacono et al, 1998).

Preeja. & Manjula (2007) investigated type and frequency of communicative functions in mothers of non speaking children with cerebral palsy in the age range of 2-3 years. Four mother child pairs were participated. Communication functions studied were Request for information, object and attention, Information, Instruction for action and speech, Confirmation, and Denial. Study revealed discrepancy between the types and frequency of communicative function used by the mother and child. Mothers had used most of the communicative utterances and they often consists multiple utterances and functions during interaction.

Nonspeaking children with Cerebral palsy were limited and used single function. Dominant communication strategies used by mothers were instructions (actions) followed by request for information, and request for attention. Instruction for speech, request for object and confirmation denial had less frequency in the communication process. In contrary communication functions demonstrated by children were information, followed by self centered communication strategies such as request for object and denial. At few instances request for attention were evident in children's repertoire.

William, G., David, L.M., Donald, M. I. (1972) investigated the aspects of communications in mothers of schizophrenic children and mothers of non-schizophrenic children. Subjects were mothers of non-schizophrenic, organic and nonorganic schizophrenics. Each group consisted by 12 mothers each. The communicative clarity in these mothers during surprise situation was observed. Higher communication clarity was seen in mothers of non-schizophrenic children than mothers of schizophrenic children. Highest score was observed

in mothers of non-schizophrenic children followed by mothers of organic schizophrenics then mothers of organic schizophrenics.

Another study done by [Goldfarb, W.](#), [Yudkovitz, E.](#), [Goldfarb, N.](#) (1973) investigated the description of objects by mothers of schizophrenic children during interaction. The parameters considered for assessment were mother's responses to child's request amount of information provided and the way they explained it. Mothers of 10 boys and 2 girls with schizophrenia were the subjects. Age of schizophrenic children was around 9 years of age, they had adequate vocabulary levels. Results showed that mothers of normal schizophrenic were scored less than mothers of typically developing children.

[Santarcangelo, S.](#), [Dyer, K.](#) (1988) studied the effect of motherese prosody by teachers on response and eye contact in children with severe disability. Two stimuli used were "motherese" and "conversational" tone. In first study six children with severe handicap and controls subjects were participated. Later experimental study was conducted with four children. The results of the first study showed a correlation between the use "motherese" prosody and response and eye contact. Further they also revealed same results. The "motherese" prosody resulted in higher eye contact as compared to "conversational tones." This suggests the use of motherese in children's development in assessing interactions.

## **2.5. Autism Spectrum Disorders**

### *2.5.1. Linguistic and Pragmatic development in Children with autism*

Children with autism rarely use gestures as a means of directing an adult's attention to an object of interest (Mundy, Sigman, Ungerer, & Sherman, 1986) and rarely use referential looking in terms of initiating joint attention (Mundy et al., 1986). Studies done by many authors had shown that children with autism show impairments in joint attention skills. Few authors compared joint attention skills in children with autism to children with delayed and typical development. Responding to the joint attention greetings of others are also less in children with autism (Loveland & Landry, 1986; McArthur & Adamson, 1996; Mundy et al., 1986); but with developmental age respond to attention bids of others seems to improve fast than the ability to initiate joint attention (Baron-Cohen, 1989; Mundy, Sigman, & Kasari, 1994).

From a developmental point of view, in conceptualizing the communicative deficits in autism studies had shown that caregivers who try to maintain child's engagement by pointing or talking about child's focus of attention are the ones who later develop superior communication skills than the others. Caregiver's behaviors facilitate the social understanding of the child and hence social behaviors occur at an early stage of development. These behaviors scaffold the attention capabilities of the child and therefore facilitate the acquisition of language.

[Tager-Flusberg](#) et al., (1990) examined the language aspects in children with autism in a longitudinal manner. The subjects were six children with autism and chronological age and

language age matched six children with Down syndrome. They subjects were examined from 12 months to 26 months of age longitudinally. Language aspects were measured during mother-child interaction at their homes. Then language used during interaction was transcribed and coded for mean length of utterances, productive syntax index, and diversity of lexemes usage. The findings revealed that autistic children also followed the developmental pattern as that of children with down syndrome and typically developing children. Both vocabulary and grammatical complexity development was similar in two groups of children. They also found that mothers interaction play a major role in this developmental pattern. Mothers of children with autism gave more nonverbal cues and used more physical contacts during interaction. Hence the children with autism does not deviant in learning formal aspects of language during their initial stages of development.

Michael, S., Marian, S. (2008) evaluated the change in the language abilities of 28 children with autism from 24 to 36 months of age. The results revealed that children's language development was depends on response of child to others attention and response of caregiver to their children's activity during play. They also found that child's age, IQ, and other abilities were not the predictor for language development. Their results support social aspects in acquisition of language.

Shilpashri & Shyamala (2008) studied the type and frequency of pragmatic skill used by mother and twin children with autism. Five year old male identical twins were the subjects and one hour video recording of mother-child interaction was carried out. The pragmatic

functions assessed were giving on request, pointing, gaze exchange, joint attention nonverbal turn taking, and nonverbal indication of negation. Results indicate that the pragmatic skills showed by twins were restricted to only requesting. In overall the subjects had poor pragmatic performance during mother child interaction. The mother was active and initiated pragmatic question during interaction. The twin subjects respond equally for mothers pragmatic questions but they differed in the frequency of use of each parameter.

In this study authors studied the association of joint attention, play, and imitation to language ability and rate of development of communication skills in children with autism spectrum disorder (ASD). Participants were 60 children with ASD in the age range of 3-6.5 years of age and assessed joint attention, play, and imitation and association of these behaviors with language ability and rate of development. Joint attention and immediate imitation were highly associated with language ability at age 3–4 years in children with ASD. But play and deferred imitation were found to be predictors of rate of communication development in ASD in later age ([Toth, K.](#), [Munson, J.](#), [Meltzoff, A.N.](#), [Dawson, G.](#), 2006).

[Wetherby, A. M.](#), [Watt, N.](#), [Morgan, L.](#), [Shumway, S.](#) (2007) studied social communication abilities in children with autism spectrum disorders by comparing with children with developmental delay and typically developing children. They had taken 50 children with autism spectrum disorders, 23 children with developmental delay, and 50 typically developing children. Subject's video recording was done from 18 to 24 months of age. Results showed that ASD group achieved significantly lower scores than the DD group on few social skills and the TD group on all the parameters measured. Children with ASD showed significant



deficits in following domains gaze shifts, gaze follow, act for joint attention, inventory of gestures, and rate of communication. Comprehension ability was the strongest indicator of developmental aspects and behavior control and gestural use was the strongest indicator of autism symptoms at 3 years of age. This study suggests five important skills in the latter half of second year that have a negative association on outcomes.

Shilpashri & Shyamala (2011) studied pragmatic development in children with Autism spectrum disorders during mother child interaction. Subjects were 108 mother-child pairs. In that 72 were typically developing children in the age range of birth to six years and 36 participants with ASD. The aim of the study was to identify the child's ability in responding to pragmatic skills initiate by communication partner and child's ability in initiating pragmatic skills during interaction with mother. Frequency and responses were coded. Frequency for both initiation of pragmatic behavior by child and response to mother's initiation of pragmatic behavior were calculated. The results showed that by 5-6 years of age all the pragmatic skills were mastered by typically developing children.

In typically developing children both emergence of pragmatic skills and response to mother's initiation of pragmatic skill increased with age and gender differences were not observed. In children with ASD they were deficient in at all age levels for all the pragmatic skills. Among mothers initiated pragmatic behavior, response for labeling was the only pragmatic behavior found to be mastered by children with ASD. Percentages of response from children with ASD on self initiation and to mother's initiation of pragmatic skills were not

constant. They also found that interaction of mothers was found to be very significant for pragmatic development.

### ***2.5.2. Mother-child interaction in Children with autism***

Many researchers investigated the role of parents in the both nonverbal and verbal communication development in children with autism. Studies show that there are predictive relations between children's communication skills for both typically developing children and children with Down syndrome with parental styles of interaction and, hence some authors mentioned that such relations should exist for children with autism. The literature also shows contrasting findings between parents of typically developing children and children with autism.

*Communicative functions in mothers of children with autism during mother-child interaction were assessed by [Cantwell](#), D.P., [Baker](#), L., [Rutter](#), M. (1977). The participants were thirteen mothers and their children with autism and 13 mothers and their children with developmental receptive dysphasia. The children with autism and developmental receptive dysphasia were matched on chronological and language age. Language aspects were compared in mothers of two groups. Mother-child dyad interaction was videotaped for one hour at their homes. Parameters assessed were the quantity of language use, frequency of utterances, the complexity and grammaticality of utterances, the clarity during communication, and the tones of voice used. Results indicated that quantity of language use, interaction pattern, clarity of communication were equal in two groups. They concluded that*

*there is no deviant pattern seen in mother child interaction in autism. This study does not support deviancy in mother-child communication in autism.*

The studies that investigated the behaviors of parents of children with autism by comparing that with behaviors of parents of typically developing children have shown that parents of children with autism are more directive and regulating (Kasari, Sigman, Mundy, & Yirmiya, 1988). Shapiro, Frosch, and Arnold (1987) concluded that unresponsiveness of the children with autism would have a negative effect on the parent child interaction. Parent's ability to establish synchronous, contingent interactions with the child with autism is the result of that. Hence this has to be worked upon during intervention process.

Even though children with autism shown to demonstrate more interest in proper use of material, task behavior, and educational improvement (Clark & Rutter, 1981) correlation of these behaviors with the child's social and the language skill has not been reported. The communicative ability in children with autism is linked to sensitiveness of parents to the focus of attention and interest of their children. Studies also found that that even when the children's mental ages and mothers' educational levels are matched the joint attention behaviors of children with autism are significantly less frequent than children developing typically or children with mental retardation, (Mundy et al., 1986; Sigman et al., 1986).

Konstantareas, M. M., Mandel, L., and Homatidis, S. (1983) studied characteristics of speech that used by parents of autistic children as a function of the language development in children with autism. An important aspect of this study is that in this study authors assessed

both mother's and father's speech in 12 children with autism. Both higher functioning and lower functioning children with autism during interaction with parents were video recorded for about 15-minutes. They found out that the amount of utterances usage was similar in mothers and fathers speech, but mother's speech contained shorter utterance length and used more prompts during activity. This was more evident when they were interacting with lower functioning autistic children. Parents used more directives while interacting with lower functioning children and at the same time higher functioning children were more frequently reinforced for speech. Directives were used more frequently by fathers. So we can say that both mothers and fathers are able to adapt their speech to their children with lower and high functioning autism but they differ the way the expresses that and mothers are more proficient in that controlling.

Loveland, Landry, Hughes, Hall & McEvoy (1998) investigated pattern of speech act in verbal children with autism during interaction with mothers. Autistic children were compared with developmentally delayed (DD) children and typically developing children. Mothers were requested to play with their children as they usually does and materials were provided and video recording was carried out for 15 min duration. Results indicate that autistic children were passive in giving response to mothers response initiation. Hence they used less affirmation signs and vocalization in mother's response. The children with DD used frequent negations than typically developing group. Then the mother's speech act parameters indicated that mothers of children with autism used more frequent observable act than other two groups. The mothers of children with autism also differed in terms of the use of directives, they used more percentage of directives than mothers of children with developmental delay.

### ***2.5.3. Comparison of mother-child interaction in autism and other atypical population***

Few authors also reported that parents of children with autism are more directive and regulating when they compared them with typically developing children. This result was shown by Cunningham, Reuler, Blackwell, & Deck (1981), where in interaction of parents of developmentally delayed children was compared with mothers of typically developing children. Kasari, Sigman, Mundy, and Yirmiya (1988) found that in responsiveness to the children's nonverbal communication and in their interaction in mutual play, the caregivers of young children with autism are equal to caregivers of typically developing children and children with mental retardation. Further, Kasari et al. (1988) found that caregivers of these children never failed to respond to a child's nonverbal communicative acts such as pointing, and giving.

Examining mother-child interaction within subgroups of children with autism, Konstantareas, Zajdeman, Homatidis, and McCabe (1988) found that the interaction behaviors of mothers of higher functioning verbal children with autism were different from those of mothers of lower functioning nonverbal children with autism. Ten higher functioning and lower functioning children with autism along with mothers were video recorded for 15-minutes. They found that the mothers of higher functioning autism used more questions answers, used modeling of language, gave frequent reinforcement for language, and gave responses to child's questions. The latter group of mothers used more directives, shorter utterances, and reinforced their children's motoric behavior more than mothers of higher

functioning children. The authors concluded that the differences reflect the mothers' appropriate responsiveness to their children's respective abilities.

Watson (1998) examined the ability of mothers of children with autism in using child's focus of attention. Participants were fourteen mother-child pairs and language age matched typically developing children and mother pairs. Subjects were evaluated during 15 minutes of play interaction. Results revealed that the mothers of children with autism and mothers of typically developing children directed verbalizations to show something within the child's attention focus. Thus, both group of children had equal opportunities to use their own attention focus. But differences were also found, mothers of children with autism directed speech when items are not within the child's focus of attention more frequently. Authors also ascribed this to the mothers' attempts to mould their children's difficulties in terms of attention and concentration.

Dawson, Hill, Spencer, Galpert, and Watson (1990) reported that during the snack time interaction with their children mothers of children with autism displayed significantly fewer episodes of smiling than did mothers of children developing typically. They also found that the mothers of children with autism were less responsive to smile back on their children's smiles. These findings were attributed to the fact that the children with autism were less likely to combine eye contact with an affective expression such as a smile. Thus, it appeared that the children with autism were not using eye contact as a means to communicate emotion to the same extent as the comparison group.

Doussard–Roosevelt et al. (2003) studied the mother–child interaction in autism and the mother’s interactional aspects and its relation to social development. They conducted two studies, in first one 24 children with autism and 24 typically developing preschoolers along with their mothers were video recorded during play time. In second study 9 mothers along and their child with autism and siblings without autism during play interactions were video recorded and compared.

Results indicate that, the number of methods used by mothers of autistic children and mothers of non-autistic children were equal, but differences were seen in terms of the way they used it. More tactile stimuli and contacts along with less social interactions were used by mothers of autistic children. Second study also revealed same result that is mothers showed a similar method while interacting with their children. Children with autism showed reduced response to mother’s interaction methods, at the same time they showed more response to methods using increased tactile care and cues along with nonverbal mode of interaction.

Siller and Sigman (2002) studied the behaviors of caregivers of children with autism during play interactions along with caregivers of children with developmental delay and typically developing children. Twenty-five children with autism, 18 children with developmental delay and 18 children with typical development and their parents were the subjects. Language age of children with developmental delay and typically developing children were matched to that of children with autism. Communication skills, developmental and language skills and caregiver-child interactions were assessed. Caregiver-child interactions were video recorded for 4 minutes and transcribed and coded for analysis. Coding was done as demanding and non-demanding according to caregiver response to child’s

behaviors. Authors focused on synchrony of verbal and nonverbal behavior of caregiver with that of child's ongoing activity.

Their findings revealed that caregivers of children with autism synchronized their behaviors in equal quantity as that of others. Another finding was that in children with autism, caregivers who used more synchrony resulted in improved joint attention and language development at later point of time than caregivers who showed less synchrony during interaction. These findings suggest an association between caregiver interaction with children and the later communication development in children with autism. The caregivers of children with autism are able to model and adapt their communication interaction according to their child's developmental aspects.

Siller and Sigman (2008) study was an extension of previous study which was done by same authors in 2002. The authors examined language development of a group of children with autism. They coded parent responses into synchrony of utterances with attention and synchrony of utterances with the attention and playing. Hence caregiver's utterances like comments and directives come under first category that is attention and utterance synchrony but later one contains only comments. Results indicated that language development rate was correlated with both attention of child and parental response for that same.

Mahdhaoui et al. (2009) developed a computerized video detector to find out motherese but use of that in ASD is not that popular. They also hypothesized that autism which is seen in early life, frequency of mother's language use is less in mothers of children with



autism due to reduced feedback from child with autism (Muratori and Maestro, 2007). This inappropriate stimulation by mothers would have an effect in developmental period. This in turn affects language development in these children with autism (Zilbovicius et al., 2006).

#### ***2.5. 4. Mother-child interaction in autism after training***

Training programs for the parent of children with autism also instruct caregivers to structure their interactions so that the adult control child's behaviors, such as what activities child has to do and how to carry out the same activity (Schopler & Reichler, 1971; Howlin *et al.*, 1987).

Parental use of language and the differences in their language use over a period were examined after training and providing guidelines for the parent regarding home intervention for children with autism. They selected two groups one who received training regarding home intervention and other group without training. Authors found that at baseline language usage of parents were not deviant. However home based intervention modified their language style and drastic changes could be seen during communication between parents and children. But parents in group without training exhibited few differences in their interaction. In intervention group they also found a positive relation between language usages by parents and social skills of children. This also explains the importance of parent training as a booster for language and social development in children with autism (Howlin, P., and Rutter, M., 1989).

Harris, S.L., Wolchik, S.A., & Milch, R.E. (1983) examined parents speech to their children with autism after providing operant training methods and behavior modification. Nine parents

with their autistic children participated in this study. Multiple baselines were taken during study. The participants were divided into groups where 1<sup>st</sup> group received operant techniques but 2<sup>nd</sup> group remain without treatment. Then second group received operant techniques and 1<sup>st</sup> group received behavior modification. Later 2<sup>nd</sup> group received behavior modification. Video recording of parent-child dyads were done at baseline and at each level of treatment. Coding was done for verbal and nonverbal parameters.

Results showed that the language of parents changed after speech training and mothers were more active in using language than fathers. But this language modification was absent after behavior modification therapy. The mothers of verbal autistic children showed evident change in language usage, but this was absent in mothers of nonverbal children with autism. Results suggest improvement in language usage in mothers of children with autism after speech training and this was also evident in children's language use during interaction.

Laski, K.E., Charlop, M.H., Schreibman, L. (1988). The main aim of this study was to find out the effect of Natural Language Paradigm on speech and language characteristics of parents of children with autism. Parents of nonverbal and autistic children with echolalia were given training regarding Natural Language Paradigm. Parents were instructed to play in unstructured manner along with toys. Parents were trained to use that technique at clinic at initial stage later that was carried out at home. The results revealed that after training, improvement was seen in terms of frequency of speaking time to children. In the same way children also showed improvement in the frequency of their vocalizations.

## METHOD

Research Design: A standard group comparison design was used. The group with autism was compared with language (comprehension) and social age matched typically developing children.

### **3.1. Participants:**

Twenty mother-child pairs participated in this study. The participants were divided into two groups, group 1-Clinical group. Group 2: Typically developing children (TDC) group. Age: A random sample of 10 children with a diagnosis of autism from 3-6 years of age and their mothers between 20-35 years of age participated in this study.

#### ***3.1.2. Clinical group inclusion and exclusion criteria:***

Among ten participants eight were males and two were female children. All the participants were diagnosed as having autism by qualified Speech Language Pathologist on basis of diagnosis using screening and diagnosis tests. All the participants were from native Malayalam speaking families or who may/may not know other languages. All the participants were taking speech language therapy from clinics or institutions. Mother's educational qualification and speech and language therapy durations were also accounted for analysis.

Children with history of visual impairment, hearing loss, seizure and other developmental disabilities were excluded from the study. Children with Rett's syndrome, Asperger syndrome and Childhood disintegrative disorders and Pervasive Developmental Disorder- Otherwise Not Specified were also excluded from the study.

### ***3.1.2. Typically developing children (TDC) group inclusion and exclusion criteria:***

Age: A random sample of 10 language (comprehension) and social age matched typically developing children and their mothers between 20-35 years of age participated in this study.

Language used: All the participants were from native Malayalam speaking families who may/may not know other language.

Children with history of visual impairment, hearing loss, seizure, other developmental disabilities and mental retardation were excluded from the study.

### **3.2. Language and other Measures**

Both direct observation and interview of mother were adapted to get the information about language and social age. All the below mentioned assessment tools were administered in both groups.

- 1) Assessment checklist for speech and language domain (Swapna, Jayaram, Prema, Geetha, 2010) was used to find out language age. This checklist assesses both comprehension and expression of a child from birth to six years of age. Item code was given for both comprehension and expression. Question in the first 3 years is given in 3 month interval period for both comprehension and expression. Question in 3-6 years is given in 6 month interval period. Number of questions varied in each month range. Scoring was given as 0- Not applicable/absent, 0.5- totally dependent/physical/verbal prompt, 1-consistent and independent.

- 2) Modified Checklist for Autism in Toddlers (M-CHAT, Robin, Fein, Barton, 1999) had used to rule out presence of autistic features. This is screening tool that identifies the children who are at risk for Autism. The test consists of 23 Yes/no questions. Yes/ no responses are converted into pass/fail criteria. There are 6 critical items. If a child fails in any two critical items or any three other items that child is at risk for Autism. Mothers were interviewed and information was collected. Diagnostic test was administered in those who failed in this test to confirm the diagnosis.
  
- 3) Vineland social maturity scale (VSMS) Indian adaptation (Malin, 1972) had used to find out social age. This test measures the social maturity in terms of social age and quotient. Social skills were assessed by qualified psychologists by interviewing mothers. The items include progressive maturation in self-help, self direction, locomotion, occupation, communication and social relations. The age range for this test is birth to fifteen years.

Hearing measures: Informal hearing screening had carried out during interview.

*Table-1: Demographic details of clinical group, Language age, social age, Duration of therapy and Mothers education*

<i>Subjects</i>	<i>Chronological age (months)</i>	<i>Gender</i>	<i>Language age (months)</i>	<i>Social age (months)</i>	<i>Duration of therapy (months)</i>	<i>Mothers education</i>
C1	70	M	25-27	27	22	Under Graduate
C2	51	M	13-15	14	24	PUC
C3	70	F	22-24	22	12	Under Graduate
C4	50	M	31-33	30	7	Under Graduate
C5	71	F	28-30	28	22	Post Graduate
C6	42	M	28-30	30	12	PUC
C7	71	M	28-30	29	24	Under Graduate
C8	48	M	36-42	38	01	Under Graduate
C9	66	M	36-42	40	8	PUC
C10	63	M	10-12	12	12	7 <sup>th</sup>

*Table-2: Demographic details of typically developing children group, Language age, Social age, and Mothers education.*

<i>Subjects</i>	<i>Chronological age (months)</i>	<i>Gender</i>	<i>Language age (months)</i>	<i>Social age (months)</i>	<i>Mothers education</i>
T1	27	M	25-27	27	Under Graduate
T2	15	M	13-15	14	Under Graduate
T3	22	F	22-24	22	PUC

T4	32	M	31-33	31	PUC
T5	28	F	28-30	28	Post Graduate
T6	30	M	28-30	30	Under Graduate
T7	29	M	28-30	29	Under Graduate
T8	38	M	36-42	38	Under Graduate
T9	40	M	36-42	40	PUC
T10	11	M	10-12	11	Under Graduate

### **3.3. Procedure:**

An informed written consent was obtained from all the mothers of children participated in the study. Before administration of the test, mothers was explained about the nature of the study, number of visits, time required and test administered during study.

#### ***3.3.1. Test administered:***

Assessment checklist for speech and language domain (Swapna, Jayaram, Prema, Geetha, 2010) was administered in two groups to find out language age. Then Vineland social maturity scale (VSMS) Indian adaptation (Malin, 1972) had used to find out social age in two groups. Modified Checklist for Autism in Toddlers (M-CHAT, Robin, Fein, Barton, 1999) had used to rule out presence of autistic features in TDC group. Informal hearing screening had carried out during interview to rule out hearing problem.

### ***3.3.2 Instructions to mothers***

Semi structured mother child interactions were video recorded. Mothers were instructed to play and interact with child as they would normally do at home. They were also counseled to ignore the presence of examiner and camera. Before recording, participants were familiarized with settings. The investigator had built rapport with mother-child to avoid shyness/fear from subjects.

### ***3.3.3. Recording***

A familiar environment such as the clinic room/child's home was selected as the venue for video recording. Venue was fixed according to mother's preferences. Video recording was done using Nikon Coolpix L820 digital camera. Only mother-child pair and examiner were present in the room. Mother-child interactions were recorded using digital video camera for one hour and noise and other distracting parameters were controlled. Breaks were provided during video recording. In case of any inconvenience to record 1 hour continuously the remaining recording was done on the consecutive days within one week duration. Examiner also provided information regarding the material use before recording to avoid ineffective use of material.

### ***3.3.4. Materials***



Toys and activities suitable for children were selected based on guidelines from toy kit for children with developmental disabilities (Venkatesan, 2003). The materials included noisemakers, building blocks, toy vehicles, fruits, doll, ball, kitchen set, flash cards of common nouns, verbs, and story, puzzles and picture book. According to age group same set of toys were used in both clinical and typically developing group.

### ***3.3.5. Coding procedure***

Cole and Stokes (1984) caregiver-child interactive behaviors were adapted for frequency analysis.

#### ***Caregiver-child interactive behaviors (Cole and Stokes, 1984)***

##### ***a) Speech Act Features***

- 1) Invitation to vocalize: The caregiver's utterance that seeks to have the child vocalize, this includes attempts to make the child imitate certain sounds, words or sentences (Mogford, Gregory and Bishop, 1979).
- 2) Self repetitions and repair devices: Caregiver repeats his or her own utterances, answers his or her own questions and revises his or her speech for better understanding of child (Snow, 1977).
- 3) Imitation: Partial or full repetition of child's preceding utterance by caregiver (Cross, 1977).
- 4) Expansion: Elaboration of child's utterance by caregiver to form semantically or grammatically complete sentence (Cross, 1977).

- 5) Yes/ No reply: Expressing affirmation or negation to child's response/ utterance by caregiver (Cross, 1977).
- 6) Other reply: caregiver's other response type which used to reply to child's response/ utterance.
- 7) Interrogatives: Caregiver's utterance with interrogative syntax or question form (Bellinger, 1979).
- 8) Imperatives: Caregiver's utterance with imperative syntax (Bellinger, 1979).
- 9) Accompaniment: Caregiver's utterance that narrate obvious, ongoing events without an apparent attempt to seek a child response and without adding new information (Cole and Stokes, 1984).
- 10) Informatives: Caregiver's utterance that adds new information to the situation, describing, explaining, expressing emotion and judgments, reporting beliefs about others internal state, starting reasons (Cole and Stokes, 1984).

***b) Referential Features:***

- 9) *Child controlled events*: Utterances by caregiver referring activity or object, child is or was doing, holding or manipulating (Cross, 1977).
- 10) *Caregiver controlled events*: Utterances by caregiver referring activity or object, caregiver is or was doing, holding or manipulating (Cross, 1977).
- 11) *People/object present*: Utterances by caregiver referring to any person/object in the immediate situation, but not the child or the mother (Cross, 1977).
- 12) *Non-immediate*: Utterances by caregiver referring to events/person/object removed from space and time from situation (Cross, 1977).

***Frequency of Caregiver-child interactive behaviors:*** From one hour video 40 minute mother-child interaction was transcribed and frequency of each parameter was measured and coded. Frequency of each one will be coded as correct, partial and no response.

Correct response- frequency greater than 10

Partial response: frequency within 5-10.

Poor response- frequency within 0-5

### **Pragmatic parameters**

1. Topic initiation: Individual introduces particular topic to the child. Starts interaction by showing object/ action.
2. Topic maintenance: Individual continues one topic for some time. Give more information and explanations regarding that topic.
3. Turn taking: Responsive behavior by partner following each verbal and nonverbal behavior by child.
4. Stylistic variation: Variations introduced by the speaker while speaking to the child which helps in better understanding.
5. Request object/action: Individual conveys the message to give an object and or action through pointing/ verbally/ indirect requests/ polite form.

These parameters were coded occasional, frequent and always according to frequency of occurrence.

Occasional- percentage of occurrence less than 30% of time

Frequent- percentage of occurrence from 30-70% of time

Always -percentage of occurrence greater than 70% of time

### **3.3.6. Selection of judges**

Three professionals including experimenter, who are postgraduate students in speech Language Pathology were selected as judges.

#### **3.4.1. Analysis of data by judges:**

The recorded video samples of mother child interactions were subjected to frequency calculation of each parameter. The judges were familiarized with definitions of each parameter with examples from one normal subject who meeting all the criteria (who was part of study). Each parameter had discussed and clarification regarding coding procedure was provided. Each judge was provided with video samples and definitions and they were allowed to see video any number of times. Judges were trained for 3 hours. After the training period judges were allowed to do the analysis. Video recordings were provided along with definitions. Frequencies of the each parameter were calculated and then and coding for the same was carried out.

### ***3.4.2. Test-retest reliability***

Test-retest reliability was measured by video recording 15 min mother-child interaction from subjects after 15 days from first recordings and frequency analysis was carried out.

### ***3.4.3. Intra-rater and inter-rater reliability***

Intra-rater and inter-rater reliability was also measured by doing frequency analysis of 10 % of each video sample after 15 days.

### ***3.4.4. Statistical Analysis***

Mean scores were converted into percentile values for frequency analysis. Data obtained were analyzed using statistical package for social science program (SPSS Version 17)

## **RESULTS & DISCUSSION**

The objectives of the study were to examine communicative functions in the mothers of children with Autism and typically developing children during mother child interactions and to compare the same between two groups. Caregiver interactive parameters and pragmatic parameters like invitation to vocalize, self repetition and repair devices, imitation, expansion, yes/no reply, other reply, interrogatives, imperatives, accompaniments, informative, child controlled events, caregiver controlled events, people/object present, non immediate, topic initiation, topic maintenance, request object or action, stylistic variation, turn taking were analyzed during mother child interaction in two groups.

Intra-judge and inter-judge reliability was computed using kappa coefficient. Inter judge reliability was computed between judges for the original data. Ten percentages of original data was reanalyzed by the three judges to find out the intra-judge reliability.

Inter judge reliability values ranged from .65-.90 (at 0.05 significance level) for most of the parameters analyzed. Few parameters like interrogatives, imperatives and people/object present kappa could not be administered because of constant values. Intra judge reliability ranged from .70-.90 (at 0.05 significance level) for all the mother child interactive parameters and pragmatic parameters. The value signifies good inter-judge reliability and intra-judge reliability.

Results of the current study are discussed under three sections.

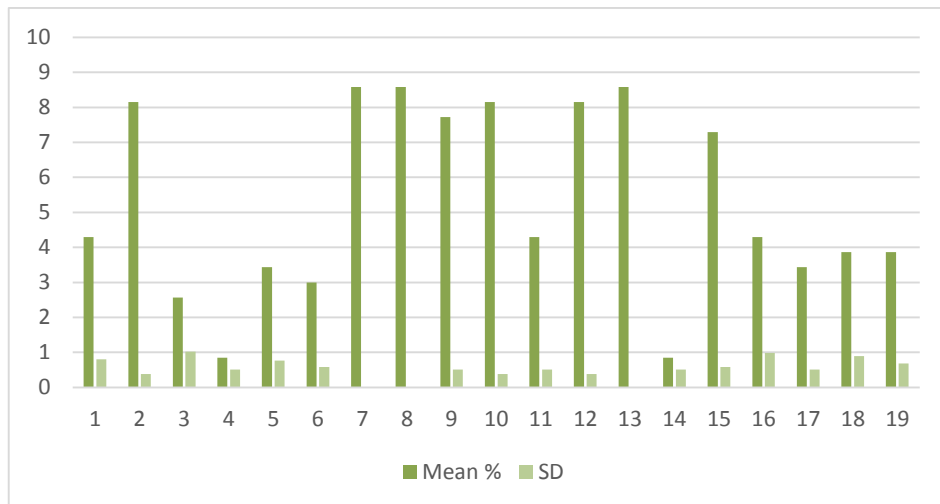
- 1) Communicative functions of mothers in clinical group
- 2) Communicative functions of mothers in TDC group
- 3) Comparison of mothers communicative functions in two groups

Descriptive statistics was used to find out the Mean and SD of each parameter in both groups. Chi square was used to find out the association of each parameter in both groups as the data was qualitative in nature. The raw scores were converted into percentile to find out the percentage of each parameter in two groups. Man Whitney test was used to compare the means between two groups.

#### 4.1.Mother-child interaction in clinical group

*Figure-1: Mean percentage and SD of communicative functions in mothers of clinical group.*

The following figure shows the Mean percentage and SD of each communicative function in mothers of clinical group.



Parameters are plotted in the following order: invitation to vocalize, self repetition and repair, imitation, expansion, yes/no reply, other reply, interrogatives, imperatives, accompaniment, informative, child controlled events, caregiver controlled events . people/object present, non-immediate, topic initiation, topic maintenance, request action/object, stylistic variation and turn taking

#### ***4.1.1. Caregiver interactive parameters***

##### ***Descriptive analysis***

In mothers of clinical group, descriptive statistics analysis revealed that raw score mean of interrogatives and imperatives was 2.00. Mean of self-repetition and repair devices, and informatives was 1.90. This was followed by accompaniments, invitation to vocalize and yes or no reply. Under the speech act parameters imitation, other reply and expansion showed lowest mean value. Expansion was the lowest one with mean of .20. Under referential features mean of caregiver controlled events and people/object present were higher compared to caregiver controlled events and non-immediate.

Hence, in mothers of TDC group, imperatives, interrogatives and people/object present has the highest frequency i.e. 8.58%. These were followed by self-repetitions & repair devices, informatives, and caregiver controlled events each with a percentage of 8.15%. The next highest percentage was obtained for accompaniments (7.72%). This was followed by invitation to vocalize (4.29%), child controlled events (4.29%), yes/no reply (3.43%), other reply (3%), imitation (2.57%), expansion (0.85%), and non-immediate (0.85%). Standard



deviations were higher in the following parameters: invitation to vocalize (.804), imitation (1.01) and yes/no reply (.762).

All together, results indicate that Mothers of clinical group used more percentage of interrogatives and imperatives along with self-repetitions and accompaniments to get child's attention. The mothers also provided more information to child regarding objects and action. Caregiver controlled events were more evident and higher in percentage than child controlled because of passiveness of children with autism during mother child interaction. Invitation to vocalize was used frequently as the child's responsiveness to mother's questions and commands were limited.

Yes/no and other reply provided by mothers as a response to child's actions were less because of reduced child controlled events and limited response of child to mother's actions. The mother hardly used any imitations and expansion as the children were more passive and nonverbal in nature. The mother's imitation responses were more as compared to expansion and this could be attributed to mother's reinforcement strategy. Mothers were able to focus on their child's utterances rather than increasing the complexity and thus repeating child's simple utterances. This again increases child's interest and helps in continuing conversation. Mothers also used less percentage of non-immediate referential features as an adaptive mechanism to cope with child's comprehension level.

Similar findings was reported by Kasari, Sigman, Mundy, & Yirmiya (1988), they found that parents of children with autism are more directive and regulating during their interaction.

Shapiro, Frosch, and Arnold (1987) concluded that unresponsiveness of the children with autism would have a negative effect on the parent child interaction. Parent's inability to establish synchronous, contingent interactions with the child with autism is the result of child's unresponsiveness. Braarud and Stormark(2008) also said that according to infant's response, mothers' will change their speech pattern, which shows that in early interactions infants are active participants during conversation. But in children with autism this developmental pattern is not evident, so mothers also become less interactive during mother child interaction.

### ***Qualitative findings***

In mothers of clinical group, few of mothers were very active during interaction and provided detailed explanation of the activity and objects. The mothers of clinical group used more of simple 'why' questions like 'what' and 'where' instead of complex questions. The questions used by mothers to their children with autism were closed ended. Frequently they provided options to these children and this could be attributed as adaptive mechanism usage by mothers. The mothers also provided nonverbal cues along with verbal utterances. The mothers used more commands and preferred physical activity.

### ***2.2. Pragmatic parameter***

Under pragmatic parameters, topic initiation had the highest raw score mean followed by topic maintenance, stylistic variation, and turn taking and request object or action. The mean percentage of topic initiation was 7.29% followed by topic maintenance (4.29%), stylistic variation (3.86%), Turn taking (3.86%) and request for action/object(3.43%).The SD was

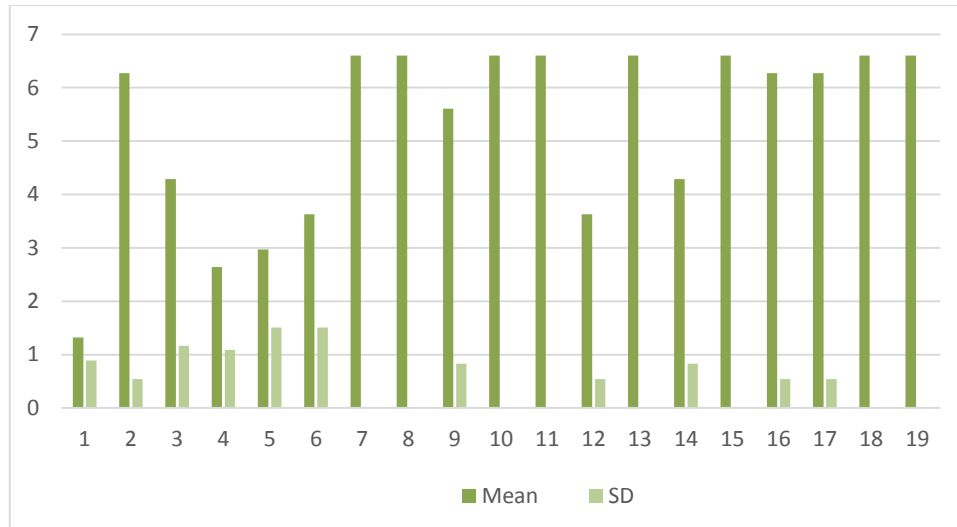
more for topic maintenance (9.84) followed by stylistic variation (.890) and Turn taking (.685). Other parameters had showed less SD values.

The mothers introduced topics but because of reduced responsiveness of mothers few of them could not maintain the topic for long time. Even though, few mothers explained completely by providing the finer aspects. Stylistic variations were very less as most of mothers used simple sentences to match child's understanding ability. Most of the utterances were directives to control the child along with simple questions. As the caregiver activities were more the turn taking was less between mothers and children. Request for action/object were also few as the mothers knew that the children show less responsiveness to their request. The mothers also preferred to do all the therapy activities during interaction.

## ***2) Mother-child interaction in TDC group***

*Figure-2: Mean Percentage and SD of Communicative functions in Mothers of TDC group*

The following figure shows the Mean percentage and SD of each communicative function in mothers of clinical group.



Parameters are plotted in the following order: invitation to vocalize, self repetition and repair, imitation, expansion, yes/no reply, other reply, interrogatives, imperatives, accompaniment, informative, child controlled events, caregiver controlled events people/object present, non-immediate, topic initiation, topic maintenance, request action/object, stylistic variation and turn taking.

### ***1.1 Caregiver interactive parameters***

In the speech act parameters raw score mean of interrogatives, imperatives, informatives were 2.00 and self repetition and repair device 1.90. This was followed accompaniments (1.70), imitation (1.30), other reply (1.10), caregiver controlled events (1.10), yes/no reply (.90) expansion (.80). The lowest mean value was obtained for invitation to vocalize i.e.0.40. In the referential features mean of child controlled events and people/object present was 2.00. Communicative function of Mothers of TDC consisted of interrogatives, imperatives, informatives, child controlled events and people/object present with a mean percentage of 6.6%. These were followed by self-repetition & repair devices (6.27%), accompaniment

(5.61%), non-immediate (4.29%), imitation (4.29%), caregiver controlled events (3.63%), other reply (3.63%). Lowest percentage was obtained for invitation to vocalize (1.32%), expansion (2.64%) and yes/no reply (2.97%). The SD values were higher for invitation to vocalize (8.88), imitation (1.16), expansion (1.08), yes/no reply (1.50), and other reply (1.50).

Hence from this study we can say that communicative functions in mothers of typically developing children obtained higher percentage for self-repetition & repair devices, interrogatives, imperatives, accompaniments, informatives, child controlled events, people/object present. These were followed by accompaniments, imitation, non-immediate, other reply, and caregiver controlled events. The least percentage were obtained for yes/no reply, expansion and invitation to vocalize.

The mothers of TDC group used more interrogatives, imperatives and informatives that helped the children during their language learning process. The mothers also used more of child controlled referential features rather than caregiver controlled items. All these results were expected. Mothers of TDC group used more of other reply to child's utterances and actions that improved child's language learning. Few yes/no reply were used these group because the mother also provided the reason for their answer and explained that. Invitation of vocalize and expansion was the rarely used communicative functions by mothers of TDC group because the children were more active during conversation and they answered mothers questions easily without any prompts. The children's utterances were grammatically correct. Whenever necessary the mothers corrected their children's errors. McDonald & Piena (1982) finding was also correlated with this findings. They found that the controlling of actions and

correcting their action along with description and then stimulation of children to participate during conversation by mothers were very important for language development. This was seen in mothers of TDC group to greater extent but along with frequent question regarding that.

### ***1.2 pragmatic parameters***

In the pragmatic parameters mean of all the parameters were greater than 1.80. All the pragmatic parameters-topic initiation, topic maintenance, request object or action, stylistic variation, and turn taking computed had almost equal mean values. The mean percentage of topic initiation, turn taking and stylistic variations were 6.6% and topic maintenance and request for object/action were 6.27%. The SD values for also less for these parameters.

Pragmatic behaviors of mothers of TDC group had used all the pragmatic parameters almost in equal quantity. They maintained the topic by giving proper initiation, content explanation and termination was also present. They also varied their speech according to child's interest and age. These parameters would have helped TDC group for better social interaction and communication.

No studies investigated mother's pragmatic functions but most of studies investigated pragmatic skills in TDC and found that mothers play a major role in pragmatic development of TDC. The findings from this study revealed fine tuning of language abilities by mothers of TDC during interaction and this depends on an active dialogue between parent and child. Earlier studies also show the importance of these factors for early communication in infants. Analysis of both mother-child interaction in the neonatal period by Brazelton et al., 1975 and early communication (Condon and Sander, 1974; Stern et al., 1975) had emphasized the importance of communicative and social interaction for infants' later development.

**1) Comparison mother's communicative functions in two groups**

Man Whitney Test was used to find out the differences in two groups in terms of the parameters taken. Pearson Chi square was used to find out the association of the parameters in two groups.

**3.1 Caregiver interactive parameters**

**3.1.1 Invitation to vocalize**

In mothers of TDC group, six of the mothers obtained scores in poor response category of invitation to vocalization and six of mothers of clinical group scored maximum scores in partial response category. Hence the association of invitation to vocalize in both groups was not significant. (F (2) = 4.400, p >0.05).

*Table-3: Mean Rank for Invitation to vocalize between two groups in Man Whitney test*

Invitation to vocalize	Mean Rank
Mothers of clinical group	12.90
Mothers of TDC group	8.10

The table shows mean values of invitation to vocalize in both groups. Man Whitney test results reveals that Invitation to vocalize was significantly different in two groups with p value of .04 at 0.05 significance level ( $|Z|= 2.013$ ). The mean rank of invitation to vocalize was 12.90 and 8.10 in mothers of clinical group and mothers of TDC group respectively. Mothers

of children with autism used invitation to vocalize more frequently than mothers of TDC. This can be attributed to reduced interest of children with autism in communication and interaction because of their language deviancy and reduced initiation of communication. Mothers of TDC also use invitation to vocalize, but to a lesser degree than mothers of clinical group. This could be attributed to spontaneous response of TDC in response to mother's questions and commands.

**3.1.2. Self-Repetition & Repair Device**

Nine Mothers from both group obtained scores in correct response category of self repetition & repair device and one from each group obtained scores in partial response. Chi square test reveals that self repetition & repair device was not associated in both groups. (F (1) = 0.000, p > 0.05)

*Table 4: Mean rank for self-repetition& repair devices in two groups in Man Whitney test.*

Self- repetition and repair devices	Mean Ranks
Mothers of clinical group	10.50
Mothers of TDC group	10.50

Man Whitney test revealed no significant differences between two groups in self-repetition& repair devices with P value of 1, at 0.05 significance level ( $|Z|=0.00$ ). Even though significant differences could not be seen in both groups of mothers subjectively mothers of clinical group



used more frequent repetitions and repair devices during interaction. This could be attributed to less responsiveness and less interest of autistic children to follow mother's command.

### 3.1.3 Imitation

In mothers of TDC group five mothers obtained partial response, four mothers obtained correct response and one obtained poor response for imitation. Six mothers of clinical group scored poor response and two of them each scored partial response and correct response. Hence association was not present for imitation in two groups ( $F(2) = 5.524, p > 0.05$ ).

Table- 5: Mean rank for imitation in two groups in Man Whitney test.

Imitation	Mean Rank
mothers of clinical group	8.10
mothers of TDC group	12.90

Man Whitney test revealed no significant difference between two groups of mothers in terms of imitation with p value .054 at 005 significance level ( $|Z| = 1.924$ ). Even though significant differences could not be seen in both groups, mothers of clinical group used less frequent imitation as compared to mothers of TDC. This could be attributed to reduced spontaneous utterances from children with autism. Children with autism need prompts and cues to respond to other's utterances and they are less responsive. Because of this in mothers of clinical group showed less frequency of imitations.

### 3.1.4. Expansion

Maximum mothers of TDC group obtained partial response for expansion and mothers of clinical group obtained maximum poor response. The association was not significant between groups for expansion ( $F(2) = 5.274, p > 0.05$ ).

Table-6: Mean rank for self-repetition & repair devices in two groups in Man Whitney test.

Expansion	Mean Rank
mothers of clinical group	7.90
mothers of TDC group	13.10

Man Whitney test revealed significant difference between two groups in terms of use of expansions with  $p = .025$  at 0.05 significance level ( $|Z| = -2.238$ ). The mothers of both groups were close in usage of expansions. But mothers of clinical group used lesser amount of expansions as compared to mothers of other group. This could be attributed to reduced output and utterances from children with autism. The reduced amount of child's utterances made the mothers to use lesser expansions. The mothers of TDC also used fewer amount of expansions this could be attributed to the improved verbal efficiency of TDC as compared to children with autism. The TDC used more grammatically correct and long utterances this reduced the use of expansions by mothers.

### 3.1.5. Yes/No Reply

In Mothers of TDC group, four of them obtained partial response, three of them each obtained poor response and correct response in yes/no reply. Maximum of mothers in clinical group scored partial response in yes/no reply. The association was not present between groups for yes/no reply ( $F(2) = 2.143, p > 0.05$ ).

Table-7: Mean rank for yes/no reply in two groups in Man Whitney test.

Yes or no	Mean Rank
mothers of clinical group	10.25
mothers of TDC group	10.75

Man Whitney test revealed no significant differences between two groups with p value of 0.839 at 0.05 significance level ( $|Z| = 0.204$ ). In both group mothers used almost equal quantity of yes/no reply. Mean rank for yes/no reply was 10.5 and 10.75 for mothers of clinical group and mothers of TDC groups respectively. But more often mothers of clinical group used these responses as a result of their children's physical activity and mothers of TDC used this in response to both verbal and physical activity.

### 3.1.6 Other Reply

In Mothers of TDC group, four of them obtained correct response, three of them each obtained poor response and partial response for this parameter. Mothers of clinical group scored

maximum in partial response category. The association was not present for other reply between groups ( $F(2) = 5.600, p > 0.05$ ).

*Table-8: Mean rank for other reply in two groups in Man Whitney test.*

Other response	Mean Rank
mothers of clinical group	9.10
mothers of TDC group	11.90

Man Whitney test revealed no significant difference between uses of other reply in two groups with p value of 0.249 at 0.05 significance level ( $|Z| = 1.153$ ). But frequency of other reply was more in mothers of TDC. Mothers of clinical group used more of yes/no reply and mothers of TDC group employed more of other reply. Mother of clinical group was more directive in response to child's responses but mothers of TDC were conversational in nature.

### ***3.1.7. Interrogatives***

All the mothers in both groups obtained maximum scores in correct response category of interrogatives. The chi square could not be computed as the scores were equal in two groups.

*Table-9: Mean rank for interrogatives in two groups in Man Whitney test.*

Interrogative	Mean Rank
Mothers of clinical group	10.50
Mothers of TDC group	10.50

Man Whitney test revealed no significant difference between usages of interrogatives in two groups at p value of 1.0 at 0.05 significance level ( $|Z|= 0.00$ ). But mothers of children with autism used more of ‘what’ and ‘where’ questions, but mothers of typically developing children used all the type of ‘wh’ questions according to child’s language level. This is also an adaptive mechanism to suit their comprehension and expression level. Subjectively the frequency of questions was more in mothers of TDC and variety of question were used by this group.

### ***3.1.8. Imperatives***

All the mothers in both groups obtained correct response for imperatives. The chi square could not be computed as the scores were equal in two groups.

*Table-10: Mean rank for imperatives in two groups in Man Whitney test.*

Imperatives	Mean Rank
mothers of clinical group	10.50
mothers of TDC group	10.50

Man Whitney test revealed no significant difference between usages of imperatives in two groups with p value of 1.0 at 0.05 significance level ( $|Z|= 0.00$ ). But mothers of children with autism used more of direct commands. They also preferred to give directive activities wherein child has to complete that without verbal utterances. This finding is also reported by other authors. Loveland, Landry, Hughes, Hall & McEvoy (1998) said that speech act parameters in mothers of children with autism indicated more frequent observable act and they used more percentage of directives.

### ***3.1.9 Accompaniment***

In both groups maximum scores were obtained in correct response category, three of the mothers in TDC group obtained scores in partial response category and two of the mothers in clinical group obtained partial scores. The association was not significant in categories between groups for accompaniment ( $F(1) = .267, p > 0.05$ ).

*Table-11: Mean rank for Accompaniment in two groups in Man Whitney test.*

Accompaniment	Mean Rank
mothers of clinical group	11.00
mothers of TDC group	10.00

Man Whitney test revealed no significant difference between accompaniments in two groups with p value of 0.615 at 0.05 significance level ( $|Z|=0.503$ ). Both the groups obtained almost equal response in this. Both groups of mothers used equal quantity of accompaniments in their

conversation. The usage of accompaniments was less as the child's age and language skills improved.

### 3.1.10 Informatives

All the mothers of TDC obtained correct response and nine mothers of clinical group also obtained same response for imperatives. The association was not significant in categories between groups for informatives ( $F(1) = 1.053, p > .305$ ).

*Table-12: Mean rank for informatives in two groups in Man Whitney test.*

Informatives	Mean Rank
mothers of clinical group	10.00
mothers of TDC group	11.00

Man Whitney test revealed no significant difference between informatives in two groups with p value of 0.312 at 0.05 significance level ( $|Z| = 1.0$ ). Both the groups obtained almost equal response for this parameter. Both groups of mothers used almost equal amount of accompaniments in their conversation. Both groups of mothers explained that according to their child's capacity. Mothers of TDC provided more information and mothers of clinical group provided only the main aspects. This is to reduce the load on child's part to learn things easily, this is again one type of adaptation process that mothers of clinical group adapted. This finding is in agreement with Barnes et al., (1983) findings that highly correlated parameters to child's language gains were directives and informative utterances.

### 3.1.11 Child controlled events

All the mothers in TDC obtained correct response but maximum mothers of clinical group obtained partial response in child controlled events. The association was significant for child controlled events in both groups ( $F(1) = 13.333, p < 0.05$ ).

Figure-3: Response pattern in Child Controlled Events in both groups

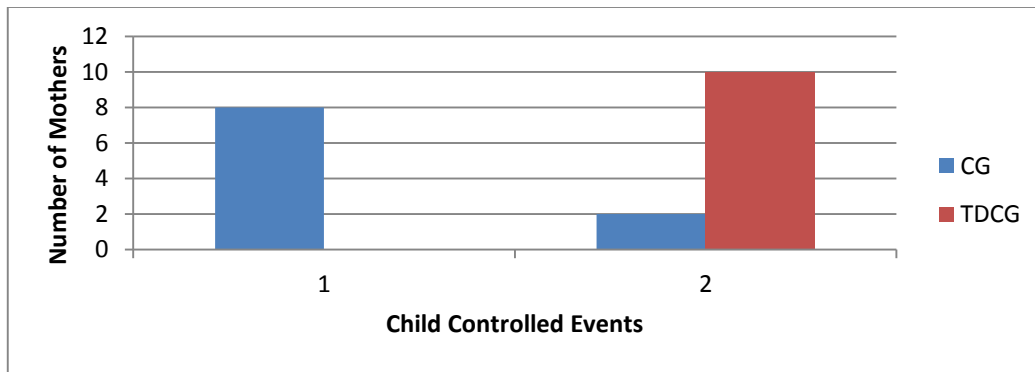


Table-13: Mean rank for Child controlled in two groups in Man Whitney test.

Child controlled	Mean Rank
mothers of clinical group	6.50
mothers of TDC group	14.50

Man Whitney test revealed significant difference between two groups in terms of child controlled events with p value of 0.00 at 0.05 significance level ( $|Z| = 3.56$ ). Mothers of TDC talked more about what child was doing during interaction. As the activities completed by clinical group was less mothers of clinical group were also used less child controlled events as the referential feature during interaction. This finding was in agreement with Tomasello



and Farrar (1986) findings they also reported positive association between adult utterances that followed the child's ongoing focus and child related activity leads the subsequent lexical development of child. Because of this TDC showed more language efficiency compared to comprehension language age matched clinical group.

### 3.1.12 Caregiver controlled events

Maximum mothers in TDC obtained partial response but maximum mothers of clinical group obtained correct response in caregiver controlled events. The association was significant for care giver controlled events in both groups ( $F(1)=12.800, p<0.05$ )

Figure-4: Response pattern in Caregiver Controlled Events in both groups

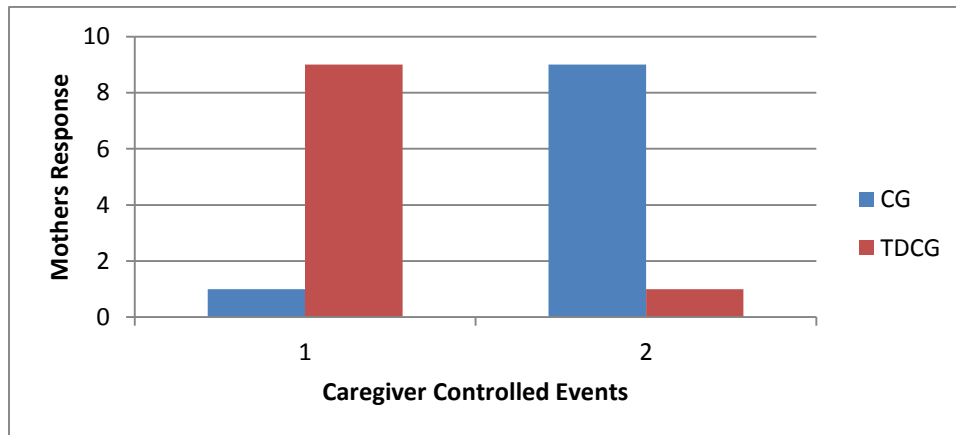


Table-14: Mean rank for Caregiver controlled in two groups in Man Whitney test.

Care giver controlled	Mean Rank
mothers of clinical group	14.50
mothers of TDC group	6.50

Man Whitney test revealed significant difference between two groups in terms of caregiver controlled events with p value of 0.00 at 0.05 significance level ( $|Z|= 3.487$ ). Mothers of TDC talked more about what child was doing during interaction and controlled activity often few times. As the activities completed by clinical group was less mothers of clinical group were also used more caregiver controlled events as the referential feature during interaction. Mothers of autistic children were more active during interaction to overcome the communication delay that occurred between mother child dyads.

### ***3.1.13 People/object Present***

All the mothers in two groups obtained correct response in this parameter. Hence the interaction could not be computed using chi square.

*Table-15: Mean rank for people/object present in two groups in Man Whitney test.*

People or object present	Mean Rank
mothers of clinical group	10.50
mothers of TDC group	10.50

Man Whitney test revealed no significant difference between this parameter in two groups with p value of 0.00 at 0.05 significance level ( $|Z|= 1.00$ ). Both the groups obtained equal response for this parameter. During interaction all the mothers talked about objects and persons present over there.

### 3.1.14 Non-immediate

In mothers of TDC group, maximum mothers obtained scores in partial response category and three of them obtained scores in correct response category. In mothers of clinical group maximum obtained no response and two obtained partial response. The association was significant in for non-immediate in two groups ( $F(2)=13.778, p<0.05$ ).

Figure-5: Response pattern in non-immediate in both groups

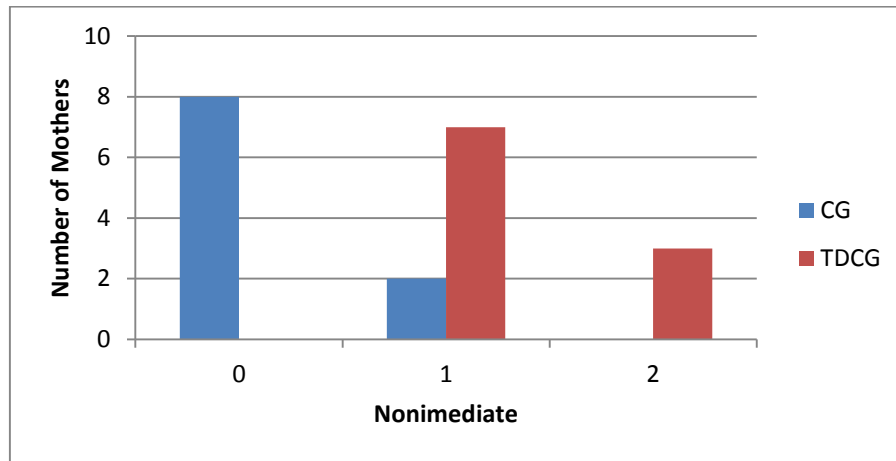


Table-16: Mean rank for non-immediate in two groups in Man Whitney test.

Non-immediate	Mean Rank
mothers of clinical group	6.20
mothers of TDC group	14.22

Man Whitney test revealed significant difference between this parameter in two groups with p value of 0.00 at 0.05 significance level ( $|Z|=3.539$ ). Mothers of TDC used more non-immediate referential feature during their interaction as compared to other group. During

mother child interaction mothers of TDC used more connective statements from past experience and also asked questions regarding non-immediate person and objects.

**3.1.15. Topic Initiation**

All the mothers in TDC scored always response in topic initiation and seven of the mothers of clinical group also obtained the same response and 3 of the mothers obtained frequent response. The association was not significant in both groups for topic initiation (F (2)=3.529,  $p>0.05$ ).

*Table-17: Mean rank for Topic initiation in two groups in Man Whitney test.*

Topic initiation	Mean Rank
mothers of clinical group	9.00
mothers of TDC group	12.00

Man Whitney test revealed no significant difference in this parameter with p values of 0.067 at 0.05 significance level ( $|Z|=1.83$ ). Both groups used topic initiation in almost same amount. All the mothers were able to introduce the topic to children in equal quantity.

**3.1.16. Topic maintenance**

Nine mothers of TDC obtained always response for topic maintenance during interaction and four mothers of clinical group obtained frequent response and three each obtained occasional responses and always response. Hence the association was present in two groups (F (2)=7.800,  $p<0.05$ ).

Table-18: Mean rank for Topic maintenance in two groups in Man Whitney test.

Topic maintenance	Mean Rank
mothers of clinical group	7.80
mothers of TDC group	13.20

Man Whitney test revealed significant difference between this parameter in two groups with p values of 0.007 at 0.05 significance level ( $|Z|=2.72$ ). Mothers of TDC group tried to give more information and ask questions and explanations as the child involved in that activity. But mothers of clinical group do not maintain the topic because of child's less responsiveness to particular activity and fleeting attention.

### ***3.1.17 Request action/object***

Nine mothers of TDC obtained always response for Request action/object during interaction and eight mothers of clinical group obtained frequent response and two obtained occasional response. Hence association was significant for this parameter in two group ( $F(2) = 16.444, p < 0.05$ )

*Figure-6: Response pattern for request action/object in both groups*

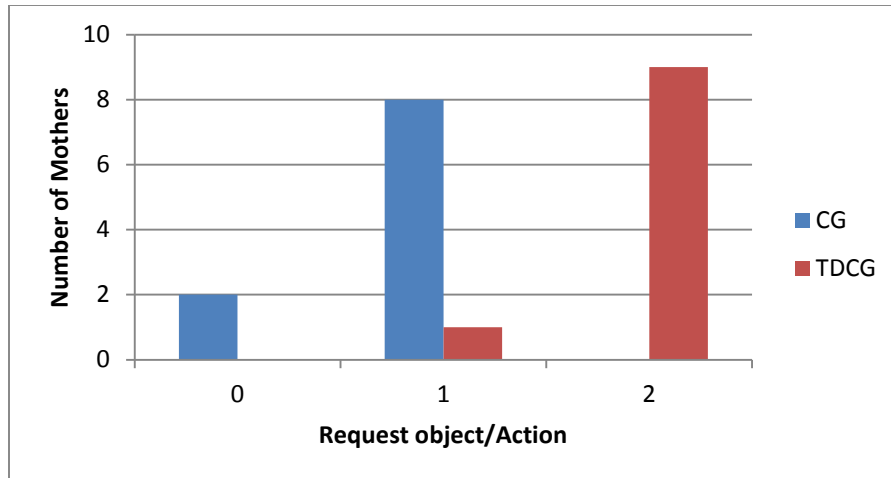


Table-19: Mean rank for request action/ object in two groups in Man Whitney test.

Request action or object	Mean Rank
mothers of clinical group	5.90
mothers of TDC group	15.10

Man Whitney test revealed significant difference between this parameter in two groups with p value of .00 at 0.05 significance level ( $|Z|= 3.84$ ). The mothers of TDC use more request as compared to other group. This could be attributed to Childs less responsiveness to mother's request and questions. As the mothers of children with autism already know their child's unresponsiveness because of this they used fewer request and more accompaniment.

### 3.1.18 Stylistic variation

All the mothers of TDC always used stylistic variations during interaction and five mothers of clinical group obtained frequent response and two obtained always and three obtained occasional response. Hence association was significant for this parameter in each group ( $F(2) = 13.333, p < 0.05$ )

Figure-7: Response pattern for stylistic variations in both groups

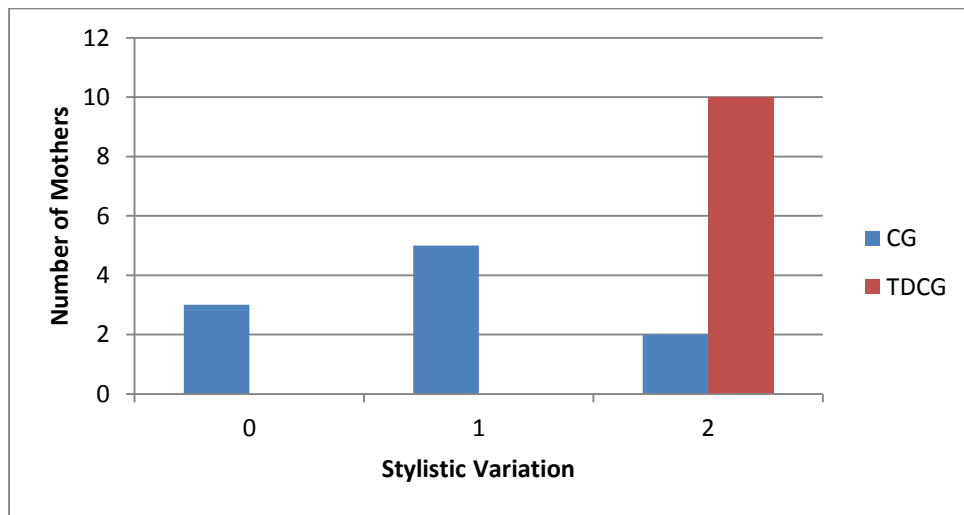


Table-20: Mean rank for stylistic variation in two groups in Man Whitney test.

Stylistic variation	Mean Rank
mothers of clinical group	6.50
mothers of TDC group	14.50

Man Whitney test revealed significant difference between this parameter in two groups with p value of 0.001 at 0.05 significance level ( $|Z| = 3.453$ ). The mothers of TDC use more stylistic

variations. As the mothers of children with autism already know their child's unresponsiveness because of this they used simple sentences and few variations.

### 3.1.19 Turn taking

All the mothers of TDC always used turn taking during interaction and seven mothers of clinical group obtained frequent response and two obtained occasional response. Hence the turn taking was associated in two groups ( $F(2) = 16.364, p < 0.05$ ).

Figure-8: Response pattern in turn taking in both groups

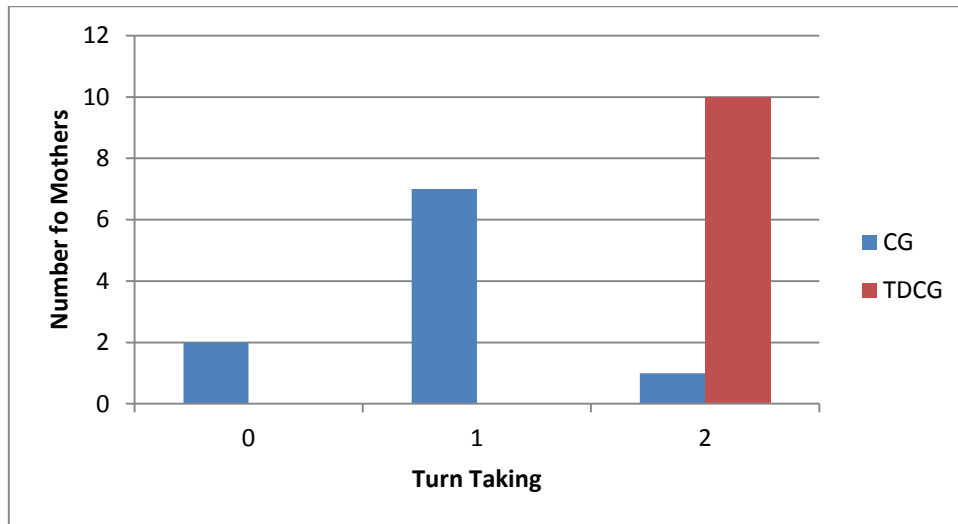


Table-21: Mean rank for turn taking in two groups in Man Whitney test.

Turn taking	Mean Rank
mothers of clinical group	6.00
mothers of TDC group	15.00



Man Whitney test revealed significant difference between this parameter in two groups with p value of 0.00 at 0.05 significance level ( $|Z|= 3.83$ ). Mothers of clinical group were taking more turns without allowing the child to give chances. The mothers of TDC group used equal turns to that of child.

Both groups of mothers used equal quantity interrogatives, imperatives and people/ object present. The mothers of clinical group used more of invitation to vocalization, caregiver controlled events as compared to other group. The mothers of TDC group used more of imitation, expansion, other reply, child controlled events, non-immediate referential features, topic initiation, topic maintenance, request for object and action, stylistic variation and turn taking.

Out of 19 parameters analyzed, invitation to vocalization, expansion, child controlled events, caregiver controlled events, non-immediate, topic maintenance, request object or action, stylistic variation, turn taking were significantly different in two groups. But self repletion & repair devices, imitation, yes or no reply, other reply, interrogatives, imperatives, accompaniments, informatives were not significantly different in two groups.

Qualitative differences were seen in use of few parameters by mothers of two groups. Mothers of children with autism were more controlling and gave more commands and directives rather than asking questions. They also used simple short utterances and more repetitions and repair devices. This can be attributed to their coping mechanism to adapt to their children's language level. This findings is in agreement with study done by Konstantareas, M. M., Mandel, L., and Homatidis, S. (1983). They found out that the amount

of utterances usage was similar in mothers and fathers speech, but mother's speech contained shorter utterance length and used more prompts during activity. Parents used more directives while interacting with lower functioning children and at the same time higher functioning children were more frequently reinforced for speech. Directives were used more frequently by fathers. They concluded that both mothers and fathers are able to adapt their speech to their children with lower and high functioning autism.

Qualitative differences were also seen in terms of mother child interaction in verbal and nonverbal children with autism. The mothers of children with verbal autism used more questions and answers, they explained the topic with more long utterances, more imitation was present and frequent reinforcement for language was given. But mothers of nonverbal children used more imperatives, shorter utterances, and reinforced their children's physical activity more than others. The same findings were also reported by Konstantareas, Zajdeman, Homatidis, and McCabe (1988). We can conclude that these differences seen in mother's response to their children's respective abilities is a part of fine tuning to adapt to their children's level.

*In contrast to these findings few studies also revealed normal pattern in mother child interaction in children with autism. Studies also find out that there is no difference in mother's use of linguistic function to children with autism and typically developing children. Study done by Cantwell, D.P., Baker, L., Rutter, M. (1977) revealed that quantity of language use, interaction pattern, clarity of communication were equal mothers of children with autism. This study does not support deviancy in mother-child communication in autism.*

Hence, finding from the study clearly indicates that inspite of counseling provided at initial stages of therapy mother-child interaction in autism is affected or impaired in terms of communicative aspects. It's neither possible nor applicable for mothers of autism to completely adapt their speech in the same way as that of mothers of typically developing children. This could be attributed of lack of skills and lack of response in conversation partner, i.e. autism children. Children's utterances are limited thus, communication is also affected.

Generalization of these results to all speech situations must be done with caution as the study is limited to semi structured situation. Speech language therapy and counseling could have an influence on mother child interaction in autism both quantitatively and qualitatively.

### **Test retest reliability**

Test retest reliability was also assessed using kappa coefficient. The results revealed good test retest agreement. Test retest reliability of each parameter was greater than .75 (at 0.05 significance level).

## **SUMMARY AND CONCLUSION**

Child directed speech is the language used by mothers while interaction to young children. Mother-child interaction is very important as that helps children in their learning process. The various features of mother-child interaction and language used by mothers have an important role in child's language development. The features like phonology, semantic, syntax and prosody and discourse used by mothers have found to be the best predictors of language development in children and these aids in language acquisition and development.

Studies which investigated mother child interaction in autism have shown that because of children's lack of responsiveness to mother's stimuli or verbal utterances the mother-child interaction in autism is found to be different from mothers of typically developing children. Few studies had also reported null finding that is there is no differentiation between two groups of mothers. The present study aimed to investigate mother-child interaction in autism by comparing the mother interaction in typically developing children.

Ten typically developing children and ten children with autism along with mothers were the participants. The mother child interactions were video recorded during semi structured contexts. One such 40 minute sample was transcribed for each mother child interactions. The frequency of the each parameter was analyzed and coded.

Table- 4: *Caregiver interactive parameters & Pragmatic parameters*

<i>Caregiver interactive parameters</i>	<i>Pragmatic parameters</i>
Invitation to vocalize	Topic initiation
Self repetition and repair	Topic maintenance
Imitation	Request action/object
Expansion	Stylistic variation
Yes/no reply	Turn taking
Other reply	
Interrogatives	
Imperatives	
Accompaniment	
Informative	
Child controlled events	
Caregiver controlled events	
People/object present	
Non-immediate	

Inter-judge and intra-judge reliability was computed using Kappa coefficient. The statistical analysis was under taken to find out the mean and SD of the each parameter in both groups. The chi square was used to find out the association between each parameter in both groups. The Man Whitney test was used to compare the parameters in two groups.

The results revealed the following:

- a) The mothers of typically developing children used the following communicative functions during interaction. Greater percentage of self repetition & repair devices, interrogatives,

imperatives, accompaniments, informatives, child controlled events, and people/object present were observed. This was followed by accompaniments, imitation, non immediate, other reply, and caregiver controlled events. The least occurred parameters were yes/no reply, expansion and invitation to vocalize.

- b) In mothers of children with autism, under the speech act features the mean percentage of interrogatives, imperatives, self repetition and repair devices, and informatives were the highest. This was followed by accompaniments, invitation to vocalize and yes or no reply. Least occurred parameters under speech act were imitation, other reply and expansion. Expansion was the lowest frequent parameter. Under referential features caregiver controlled events and people/object present were more compared to child controlled events and non-immediate. Among pragmatic parameters topic initiation had the highest mean followed by topic maintenance, request object or action, stylistic variation, and turn taking.
- c) Out of 19 parameters analyzed, self repetition & repair devices, imitation, yes or no reply, other reply, interrogatives, imperatives, accompaniments, informatives were not significantly different in two groups. Invitation to vocalization, Expansion, Child controlled events, Caregiver controlled events, Non immediate, Topic maintenance, Request object or action, Stylistic variation, Turn taking were all significantly different in the two groups.

The results from the present study revealed that the mothers of children with autism adjusted their conversational style to suit the child's language levels. But child's unresponsiveness to mothers' utterances and stimuli adversely affect the mother's conversational pattern both quantitatively and qualitatively.

## **Implications of the study**

The findings from this study indicate that counseling and parent training during intervention for children with autism are very important. The parents play primary role in teaching language to their young children with autism. As the child learns language parents must constantly change the complexity of utterances to help the child to learn more advanced vocabulary.

The analysis of the mother-child interaction during initial stages itself is necessary and is required to include the same during assessment of children with autism is very important. Helping the parents to make adjustments both qualitatively and quantitatively while interacting with child should be one of the most important goals for training program. This emphasizes the importance of clinician's role as an observer and analyzer regarding the parent-child interaction before the actual intervention. The parents need to be informed and educated regarding their conversational styles. The parent may be trained:

- a) To encourage and reinforce any attempt by the child to communicate
- b) To wait for response from the child
- c) To use and expand imitation and verbal mediation to describe on going activities.
- d) To focus on child's focus of attention and provide verbal input such as naming and other information along with non verbal feedback.
- e) To encourage the child to imitate

- f) To facilitate conversational style rather than a directive way of speaking

Thus, it is very important to evaluate parental style of verbal interaction before counseling and to individually tailor the parent training programs.

### **Limitations of the study**

- 1) The small number of the participants limits the generalization of the results.
- 2) The study was restricted to semi-structured situations and which may not be a complete representative of the child's entire language environments.

### **Future suggestions**

- 1) Replication of the study with large sample size
- 2) Later research to focus on longitudinal view of mother- child interaction in autism
- 3) Research to focus on mother-child interaction in autism and their siblings.
- 4) To analyze mother- child interaction in autism by incorporating different communication context in structured and unstructured manner.
- 5) To investigate the effect of parent training in children with autism



## REFERENCES

- Barnes, S., Gutfreund, M., Satterly, D., and Wells, G. (1983). Characteristics of adult speech which predict children's language development. *Journal of Child Language*, 10 (01), 65-84
- Cantwell, D. P., Baker, L., & Rutter, M. (1977). Families of Autistic and Dysphasic Children: II. Mothers' Speech to the Children. *Journal of Autism and Childhood Schizophrenia*, 7(4), 315-327.
- Conti-Ramsden, G., & Friel-Patti, S. (1983). Mother's Discourse Adjustments to Language-Impaired and Non-language-Impaired Children. *Journal of Speech and Hearing Disorders*, 4, 360-367.
- Cooper, R. P., and Aslin R.N., (1990). Child Development Preference for Infant-directed Speech in the First Month after Birth. *Child Development*, 61(5), 1584-1595.
- Doussard-Roosevelt, D.L., Joe, C., Bazhenova, O.V., and Porges, S.W. (2003). Mother-child interaction in autistic and non-autistic children: Characteristics of maternal approach behaviors and child social responses. *Development and Psychopathology*, 2, 277-295.
- Fahim, M.R., and Ahimi, A. (2013). An Investigation of Structures and Prosodic Features of Child Directed Speech during Shared Reading. *Journal of Academic and Applied Studies*, 3(1), 52-61.
- Goldfarb, W., Yudkovitz, E., Goldfarb, N. (1973). The mother speaks to her schizophrenic child: Language in childhood schizophrenia. *Psychiatry: Journal for the Study of Interpersonal Processes*, 35(3), 217-226.

Harris, S. L., Wolchik, S. A., & Milch, R. E. (1982). Changing the Speech of Autistic Children and Their Parents. *Child and Family Behavior Therapy*, 4(3), 151–173.

Howlin, P., Cantwell, D., Marchant, R., Berger, M., & Rutter, M. (1973). Analyzing Mothers' Speech to Young Autistic Children: A methodological Study. *Journal of Abnormal Child Psychology*, 1(3), 317–339.

Howlin, P., and Rutter, M., 1989. Mothers' Speech to Autistic Children: A Preliminary Causal Analysis. *Journal of Child Psychology and Psychiatry*, 30(6), 819–843.

Kasari, C., and Sigman, M. (1997). Linking Parental Perceptions to Interactions in Young Children with Autism. *Journal of Autism and Developmental Disorders*, 27(1), 39-57.

Kasari, C., Sigman, M., Mundy, P., Yirmiya, N. (1988). Affective Sharing in the Context of Joint Attention Interactions of Normal, Autistic, and Mentally Retarded Children. *Journal of Autism and Developmental Disorders*, 18(4), 647-656.

Konstantareas, M. M., Mandel, L., and Homatidis, S. (1988). The language patterns mothers and fathers employ with their autistic boys and girls. *Applied Psycholinguistics*, 9 (4), 403-414.

Konstantareas, M.M., Zajdeman, H., Homatidis, S., McCabe, A. (1988). Maternal Speech to Verbal and Higher Functioning versus Nonverbal and Lower Functioning Autistic Children. *Journal of Autism and Developmental Disorders*, 20(1), 87-100.

Laski, K.E., Charlop, M.H., Schreibman, L. (1988). Training Parents to Use the Natural Language Paradigm to Increase Their Autistic Children's Speech. *Journal of Applied Behavior Analysis*, 21(4), 391–400.

Maestro et al., (2002). Attentional Skills During the First 6 Months of Age in Autism Spectrum Disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(10), 1239–1245.

Mahdhaoui, A., Chetouani, M., Cassel, R.S., Saint-Georges, C., Parlato, E., Laznik, M.C., Apicella, F., Muratori, F., Maestro, S., and Cohen, D.(2009). Computerized home video detection for motherese may help to study impaired interaction between infants who become autistic and their parents. *International Journal of Methods in Psychiatric Research*, 20 (1), e6–e18.

McDuffie, A., Yoder, P. (2010). Types of Parent Verbal Responsiveness That Predict Language in Young Children with Autism Spectrum Disorder. *Journal of Speech, Language, and Hearing Research*, 53, 1026–1039.

**Orsmond, Seltzer, Greenberg, and Krauss (2006).** *Journal of Child Psychology and Psychiatry*, 50 (10), 1255–1263.

Preeja, B. and Manjula, R. (2007). Mother-Child Communication Interaction in Children with Cerebral Palsy. *Journal of All India Institute of Speech and Hearing*, 26, 75-85.

Ravikumar, Haripriya, G.V., and Shyamala, K.C. (2010). Verbal Interaction and Input in Hearing Impaired. *Language in India*, 10, 27-36.

Santarcangelo, S., Dyer, K. (1988). Prosodic Aspects of Motherese: Effects on Gaze and Responsiveness in Developmentally Disabled Children. *Journal of Experimental Child Psychology*, 46(3), 406–418.

Shilpashri, H.N., and Shyamala, K.C. (2008). Pragmatic skills in Typically Developing Infants. *Journal of All India Institute of Speech and Hearing*, 27, 52-55.

Shilpashri, H.N., and Shyamala, K.C. (2008). Pragmatic skills in Nonverbal Identical Twins with Autism Spectrum Disorders, *Journal of All India Institute of Speech and Hearing*, 27, 56-63.

Short, A.B., & Schopler, E. (1988). Factors Relating to Age of Onset in Autism. *Journal of Autism and Developmental Disorders*, 18, 207-216.

Siller, M., and Sigman, M. (2002). The Behaviors of Parents of Children with Autism Predict the Subsequent Development of Their Children's Communication. *Journal of Autism and Developmental Disorders*, 32, 77-89.

Siller, M., Sigman, M. (2008). Modeling Longitudinal Change in the Language Abilities of Children with Autism: Parent Behaviors and Child Characteristics as Predictors of change. *Developmental Psychology*, 44 (6), 1691-1704.

Smolak, L., and Weinraub, M. (1983). Maternal speech: strategy or response? *Journal of Child Language*, 10 (02), 369-380.

Stone, W.L., Hoffman, E.L., Lewis, S.E., and Ousley, O.Y. (1994). Early Recognition of Autism. Parental reports Vs Clinical Observation. *Archives of Pediatric Adolescent Medicine*, 148, 174-179.

Stone, W.L., Lee, E.B., Ashford, L., Brissie, J., Hepburn, S.L., Coonrod, E.E., and Weis, B.H. (1999). Can Autism Be Diagnosed Accurately in Children Under 3 Years? *Journal of Child Psychology and Psychiatry*, 40 (2), 219-226.

Sullivan, A., Kelso, J., Stewart, M. (1990), Mothers' Views on the Ages of Onset for Four Childhood Disorders. *Child Psychiatry and Human Development*, 20, 269–278.

Tager-Flusberg, H., Calkins, S., Nolin, T., Baumberger, T., Anderson, M., Chadwick-Dias, A.(1990). A longitudinal study of language acquisition in autistic and down syndrome children. *Journal of Autism and Developmental Disorders*, 20 (1), 1-21.

Toth, K., Munson, J., Meltzoff, A.N., Dawson, G. (2006). Early Predictors of Communication Development in Young Children with Autism Spectrum Disorder: Joint Attention, Imitation, and Toy Play. *Journal of Autism Developmental Disorders*, 36 (8), 993-1005.

Watson, L.R. (1998). Following the Child's Lead: Mothers' Interactions with Children with Autism. *Journal of Autism and Developmental Disorders*, 28, 51-59.

Wetherby, A.M., Watt, N., Morgan, L., Shumway, S. (2007). Social Communication Profiles of Children with Autism Spectrum Disorders Late in the Second Year of Life. *Journal of Autism and Developmental Disorders*, 37(5), 960-75.

William, G., David, L.M., Donald, M. I.(1972). Verbal symbols to designate objects: An experimental study of communication in mothers of schizophrenic children. *Journal of Autism and Childhood Schizophrenia*, 3(4), 281-298.

Wolchik, S. A. (1983). Language Patterns of Parents of Young Autistic and Normal Children. *Journal of Autism and Developmental Disorders*, 13, 167–18

**APPENDIX-1**

**Consent Form**

***ALL INDIA INSTITUTE OF SPEECH & HEARING***

***Manasagangothri, Mysore 570 006***

**TITLE: Mother Child Interaction in Autism**

**CONSENT FORM**

I have been informed about the aims, objectives and the procedure of the study. The possible risks-benefits of our participation as human subjects in the study are clearly understood by me. I understand that I have a right to refuse participation or withdraw my consent at any time. I have the freedom to write to head of the Institute in case of any violation of these provisions without the danger of my being denied any rights to secure the clinical services at this institute. I am interested in participating in the study along with my child and hereby give my written consent for the same.

I, \_\_\_\_\_, the undersigned, give my consent to be participant of this investigation/study/program. I have no objection in participating my child and myself in the program.

Signature of Participant

(Date)

Name and Address: -----

-----

-----

## APPENDIX-2

### Scoring sheet

#### Caregiver interactive parameters

<i>Speech act features</i>	Correct Response	Partial response	Poor response
Invitation to vocalize			
Self-repetitions and repair devices			
Imitation			
Expansion			
Yes/ No reply			
Other reply			
Directives			
-Interrogatives			
-Imperatives			
Accompainment			
Informatives			
<b>Referential features</b>			
Child controlled events			
Caregiver controlled events			
People/ object present			
Nonimmediate			

#### Pragmatic parameters

<b>Pragmatic parameters</b>	Always	Frequent	Occasional
Topic initiation			
Topic maintenance			
Stylistic variations			
Request for object/action			
Turn taking			

