Mother-Child Interaction: Communication in Children with Cerebral Palsy using AAC

Thesis submitted to University of Mysore for the degree of

DOCTOR OF PHILOSOPHY (Ph.D.)

IN

SPEECH AND LANGUAGE PATHOLOGY

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DECLARATION

I declare that the thesis entitled ***'Mother-Child Interaction: Communication in Children with Cerebral Palsy using AAC'*** *which is submitted herewith for the award of the degree of Doctor of Philosophy (Speech and Language Pathology) at the University of Mysore, is the result of work carried out by me at the All India Institute of Speech and Hearing, Mysore, under the guidance of Prof. R. Manjula, Ph.D, Professor in Department of Speech-language Pathology, A.I.I.S.H, Mysore.*

I further declare that the results of this work have not been previously submitted for any degree.

Place: Mysore

Date:

Preeja Balan

Candidate

CERTIFICATE

*This is to certify that the thesis entitled '**Mother-Child Interaction: Communication in Children with Cerebral Palsy using AAC**' submitted by Ms. Preeja Balan for the degree of Doctor of Philosophy to the University of Mysore, was carried out at All India Institute of Speech and Hearing, Mysore.*

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CERTIFICATE

This is to certify that the thesis entitled ***'Mother-Child Interaction: Communication in Children with Cerebral Palsy using AAC'*** *submitted by Ms. Preeja Balan for the degree of Ph.D. in Speech-Language Pathology, in the University of Mysore, is the result of the work done by her at All India Institute of Speech and Hearing, Mysore, under my guidance. I further declare that the results of this work have not been previously submitted for any degree.*

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INTRODUCTION

Communication in human beings is unique in many ways and involves verbal and nonverbal forms. Verbal communication is attained through speaking, whereas nonverbal communication is carried out using means other than speech, such as hand gestures, eye-gaze, facial expressions, touch, posture, spatial behavior, physical appearance, non-verbal vocalizations and smell (Argyle, 1996).

Language development in typically developing children occurs as a continuum. In the initial stages of development, children use nonverbal communication strategies. As they develop, children transit from the use of nonverbal to verbal communication strategies. Even in the later stages when children are proficient in verbal communication, nonverbal communication plays a significant role in adding to the meaning, stating the emotions involved and others. Typically, most of the nonverbal communication is attained through body gestures such as pointing, facial expressions, eye gaze, body movements etc. Yoder & Warren, (2001a) state that gestures and vocalizations serve the same pragmatic functions (such as requests and comments) as early words.

Functions of language in typically developing children are described in various ways. Halliday (1975) described communication functions as instrumental, regulatory, interactional, personal, heuristic, imaginative and informative while Dale, (1980) included some of the semantic categories such as naming, attribution, nonexistence, rejection, denial and affirmation. These communication functions are learnt through early interactions with

significant others in the environment. Language skills, as stated by Bochner, Price, Jones, (1997) are acquired as children take part in routine exchanges with the adults who care for them. Wetherby, Cain, Yonclas and Walker (1988) observed that in early years, typically developing children use communicative functions for depicting wide range of functions such as making comments, questioning, acknowledging and also for negotiating communication breakdown.

Language acquisition is believed to develop from early non-verbal communicative behaviors, in particular the use of gestures (Franco & Butterworth, 1996; Franco & Wishart, 1995). Gestures are actions produced with the intent to communicate. The emergence and evolution of gesture is predictable and natural in developmental sequence. It is typically expressed using the fingers, hands, arms and includes facial features and body motions (Iverson & Thal, 1998). The onset of intentional communication is signaled by infants by using gestures such as eye gaze, facial expressions, touch, and other gestures to express their wishes and interests. These gestures are used for communication before speech develops and at a later stage alongside speech. As the speech skills develop, the gestures used also vary in nature. McNeill (1992) lists the various gestures as follows:

- Gestures may be produced along with speech,
- Gestures may not show duality of patterning,
- Gestures maybe rarely combined and therefore convey single idea units.

Most of these early interactions in infants are need based, and it is the mother who is involved in fulfilling them. The process of interaction between a mother and child is an

ongoing, natural and an enjoyable process and communication develops within this social interaction (Conti-Ramsden, 1994). Mothers respond to infants as if they were communicative partners from an early age of two years and this scaffolds the later emergence of intentional communicative behaviors and subsequent words (Bruner, 1983). At around the age of 2 years and 6 months, typically developing children are skilled communicators, taking an active and independent role in conversation with familiar adults (Clarke-Stewart & Hevey 1981).

During the initial period of development, infants use cry as their primary mode of communication. As they develop, they start using vocalization to indicate their physical state. This marks the beginning of a communication interaction process. Wetherby, Cain, Yonclas, Walker (1988), observed that mothers vocalize, and wait for a response from the infant. They then vocalize again, either in response to infant's vocalization or to elicit a response from the infant. The child in turn indicates his readiness by vocalizing and/or by being quietly alert for longer periods of time. In parallel to these verbal behaviors, infants also use non verbal communication to indicate their needs through touch, gaze, smile and facial expressions. As they develop, they start using more mature gestures to indicate their needs.

Children with congenital motor impairments such as those arising from cerebral palsy (CP) show a considerable difference in the ability to communicate and interact with the communication partners. Cerebral palsy (CP) is a nonprogressive, neurological disorder with motor impairment that is diagnosed in early childhood (Pellegrino & Dormans, 1998). Depending on the neuroanatomical involvement and its physiological correlates children with

CP exhibit various motor problems, sensory issues, feeding difficulties, apart from the motivational, affective or attentional limitations that exist as co morbid disorders in such individuals. Children with CP thus are at risk for communication impairment. Some of them are verbal, with significantly unintelligible speech, while others are fairly intelligible. Children with severe speech and physical impairment (SSPI) and CP do attempt to communicate. However due to their condition, their communicative attempts gets distorted, and many a times they tend to use subtle and unconventional acts that lead to confusion in interpreting their intentions (Iacono, Carter & Hook, 1998). Children with CP, especially those with severe degree of involvement often rely on nonverbal modalities for expression such as use eye gaze, facial expressions, vocalizations and movements of arms and hands. However, due to the limited motor ability in such children, the ability to use these behaviors is also limited and this in turn affects the caregiver's use of known strategies to read the potentially communicative signals (Trad, 1994).

Most of the children with severe CP have difficulty in speaking and as a part of rehabilitation measures, they are suggested use of 'Augmentative and Alternative communication' (AAC) strategies. Augmentative and alternative communication helps in compensating for temporary or permanent impairments, activity limitations, and restricted participation of individuals with severe disorders of speech-language production and/or comprehension, including spoken and written modes of communication" (ASHA, 2005). The unaided modes of communication in AAC rely completely on the user's body to convey messages such as gestures, sign language/ systems and facial expressions. The aided communication modes in AAC require the use of tools in addition to the user's body. It can

range from use of low-tech systems (e.g. line drawings) to high tech systems such as dedicated devices with digitized speech output (Johnston, Reichle & Evans, 2004). In most instances, such augmentative and alternative communication strategies might develop on their own as a means to convey intent, needs and feelings or it might be taught to them by significant others or professionals. In most of the instances however, due to the limitations that the condition imposes, children with CP use non-verbal symbols which are slow and effortful, and are not associated with the required facial expressions and body movement.

There has been substantial body of research undertaken to describe the interaction between children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) and their parents or other partners involved in communication. Most of these studies which describe the communication interaction in the dyads (SSPI with CP and their communication partners) describe the functions of communication and the various modalities used to express such functions. Pennington and McConachie (2001), described communication interactions in this population as highly constrained in terms of conversation structures with seldom use of commands or questions and production of more yes/no answers and acknowledgements to others. They further added that communication partners most often used high levels of directive functions such as requests for objects and actions, and requests for information.

Communication modes used by children with SSPI and CP are reported by various researchers and several patterns have been noted. It is reported that natural modes of communication such as vocalization, eye pointing, gesture and body movements are preferred by children using augmentative devices. Harris (1982), while discussing the choice

of modes to communicate, observed that some children prefer quickest form of communication. Few other researchers have hypothesized that modality preference is function dependent. Smith, (1994) and Light, Collier and Parnes, (1985c) observed that children confirmed, denied, requested for objects/actions, and attention by using gesture and/or vocalization while provision of information, especially relating to absent objects, or not relating to present context and clarification using aided communication devices.

Need for the study:

There is a significant contribution of maternal stimulation and interaction style in communication development of infants. However, there are very few reports on mother-child interaction in children with cerebral palsy, especially because they form a unique group of individuals with severe speech and physical impairment. It would be thus interesting to view communication interaction between children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) and their mothers. Children, who are verbal, play a significant role in the kind of stimulation they receive. On similar lines, children with cerebral palsy especially those who depend on nonverbal communication would also have a role to play in the kind of language stimulation they receive. It is essential for rehabilitators to have a data on the communicative functions in children with SSPI and CP, especially when they are dependent on unaided i.e. naturally available nonverbal communication strategies.

Most of the reported studies address issues such as partner interaction with nonspeaking children with physical impairment using various AAC communication

strategies. There are no studies evaluating mother-child interaction in children with SSPI and CP who have *not undergone* any kind of speech and language stimulation or prescribed AAC strategies. Hanzlik (1989), studied children with a mean age range of 16 months but this study included children with CP with varying degrees of physical impairment (included quadriplegic, hemiplegic, diplegic of mild moderate and moderate-severe degrees). Basil (1992) studied children with CP in the higher age range (7.4-8.8 years) with poor receptive language age using communication boards while interacting with parents (mothers and fathers).

Light, Collier and Parnes (1985 b & c) studied communicative interaction patterns of eight congenitally nonspeaking physically disabled children using aided AAC (between the ages of 4 and 6 years) and their primary caregivers. Pennington and McConachie, (1999) conducted an in-depth analysis of interaction between mothers and their severely physically disabled children between the age ranges of 2-10 years whose speech was unintelligible out of context to their parents. Most of them were also provided with aided communication systems. Restricted conversation patterns were evident in these children, along with maternal directiveness. Further, Pennington and McConachie, (1999) suggest that interaction for children with severe motor and speech impairments becomes "fossilized" as their age progress.

The outcome of most of the previously conducted studies cannot be generalized due to limited control over variables such as type and severity of cerebral palsy, receptive and expressive language skills of children with CP, clear designation of communication partners,

their age, education, and socio economic status. Most of the children included as subjects in these studies cited were dependent on aided communication systems, thus not revealing baseline communication interaction patterns. Besides, most of the reported findings are from the Western countries. Significant differences are to be expected in the Indian scenario due to different cultural and socioeconomic factors (Westby & Ford, 1993). In addition, differences are to be expected in terms of the type of communication strategies that are used, that is, whether it is augmentative and alternative communication (AAC strategies) in the Indian scenario.

There is scarcity of information on mother-child interaction patterns involving children with cerebral palsy, especially because they form a unique group of individuals with significant speech and physical impairment. Children with cerebral palsy especially those who depend on nonverbal communication have a role in the kind of language stimulation they receive. It is essential for rehabilitators to have data on the communication interaction patterns in children with SSPI and CP, in the absence of speech, especially when they are dependent on unaided i.e. naturally available nonverbal communication strategies. There are hardly any studies in India which have evaluated mother-child interaction in non speaking children with cerebral palsy who have not undergone any kind of speech and language stimulation specific to Indian context

Aims of the study: The major objective of the study was to analyze communication interactions of children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) with their mothers during instructed play. The specific aims were to study:

Section A:

- ‘Communication functions’ used by mothers and children with SSPI and CP
- Responses of mothers and children with SSPI and CP to the ‘communication functions’ used by each in the dyad.
- ‘Communication modalities’ used by the mothers and children with SSPI and CP.
- Responses of mothers and children to the communication ‘modalities’ used by each in the dyad.

Section B:

The secondary objective of the study was to describe how mothers’ participating in the study viewed their children’s disability; specifically communication impairment linked to SSPI and CP, their sensitivity towards physical limitation that the condition imposes and their concerns about the condition and prognosis.

METHOD

The participants were selected from various rehabilitation centers which were mainly involved in the rehabilitation of children with physical impairment of neurological origin. Informed consent was obtained from mothers prior to their inclusion along with their children in the study. Ten Kannada speaking dyads between the age ranges of 2; 1 to 3; 11 years (mean age range of 2.8 years) with the diagnosis of severe quadriplegic cerebral palsy belonging to middle socio economic status [as on the adapted version of NIMH Socioeconomic status scale (NIMH, 1994)] participated in the study.

Receptive language of the children were found to be within ± 3 months of their chronological age as assessed using 'Assessment Checklist for speech and language skills' (Geetha, 2007). A checklist based on items and guidelines from 'The nonspeech receptive and expressive language scales' by Huer (1988)was prepared to specifically assess the nonverbal receptive and expressive language skills in children included in the study. Receptive and expressive language in children and choice of modality by the children was noted down using the checklist. None of the children in the study had undergone formal speech and language therapy except one participant who attended speech and language therapy for duration of a month. Mothers involved in the study were in the age range of 21-30 years (mean age range of 25 years) and had a minimum qualification of 12^{th} grade. None of them had any speech and language impairment or any sensory issues.

Toys and activities suitable for children in the selected age range were provided to mothers and they were told to interact with their child as they would normally do at home. Few trial recordings of interactions were carried out with different set of toys for familiarizing the participants to the testing procedure and desensitizing the participants towards the camera. Mother-child interaction was video recorded in a quiet room with limited distraction for 15-20 minutes in a comfortable setting during instructed play situation. Four interactive sessions of fifteen minutes each were recorded in order to provide maximum opportunity for the occurrence of communication functions and to rule out the contextual limitations if any (as in selection of a particular toy). Following this, a semi-structured interview was carried out using a detailed closed ended questionnaire. It was specifically

prepared for the purpose of obtaining mother's views about various factors contributing towards the acceptance of a communication system and towards communication efficiency.

The investigator as the third judge transcribed in entirety the mothers' communication interaction strategies by viewing the video recorded samples. Communication functions used by mothers included verbal, nonverbal or combined strategies whichever was applicable at that instance. The children with SSPI and CP participating in this study were nonverbal. Hence, communicative strategies used by these children included only the nonverbal strategies. The nonverbal strategies used by mothers and children were not identified at this stage by the investigator as transcribing these nonverbal strategies would provide details of the modalities which had to be later coded by trained judges.

Two professionals, who were post graduates in speech and language pathology and had a minimum of 2 years of experience in intervention of childhood language impairment, were selected as judges. The investigator also participated as the third judge in the coding process. Taxonomy to describe communication interaction in dyad involving children with SSPI and CP was compiled after reviewing studies cited in literature. The judges were familiarized with the operational definitions for the various communicative strategies used by the mothers and children. Training was provided to the judges using a sample video recorded clip of a 6-year-old child meeting all the criteria as specified for children included in this study, except for the age. The actual recorded samples were played to both the judges. The judges viewed the communication interaction and coded the dyadic communication

interaction for functions, modalities and responses of mothers and children to the functions and modalities used by their partners in the dyad.

The judges utilized the transcription along with the taxonomy provided to them during the training phase as the bases for coding the communication interaction in the dyad. The judges coded the following:

- 'Communication functions' and 'communication modalities employed by mothers and their children,
- Responses of mothers and children with SSPI and CP to the communication functions and communication modalities used by each in the dyad.

Communication acts included two components: function or meaning (request for information, request for attention, request for objects, information, instruction for action, instruction for speech, confirmation and denial) that the mother/child intended to convey and the actual behavior or means (vocal, eye, facial, part body and combination gestures). Responses of mothers and children to the various functions and modalities used were analyzed based on 'response', 'no response' and 'response not expected'. Frequency of occurrence of functions, modalities and responses for various functions and modalities were also calculated.

Inter and Intra-judge reliability measures using alpha co-efficient was carried out for the:

- transcriptions,

- communication functions and modalities used by mothers and children with SSPI and CP,
- responses of mothers and children for the functions and modalities employed by each in the dyad .

The results obtained are presented and discussed under two main sections (A & B)

Section A:

- 'Communication functions' used by mothers and children with SSPI and CP
- Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.
- 'Communication modalities' used by the mothers and children with SSPI and CP
- Responses of dyad to the communication 'modalities' used by each in the dyad.

Section B:

Mother's responses to the questionnaire were analyzed to understand their attitudes towards various issues in children with SSPI and CP as well as their knowledge about the condition. Variation in responses of mothers' on the questionnaire versus the communication acts as coded by the judges are also presented with respect to two main parameters namely:

- Communication functions and modalities employed by children with SSPI and CP and
- Children's responses to various communication functions used by the mothers

RESULTS

The findings of the study are presented under 2 sections (Section A and B).

Section A:

The following 'communication functions' used by mothers and children with SSPI and CP were analyzed. Communication functions included were the following;

- Request for information (general)
- Request for information (yes/no)
- Request for attention
- Request for objects
- Information
- Instruction for action
- Instruction for speech
- Confirmation and
- Denial

The following 'communication modalities' used by the mothers and children with SSPI and CP were analyzed. Communication modalities included were the following;

a. Vocal gestures

- Vocalization
- Verbalizations

b. Eye gestures

- Looking at object
- Looking at person
- Looking at location
- Combination of looking at object/person, location
- Eye blink

c. Facial gestures

d. Part body gestures

- Showing
- Pointing
- Ritualized

e. Combination gestures:

- Sequential (specify)
- Simultaneous (specify)

Responses of mothers and children to the communication 'functions' and 'modalities' used by each in the dyad were analyzed and defined as those functions and modalities:

- that received a response;
- that did not receive a response; and
- where responses were not expected

Section B:

The secondary objective of the study was to describe the attitudes of the mothers in the dyad towards their children's disability. It specifically aimed to study issues linked to SSPI and CP in terms of:

- Indication of needs by their children
- Various communication functions utilized by their children
- Responses from children for various maternal functions
- Modalities that facilitate understanding communication attempts of children

- Impact of physical disability in children in various spheres of development
- Prognostic expectations by mothers about their children's condition
- Role of various strategies in rehabilitation
- Concerns that mothers' have about their children
- Knowledge about aids
- Impact of nonverbal communication in communication development of their children

Individualistic variations in 'communication functions', 'communication modalities' and responses of mothers' and children for the various communications and modalities used were evident. Hence individual data was profiled and group behavior wherever applicable was described. Responses to the questionnaire were also qualitatively discussed.

Implications of the study

The study was designed to examine the communication functions and modalities in instructed play situation between mothers and children with SSPI and CP. This is one of the first attempts in such a population in Indian context The study contributes to the empirical database in understanding the communication behavior of children with SSPI and CP who have not received any formal speech-language training/therapy. The outcome of the study points towards the need and importance of sensitizing parents/caregivers and professionals dealing with children with SSPI and CP regarding various nonverbal communication attempts in such children and how it has to be encouraged to fulfill the communication cycle.

Furthermore, it specifies the communication functions and modalities that needs to be boosted or dampened to promote communication between the dyads involving mothers and children with SSPI and CP. In this sense the outcome of the study not only helps in evaluation of nonverbal communication in other such dyads, but also helps in setting goals in intervention.

Limitations of the study:

1. The stringent criteria followed in the method to select a homogenous group of dyads gave way to a limited sample size of ten dyads. Hence there was no scope for statistical verification of the results as individual variability across the ten dyads studied was high.
2. The study profiled a wide range of communication functions and modalities used by children with SSPI and CP with mothers during instructed play situation only.
3. In the analysis, no attempt was made to study and control external variables such as parenting styles, individualistic communication patterns, acceptance of the physical impairment and parental beliefs as well their practices.
4. Only a close ended questionnaire was used to tap the mothers' attitudes and this by itself could have limited the responses of mothers on the same.

REVIEW OF LITERATURE

Communication is the process of exchange of information between a sender and a receiver. It is a highly complex and dynamic phenomenon whereby the sender and receiver are continuously coordinating and modifying their present and anticipated actions according to others signals (Fogel, 1993). Development of communication is multimodal and multidimensional in nature. The review of literature is organized and presented as follows:

1.0. Development of communication in typically developing children

2.0. Interaction between typically developing children and mother's during communication development

3.0. Intentional communication development in typically developing children

3.1. Communicative functions in typically developing children

3.2. Use of communication modes in typically developing children

4.0. Cultural aspects in communication interaction in typically developing children: Specific reference to Indian culture

5.0. Children with cerebral palsy (CP)

6.0. Communication impairment in children with severe speech and physical impairment and CP

7.0. Augmentative and Alternative Communication systems (AAC)

7.1. Communication interaction in AAC users

7.2. Communication functions in AAC users

7.3. Modes of communication in AAC users

7.4. Interaction patterns with reference to communication functions and modalities in AAC users

8.0. Communication behaviors in mother-child interactions

8.1. Assessing communication skills in children with SSPI and CP

8.2. Methodological issues

8.3. Sampling techniques

9.0. Attitude of mothers and its relationship to communication behaviors

1.0. Development of communication in typically developing children

Communication development in typically developing children is not haphazard, but follows a systematic pattern. This is evident from the way the infant moves from the perlocutionary stage to the locutionary stage in a natural and predictable manner. In the early phase of language development, prelinguistic gestures and/or vocalizations are prominently used by children for intentional communication before the use of speech (Harding & Golonkoff, 1979; Coggins & Carpenter, 1981).

Few investigations have addressed the relationship between children's prelinguistic behavior and subsequent linguistic communication. Bates, Camaioni and Volterra (1975), based on the *speech act theory* of Austin (1962), described three stages in the emergence of communication. According to this, from birth to nine months, communication development is described as in the perlocutionary stage, where the child has a systematic but unintentional effect on the caregiver. In the illocutionary stage of communication development at about 9

months, the child's communication has an intentional effect on the caregiver. The use of propositions with referential words by the child at 13 months of age marks the locutionary stage wherein communication intent is expressed using words. On similar lines, Harding (1984) suggested that there is a gradual transition from the preintentional stage to the intentional stage and from prelinguistic vocalization to referential speech. Bruner (1983) described the communicative intentions that emerge during the first year of life as: (a) *behavioral regulation*, which includes acts to regulate another person's behavior for the purpose of obtaining or restricting an environmental goal, (b) *social interaction,* which includes acts to attract and maintain other's attention to oneself for affiliative purposes *(c) joint attention,* which includes acts to direct another's attention for purposes of sharing the focus on an entity/event. The major achievement in the prelinguistic stage, as Bates, Benigni, Bretherton, Camaioni and Volterra (1979), states, is the emergence of intentional communication in which the child uses signal deliberately to have a preplanned effect on the caregiver.

2.0. Interaction between typically developing children and mothers during communication development

Communication involves dyadic interaction. It is only when the sender's message is decoded by the listener who is the partner, communication is said to be successful. For communication to be complete, the presence of a partner is essential. Conti-Ramsden and Friel Patti, (1984), Yoder, Warren, Kim and Gazdag (1994); and Iacona and Carter (2002) stressed the role of partner in distinguishing intentional from preintentional communication. Intentional

communication as compared to preintentional communication is directed towards the partner. This direction when coupled with improved clarity decreases the possibility of these communicative signals being overlooked, and increases the chances for the partner to provide a symbol which reflects the meaning and intention of the communication behavior. Partner's ability to consistently recognize a child's potential communicative attempt and respond to those attempts in a contingent, appropriate and consistent manner contributes to the emerging differences between preintentional and intentional communication (Wilcox, Kouri & Caswell, 1990).

One of the most important factors in the child's communication development is the contribution of the mothers. Mothers are the most readily available partners for children. Most of the child's needs such as feeding and self-care are met by the mothers; and it is usually during these activities that children begin to interact with their mothers. Studies on mother-infant interactions have documented coordinated activities, whereby parents carefully study their infant's facial expressions and movements and respond to vocalization as though they were social signals (Locke, 1993). It is also observed that in typically developing children, mothers imitate the early motor and vocal behaviors of their children. However, early maternal imitation follows a consistent pattern. Mother's imitate children's behavior to associate it to behaviors that are salient, consistent and to modify children's behavior to achieve some target. During interactions, mother's treat children as conversational partners and structure their "conversations" so that they are able to take their "turn" at the appropriate time. Thus, the communication development is shaped by the cumulative experience of such interactive processes between mother's and their children. Interpretation of the preintentional

communication acts of children are purely based on the context in which such interactions occur with their mothers.

A considerable amount of research is available on the early interactions by typically developing infants' and its role in language acquisition. Bates, Benigni, Bretherton, Camaioni, and Volterra (1979); Akhtar, Dunham and Dunham (1991); Thal and Tobias (1992); Carpenter, Nagell and Tomasello (1998); Mundy and Gnomes (1998) and Yoder and Warren (1999), have demonstrated strong links between children's prelinguistic communication behavior such as babble, gestures, functions, interactive processes (e.g., joint attention), and verbal input to subsequent language outcomes.

Bruner (1983) and Locke (1993) suggest that during interactions, there is an innate drive in children to engage in social interaction which makes them take an active role in the communication interactions. Further, it is during these early interactions with mother's that many critical processes specific to language are encouraged such as the desire to engage in playful vocalization including vocal exploration, emergence of turn taking and dialogue structure, and the desire to imitate vocal patterns.

Amongst various interactional parameters contributing to communication development, one of the most studied and well researched areas is attentional regulation. Tomasello and Farrar (1986) defined two styles during interaction: attention- directing and attention-following. In attention-directing, the adult directs the child's attention to the object or event of interest to the child whereas in attention-following, the adult attends to the child and

then makes a comment on the object/event of interest of the child. Further, periods of shared attentional focus between adults and young children (i.e., joint attention) provide linguistic scaffolding for the child's communicative interactions.

Children need to attend to the same object or event as that of the partner who is involved in interaction. This skill is essential for learning language (Bruner, 1983). Study by Akhtar, Dunham and Dunham (1991) revealed that some types of directiveness by partners that follows children's action and attention facilitates communication development. During early interactions, mothers elaborate upon their children's verbal and non-verbal behaviors. Mothers' language may be salient because of the already directed focus in children's expressions. Thus, maternal linguistic input in the form of describing child directed activities provides a better context for children to decode their linguistic message. Children tend to acquire more words and maintain joint attention for longer periods when caregivers use attention-directing strategies. Vigil and Hwa- Froelich (2004), state that when adult focuses on the child's interest, it reinforces his/her interests while, a directive style reflects the dominating nature of the caretaker. However adult directing the child's attention towards the activity of their choice is associated with poorer communication patterns in their children (Tannock, Girolametto & Siegel, 1992). Harding (1984) is also of the view that child's attention to an interactive partner is an important aspect in mother-child interaction. According to few investigators, child's focus of attention is an important characteristic differentiating preintentional from intentional nonverbal communication during the prelinguistic period. However, this is not considered to be true by few others. Warren and Yoder (1998) and Adamson and Chance (1998), observed that the distinction between preintentional and intentional communication hinges on a child's

ability to co-ordinate visual attention between an interactive partner and a communicative referent. Other investigators state that intent to communicate in children can be confirmed when they produce gestures, vocalization and/or eye contact to direct the attention or actions of an interactive partner (Mundy & Gnomes, 1998). Other factors which help in strengthening communication intent in a child include (a) an expectation of a response as evidenced by waiting after a communicative attempt and (b) persistence in communicative attempts that may be revised to increase clarity (Wilcox, Hadley & Ashland, 1996).

The identification of a child's intent to communicate thus does not depend on a single factor but multiple factors which vary across reported studies. The child's focus may be more important than the actual structure or pragmatic intent of a mothers' utterance. As Bruner (1985) has indicated, much of the child's early language acquisition takes place in recurring routines or formats. These formats are well established and free the child from the burden of determining the adult's focus and thereby allowing him to allocate more processing capacity to language learning (Rocissano & Yatchmink, 1983). This is especially important based on the fact that social interaction involves a partner, who is more sensitive and who responds in a much better fashion. Maternal responsiveness has been reported to have an important role in early language acquisition. From early stages, children are regarded as active participants in interaction who demonstrate increasing competence in conveying messages to their interactive partners. Preintentional communication acts of children result in communication because the interactive partners recognize and attribute meaning to young children's behavior. Wilcox, Kouri, and Caswell (1990); and Yoder and Warren (1999) observed that intentional

communication elicits more contingent responses from mothers as they are easier to interpret or mothers attribute meaning to subtle cues elicited by children.

Landry, Smith, Swank, Assel and Vellet (2001); and Tamis-LeMonda, Bornstein and Baumwell, (2001) reported that mothers' consistent and sustained adaptation to their children's changing needs over time, rather than an early pattern of mothering facilitates young children's social and cognitive development. However Paavola, Kunnari, and Moilanen (2005) found that frequencies of maternal responses and infant's intentional communicative acts were not correlated and thus did not have any predictive validity to subsequent communication and linguistic skills. They concluded that maternal responsiveness during the prelinguistic stage is not necessarily dependent on children's communicative competence. They also suggested that both maternal responsiveness and infant's intentional communication could predict early comprehension skills whereas expressive skills of verbal and gestural communicative means were predicted by infant's intentional communication. To summarize, mothers have a significant role as promoters of early communicative and linguistic skills in infants and both maternal responsiveness and infant's intentional communication make a distinct contribution in later communication development.

3.0. Intentional communication in typically developing children

Infants themselves play an important role in determining the kinds of linguistic experience they receive, influencing their language environment by means of pragmatic

communication. As development progresses, infants express more intentions in their acts, displaying means-end relationship and co-coordinating their use of gestures, vocalizations, and eye-gaze. The non verbal signals used during this period also become clearer, making it easier for adults to assign an intention to their communicative attempts (Warren & Yoder, 1998).

Various aspects of communication have been taken into consideration while evaluating communication development in typically developing children. Wetherby and Prizant (1991) emphasized on the form of communication (E.g., no. of different gestures, sounds, words and word combinations) for assessing communication development of children who are at preverbal or verbal levels. Though such assessments provide a wealth of information on the communicative form, it does not evaluate the intentions expressed in these communication acts. In this study, intentional communication development has been reviewed under two main headings namely communicative functions and use of modalities for communication.

3.1. Communicative functions in typically developing children

Communication intentions are mainly understood in terms of the functions they convey. Beginning at about 9 months of age, children have been found to express a wide variety of intentions. Bates, Camaioni and Volterra (1975), Halliday (1975), Coggins and Carpenter (1981) have each identified a set of early communicative behaviors in different stages of development. In preverbal stage, a wide variety of intentions have been found to exist such as:

- attention seeking,
- requesting objects,
- actions and information,
- greetings,
- transferring,
- protesting
- responding and
- informing.

In children at single-word stage of development, Halliday (1975) identified the following functions:

- naming,
- commenting,
- requesting object,
- requesting action,
- requesting information,
- responding,
- protesting,
- attention seeking and
- greetings.

Wetherby, Cain, Yonclas and Walker (1988) attempted to view the developmental trend of intentional communication behavior displayed by typically developing children. They followed sixteen children longitudinally from the prelinguistic to multiword stage of

language development. Significant differences were observed across stages for specific categories of functions. By the multiword stage, *request for object* and *protest* increased while *request social routine* and *showing off* decreased. *Commenting* was most frequently used by most of the subjects' at all the language stages with *request for action* category following it. The findings of the study indicate that even during the prelinguistic stage, typically developing children are likely to use all the three major functions namely; behavioral regulation, social interaction and joint attention. Similar developmental trend was observed in the use of communication function by Wetherby and Rodriguez (1992). *Request object* and *protest* increased as *request action* decreased from prelinguistic stage to one-word stage. During the prelinguistic stage and one-word stage, *request social routine* and *showing off* was evident. By the time the child attained multi-word stage he/she developed more sophisticated conversational functions within social interaction and joint attention. Thus, they concluded that either a failure to develop communication functions or a change in pattern of communication function or limited range of communicative behavior in children may be indicative of future communicative impairment.

3.2. Use of communication modes in typically developing children

Communication in human beings is multimodal. Though it involves the auditory, visual and tactile channels, most individuals use multimodal communication (Vanderheiden & Lloyd, 1986). Successful language acquisition is believed to develop from early non-verbal communicative behaviors, in particular, the use of gestures and pointing (Franco & Wishart, 1995; Franco & Butterworth, 1996). These early non-verbal communicative

behaviors lay an essential foundation for language development in all children (Tomasello & Farrar, 1986; Harris, 1992; Harris, Kasari, & Sigman, 1996). Crais, Douglas and Campbell (2004) view gestures as the most consistent early indicators of intentionality that provides information about the development of early communication skills. Gesture is believed to share the underlying cognitive skills with both receptive and expressive vocabulary (Capone & McGregor, 2004). Majority of gestures are usually non meaningful and emerge from infant's own experiences with objects or emerge within interactive routines. These gestures are usually iconic and often take the form of actions that are associated with objects. As children explore the environment using motor acts, mothers assign meaning to them through the interaction. In typically developing children, spoken language and gesture develop in parallel during the initial stages of communicative development (Caselli, 1990; Chan & Iacono, 2001). The emergence and evolution of gesture occurs naturally and is predictable in developmental sequence.

During language acquisition in typically developing children (Bruner, 1975), behaviors representing nonlinguistic modes that are referred to as prelinguistic, precede the development of true language. Typically developing infants are known to integrate a number of modalities: gesture, body movements, facial expression and vocalizations to communicate prior to the development of speech (Capiri, Iverson, Pizzuto, and Volterra, 1996; Smith, 1998). As infants develop the use of only gestures or only sound decrease from the prelinguistic through the multiword stages. Carpenter, Mastergeorge, and Coggins (1983) in their study, found that the use of isolated gestures decreased as children developed; while use of vocalizations accompanied by gestures increased and became the predominant means for communication from 10-15 months. Children started using words only by 13 months and

used them minimally till 15 months, again highlighting the developmental pattern in the use of modalities. The modalities change over time in strength and its relevance to the communication context as children become more proficient within each mode and learn to manipulate them in relation to one another (Smith, 1998). Similar developmental trend was observed by Roth and Speakman (1984), who stated that at the pre-linguistic stage, infants make sense of, and produce functional communication in a number of modalities. Children at single word stage encode certain intentions linguistically while; to depict certain intentions they tend to rely on gestural means. Once language emerges, little attention is given to these prelinguistic behaviors. In the later period of development, when speech develops, gestures vary without being terminated. Some of the gestural variations as observed by McNeill (1992) are as follows:

- they are produced in synchrony with speech;
- they do not show duality of patterning;
- they are rarely combined and therefore convey single idea units.

Different kinds of gestures are reported to emerge during developmental period (Capirci, Iverson, Pizzuto, & Volterra, 1996). Showing, giving, and pointing emerge in this predictable sequence, starting at approximately 10 months of age (Folven & Bonvillian, 1991) and as reaching and emotive gestures decline, the occurrence of these gestures increase (Blake & Dolgoy, 1993). At around 12 months, recognitory gestures, i.e. actions carried out on an object and actions representing the object in terms of its function emerge. However some investigators question whether these behaviors can be classified as gestures as it is not symbolic and does not meet the communicative status criteria (Iverson, Capirci, & Caselli,

1994). Other investigators like McCune-Nicolich (1981) still feel that such gestures depict an infant's capacity for symbolic representation in similar ways to spoken words. Another type of gesture explained by few investigators are the referential gestures (Nicoladis, Mayberry, & Genesee, 1999), which carry meaning in their form to symbolize a referent, e.g., flapping of wings to depict a bird flying. *Deictic gestures*' emerge during the pre-linguistic period and are used to request, declare, and draw attention, be it joint or otherwise, to an object or location and predicts the emergence of first words. These gestures are interpreted by the partner based on the context in which it occurs. *'Representation gestures'*, are symbolic and complement spoken forms and represent a given object or action. This type of gesture emerges slightly later than deictic gestures. Even during later development, gestures continue to scaffold performance on more complex cognitive tasks, including comprehension of language or clarification of their own spoken messages.

Typically developing children use both nonsymbolic (deictic) gestures such as pointing and symbolic gestures for communicative purposes (Acredolo & Goodwyn, 1988; Acredolo & Goodwyn, 1990). Deictic gestures emerge with intentional communication and are seen by the age of 9 months (Snyder, 1978), while symbolic gestures appear with words at around 12 months of age (Acredolo & Goodwyn, 1988). Acredolo and Goodwyn (1988) further add that gestures in typically developing children develop spontaneously in interactive routines with parents or during the child's own interaction with the object. Thal, Tobias & Morrison (1991) hypothesize that communicative gestures are used as "back up" to establish and maintain communication in the absence of oral language. This finding is supported by

Acredolo and Goodwyn (1990), who stated that some children may rely heavily on gestures for communicative purposes when there is a temporary impediment in acquiring the oral language.

Capirci, Iverson, Pizzuto and Volterra (1996) studied the relationship of gesture and spoken words. They observed that all twelve typically developing children in their study (recorded at 16 months and 20 months) produced gestures and words as two element 'utterances' before producing two-word spoken utterances. They concluded that this pattern is part of the typical developmental sequence in the transition to two-word utterances and believed that prelinguistic communicative functions form the foundation for emergence of words. The role played by gestures in further language development is also well documented. Marcos (1991), and Marcos and Kornhaber-le Chanu (1992) reported on the relationship of gestures, vocalizations and words in typically developing infants aged around eighteen months. The infants in their study were observed to revert to gesture and exaggerated body movements when words failed to produce the desired results of requesting an object.

Though numerous studies are reported in the literature discussing the developmental trend of gestures and words, few investigators (Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; Gopnik & Meltzoff, 1986; and Bates, Bretherton & Snyder, 1988) support the idea that language and gesture develop in parallel. The parallel progression has been interpreted as reflecting shifts in the cognitive mechanisms that underlie the development of linguistic and gestural symbols.

To summarize, development of gestures is reported as a systematic process. The transition from preintentional to intentional stage is achieved through use of varied gestures. Gestures also act as potential predictors of language development at a later stage.

4.0. Cultural aspects in communication interaction in typically developing children: Specific reference to Indian culture.

Children across the world show similar stages of communication development. Children start producing gestures, move on to exhibit more sophisticated and combination gestures as development progresses. The maternal interaction strategies and its role in developing communication in typically developing children are well documented in the literature. However, various factors have been observed that affect communication interaction and communication development in typically developing children. Some of the well investigated variables include; culture, (Bornstein et al., 1992), socioeconomic status and maternal education, birth order and gender (Ling & Ling, 1974).

Mother-child interaction has a strong root in the cultural context in which it occurs. In the Indian context Srinivasan (2000), found that educational qualification of mothers significantly contributed to the differences in the language addressed to their children with cerebral palsy. Further, her study revealed that mothers with higher educational qualification communicated more often with their children than mothers with lower education; both when children did and did not have disabilities. Sanagavarapu, Elliott and Relich (1994) in their study observed that Indian mothers tended to use instructions or directives more frequently as

compared to other functions. Their speech with children had an authoritative orientation reflecting the age hierarchies in adult-child communication. They also found that the speech of Indian mothers' consisted of endearments, affective statements and motivational statements that reflect cultural specific socialization practices. There was also insistence on using correct sitting posture especially for girls. Certain beliefs and practices that are quite unique to Indian culture were also found despite their well recognized sub cultural variability (Simmons and Johnston, 2007). Though families act as an important social unit, Indian culture places less value on individual autonomy. There is a strong commitment to group goals rather than individual goals and most of the interactions are structured within the traditional hierarchical roles (Gardano, 1996; Assanand et al., 2005). Unique to India, there are again roles assigned within the families based on gender and the age of the individual. Older individuals are the decision makers, while younger individuals are expected to follow their advices. Women are most often assigned the caretaker's role, while the men in the families are expected to earn and take the responsibility of the family (Mohanty, 2000). Rao McHale, Pearson, (2003) conducted a survey to investigate the group and individual differences between Indian and Chinese mothers of preschoolers regarding various parental socialization goals. Results revealed that parents of Indian origin were dominant, mainly authoritarian and adult centered. They observed that the focus of interaction was child's interdependence rather than independence, which again, is believed to lead to well-being of the child and guarantees the support of family (Derene, 2000).

Reporting on the child-rearing practices in India, Srinivasan and Karlan (1997) opined that although mothers acknowledge the value of stimulation, talking and play; these

activities are acknowledged as worthwhile only when they are guided by adults. Such maternal belief lays constrains on the child with respect to the opportunities to explore and initiate. On similar lines, Chaudhary (1999) in her study of Indian mothers focusing on the content of talk to children observed that the bulk of the talk consisted primarily of people familiar to the child rather than objects and events. Maternal interaction also consisted of mothers asking children to perform ritual actions e.g., 'Do namaste' (hand gestures involving folding both hands and held near the heart accompanying by bowing of head). Higher instances of use of *instructions* were also reported in mother-child interaction in typically developing children in Indian mothers (Sanagavarapu, Elliott & Relich, 1994). Further, Simmons and Johnston (2007) found specific features in Indian mother's interactions with their children while describing the cross-cultural differences in beliefs and practices that affect the patterns of talk to children. Indian mothers believed that children's wishes need to be fulfilled to keep them happy. Indian mothers were also of the opinion that children ask too many questions, they need to be taught to speak, are independent and must be taught to depend on family. Their study also revealed that most Indian mothers did not consider play as an important medium of learning. Data from their study also indicated that Indian mothers asked their children to repeat words or sentences after them, practiced religious songs and informed children about their grammatical errors. Further, Indian mothers were less likely to follow their child's topic of conversation, use parallel talk, and did not pressurize their children to attain conversational goals. Thus it is important to understand the child rearing practices, maternal communication strategies and maternal expectations from their children as they have deep rooted linkage to the culture to which they belong to.

5.0. Children with Cerebral Palsy (CP)

There is a large amount of investigative attention on communication development in typically developing children and the role of maternal interaction in such children. In comparison, however, there is limited literature on the maternal interaction and communication development in children with developmental disabilities especially in children with cerebral palsy. Cerebral palsy forms a unique group among the developmental disabilities. Cerebral palsy is a non-progressive neurological condition affecting the developing brain (Hardy, 1983). Cerebral palsy (CP) "includes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disturbances of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, behavior, epilepsy, and by secondary musculoskeletal problems" (Rosenbaum et al., 2007). National sample survey Organizations NSSO (1991) in India records that CP is the cause for locomotor disability in 48% of the rural population in India and 43% in urban population.

Most often, cerebral palsy as a condition does not exist in a pure form and there are numerous functional overlays to it. McDonald (1987) classified CP into the following categories namely;

- Athetosis, causing uncontrollable involuntary movement;
- Rigidity, causing resistance to flexion and extension movements;
- Ataxia, resulting in difficulty maintaining balance;

- Tremor, resulting in repetitive, involuntary contractions of the flexor and extensor muscles;
- Atonia, in which muscle tone is lacking or deficient; and
- Mixed-type, in which there are combinations of two or more of the above problems

According to the topographical distribution of the disorder suggested by Sankar and Mundkar (2005), CP may be further categorized into

- Monoplegia: Involvement of one limb
- Diplegia: Lower limbs are more severely affected than the upper limbs.
- Triplegia: Involvement of 3 limbs
- Quadriplegia: Involvement of all four limbs, (trunk and upper limbs are more severely involved than the lower limbs).
- Hemiplegia: Involvement of one half of the body (upper and lower limb of the same side with upper limbs more severely affected than the lower limbs).

In India, as stated by Sankar and Mundkar (2005), diplegia is the commonest form observed (30% – 40%), followed by hemiplegia (20% –30%) and quadriplegia (10% – 15%). However Singhi, Ray and Suri (2002) reported that in 1000 individuals with CP from India, spastic quadriplegia constituted 61% followed by diplegia which constituted 22 % of cases Monoplegia and triplegia in India were found to be relatively uncommon.

Oromotor problems with feeding difficulties, swallowing dysfunction and drooling are also evident in children with CP (Reilly, Skuse & Poblete, 1996). Associated disorders such as abnormalities of proprioception and tactile sensations, behavioral problems, psychiatric disorders such as anxiety, depression, conduct disorders, hyperkinesis and inattention have more disastrous effect than the motor issues in general (Sankar & Mundkar, 2005). However due to the presence of motor difficulties associated with CP, these conditions are not readily recognized (Ashwal et al., 2004) causing challenges in the identification of these difficulties in children with CP.

6.0. Communication impairment in individuals with severe speech and physical impairment (SSPI) and CP

Children with cerebral palsy present speech, language and communication disorders along with other associated impairment (Aicardi & Bax, 1992). Severe speech and language impairment (SSPI) seen in children with CP could be because of the physical limitation (Cress et al., 2000) imposed by the condition along with the other associated issues. This limitation also reduces the opportunities for exploration and object-based play. Since most of the early learning involves physically acting on the environment, learning language through exploration is equally difficult. Thus, unlike in typically developing children, children with SSPI and CP develop early cognitive and communicative skills more through social play interactions as compared to object play.

Children with SSPI and CP rely on vocalizations eye-gaze and gestures while interacting with communication partners (Bode, 1997). They also have limited repertoire of vocalizations, eye-gaze, and motor control of arms and hands (Light, 1997) resulting in production of unconventional, ambiguous, and idiosyncratic communicative signals.

7.0. Augmentative and Alternative Communication (AAC) systems:

Augmentative and Alternative communication (AAC) is broadly thought of as a multimodal process involving various aided and unaided modes, including gestures, manual signs, traditional orthography and other types of alternative symbols (Heim & Baker- Mills, 1996). Children who are nonverbal rely on unaided communication systems such as eye gaze, facial expressions, gestures and vocalization. Interpretation of these communication strategies through nonverbal modalities are based on the context in which it occurs. Depending on the severity of the condition, children with CP present poor speech intelligibility or may have little scope for developing verbal language. They may need *augmentative communication* strategies to supplement speech and facilitate communication and/or rely on *alternative communication* strategies using suitable unaided communication systems.

The preference of a particular mode or combination of modes depends on various parameters. Partner with whom the nonspeaking individual is communicating, proximity of the partner, familiarity with the partner, the intent conveyed, the context in which communication is occurring, the activity which is being used to express communication, plays an important role in the choice of the modality. In some children with cerebral palsy,

nonverbal strategies are used temporarily, whereas in some cases, nonverbal strategies are prescribed as the only available means of communication. Thus, nonlinguistic modes of communication are used concurrently with the development of linguistic modes and in instances where speech needs supplementation, nonlinguistic modes of communication will continue to play a vital role or replace speech. In most instances, such augmentative and alternative communication strategies might develop on their own as a means to convey intent, needs, and feelings or it might be taught to them by significant others or professionals. Some or the other kinds of AAC strategies are usually beneficial for most children with SSPI and CP.

Romski and Sevcik (1996) believed that AAC intervention would facilitate the production of speech in individuals with developmental disabilities who have significant speech impairments**.** Light, Binger, Agate, and Ramsay (1999) also acknowledged the benefits of AAC intervention by enhancing their communicative competence in individuals with significant speech and language impairments. Most often however, some parents and professionals are hesitant to initiate AAC intervention because of their concern that AAC will inhibit speech production (Beukelman, 1987). Dowden and Marriner (1995) further support this opinion and state that AAC intervention can have a negative effect in the emergence of speech in individuals with developmental disability. In a meta-analytic study to determine the effect of AAC on speech production of individuals with developmental disabilities, Millar, Light and Schlosser (2006) revealed that AAC intervention did not have a negative effect on speech production. They also added that the benefits of AAC intervention are observed in individuals who have passed the critical early childhood years.

Communication skills are equally important for children with developmental disabilities like children with SSPI and CP as it is for typically developing children. It encourages such individuals to be functionally independent (Wetherby, Alexander & Prizant, 1998). Typically, researchers have inferred intentionality in individuals with disabilities from the presence of specific behavioral indicators (Iacona, Carter and Hook 1998). Wetherby and Prizant (1989) have summarized a cluster of behavioral indicators utilized for communication by typically developing children. They are as follows:

- Alternative eye-gaze between a goal and a listener,
- Persistence in signaling,
- Changing the quality of a signal until a goal is met,
- Using a signal with a conventional or ritualized form,
- Awaiting a response from the receiver,
- Terminating the signal when the signal is achieved,
- Indicating satisfaction / dissatisfaction depending on whether the goal is achieved.

Iacona, Carter and Hook (1998) however criticized the observation described by Wetherby and Prizant (1989) on the grounds that such signals may be difficult for some individuals to produce depending on their disability. Reichle, Halle and Drasgow (1998) added that some of these indicators may be nonobligatory features of intentional communication in individuals with disabilities using AAC.

7.1. AAC users and communication interaction

There have been numerous attempts by investigators to describe the patterns of interaction in AAC users with their conversational partners. Some of the variables studied by them include communicative intents/ functions, communication modes, rate of message transmission, turn regulation and topic maintenance (Beukelman & Yorkston, 1980; Calculator & Dollaghan, 1982; Buzolich, 1983; Calculator & Luchko, 1983; Colquhoun, 1982; Light, Collier & Parnes, 1985 a, b, c).

Wilder and Granlund (2003) stated that, interaction is a mutually rewarding activity and is as important for caregivers who interact with children with disabilities as it is for caregivers who interact with children without disabilities. However interactions with children with physical impairment such as cerebral palsy are unique in itself. The impairment if severe has a devastating effect on the limbs leading to delayed motor milestones and impairment of speech structures. Due to this, parents of children with SSPI and CP face various challenges during the initial period of development. The typical nonverbal behaviors observed during development, even if it is present get masked by the pathological reflexes and difficulty in control and co-ordination of movements.

Communication interaction in children with severe physical disabilities is challenged by several factors. This is due to the limited ability to use behaviors such as eye gaze, motor control etc. by these children and the poor ability of the caregivers' to read these behaviors as communicative signals (Dunst & Wortman Lowe, 1986; Carter & Hook, 1998). Kraat (1985)

further suggested that, severe physical impairments from an early age, limit the infants' ability to take an active role in interactions. In spite of the attempts to communicate, the signals produced by children with SSPI and CP may be ignored or incorrectly interpreted because of their inherent unintelligibility. Depending on the configuration of the behavior (use of vocalizations, eye-gaze, and motor control of arms and hands) that convey the intent, either singly or in the combined form, there would be obvious confusion on the part of the caregivers as to how to interpret the child's behaviors and associate meanings to his/her communication intention (Iacona, Carter and Hook, 1998). The caregivers in these situations must make inferences on the basis of other available sources of information such as the context, basic understanding of the nature of the child and/or previous experiences of interacting with the child. The other option is that the caregivers or the communication partners have to adapt to other kinds of expressions (Iacona, Carter and Hook, 1998).

Certain maternal behaviors such as affective, didactic, and pragmatic behaviors have been related to a broad range of child competencies (Wallace, Roberts & Lodder, 1998). Affective qualities such as maternal sensitivity, responsiveness and warmth have been positively linked to child's cognitive and communicative outcomes. Sensitivity usually means an awareness of the child's verbal and nonverbal cues and responsiveness relates to how mothers respond to these cues in interactions with their child. Warmth is a positive affect displayed in the mother-child interactions. Thus, while interacting with such children mothers not only need to adapt to other kinds of expressions (Iacona, Carter and Hook,1998) but interpret complex nonverbal signals which involve a combination of behaviors of different configuration arranged in a particular manner (Weinberg, Gianino & Tronick,

1989). While interacting with such children, mothers need to depend on other sources of information such as context in which a behavior has occurred, previous experiences with the child and knowledge about child's preferences (Grove, Bunning, Porter & Olsson, 1999).

Maternal styles in children using non verbal communication strategies during interactions have also been an area of focus for most investigators. McCollum and Hemmeter (1997), Girolametto, Weitzman Wiigs and Pearce (1999), observed that attempts to engage children who are non communicative or whose signals are difficult to interpret, results in mothers using a directive style. Cress et al. (2000) reported that children with physical impairment do not have a clear sense of their own body movements which makes it difficult to relate their behaviors to interaction effect, which in turn leads to such maternal interactive styles. Early attempts of communication could have been unsuccessful due to parent's inability to recognize children's unusual or subtle movements as intentional or communicative in turn leading to no response. This hampers the development of communication in children with physical impairment leading them to become more passive communicators and shifting more responsibility on the partners. The passivity in these children could lead to more directive nature of mothers in the communication process wherein mothers understand the child's communicative attempts through contexts. Many investigators have supported this observation. For instance, Hanzlik (1990) found that caregivers of young children with physical impairments tend to be more directives during interactions than caregivers of children with disabilities. Cress et al. (2000) in their study observed play and parent interaction in young children with physical impairments. Though they found similar findings as that of Hanzlik (1990), they explained this directiveness to be

an appropriate compensation for children with physical impairment. Thus children who are nonverbal may exert a less dynamic influence on their language learning environment (Smith, 1998).

Regardless of various limitations faced by these children due to their condition (SSPI and CP), there also appears to be significant differences in the language input that they receive in terms of the type and amount of linguistic input they are provided. Studies by Tannock, and Girolametto (1992) and Leonard (1998) suggest that there is a possibility of an "idiosyncratic feedback cycle" in which the language delay may elicit less than optimal parental input as overcompensation, which in turn may further exacerbate the child's language learning difficulties. Children with SSPI and CP are also known to have reduced amount of linguistic input as compared to that of typically developing children. Light and Kelford Smith (1993) reasoned these differences in the linguistic input as due to indulgence of the mothers of children with disabilities and the tendency to prioritize and spend more time in physical care activities than in play and other language related skills. This in turn results in failure to develop contingency awareness, i.e. the understanding that a behavior has an effect on the environment. This also leads to failure in developing motivation to act on the environment, thereby initiating a cycle of learned helplessness (Schweigert, 1989). The long term effect of this learned helplessness is passivity in communication or even in a failure to develop intentional communication (Basil, 1992). Similarly, certain qualities of children including cognitive abilities, temperament and physical characteristics may elicit different responses from caregivers. To summarize, interaction is a bidirectional process wherein child and the mother both mutually influence one another (Sameroff, 1983). Children with SSPI

and CP have limited ability to communicate unlike the typically developing children and there is evidence to suggest that the mothers are unable to recognize these communicative signals.

There is limited information available about the development of language in terms of the functions or the modalities employed to convey these functions in young children with severe speech impairments who require augmentative and alternative communication. There is a debate as to whether children with severe speech impairments who require AAC exhibit conventional or atypical profiles of language development (Gerber & Kraat, 1992). Hence knowledge of developmental milestones seen in typically developing children cannot be applied or generalized to children using AAC systems. In the following sections, communication development in AAC users have been reviewed basically under 3 main headings:

- Communication functions in AAC users
- Modes of communication in AAC users
- Interaction patterns with reference to communication function and modalities in AAC users

7.2. Communication functions in AAC users

Conversation between non-speaking children and familiar adults is mostly controlled by the adult. Such dominance is seen mainly in the use of communicative functions. Children

provide information often as a response to an adult request, and such conversations seldom involve the exchange of new information as the adults' questions are often ones to which they already know the answer. Adults' requests for information are again restricted to children's responses as a yes/ no answer only. Other functions of communication, such as requests for information and requests for clarification are reported to occur infrequently in the conversation of non-speaking children (McConachie & Ciccognani, 1995). Light Collier and Parnes (1985b) concluded that adults tend to produce high proportion of questions, commands and requests for clarification, whereas children tended to produce yes/no answers and provide information. Pennington and McConachie (1999) conducted an in-depth analysis of the interaction between mothers and their severely physically disabled children between the age ranges of 2-10 years of age, whose speech was unintelligible, out of context compared to their parents and most of them were provided with aided communication systems. The standard play situations were video recorded using toys to elicit full range of communication skills targeted in the study. The recording was coded to show the structure of conversation, the functions used and the mode of communication during this interaction. In addition, semi-scripted conversation with the clinician as recommended by Light, Collier and Parnes (1985b & c) was also used to elicit the communicative functions. Results pointed to restricted conversation patterns in children along with maternal directiveness. Mothers initiated most of the communicative exchanges, asking many questions and issuing many requests for attention, objects or activities while children across the age range produced more response moves than any other type. Their responses contained more of yes/no answers and acknowledgements and to a lesser extent provision of information. Most of their communicative attempts, especially for simple confirmations, denials, and

acknowledgements were not completely understood and were usually followed by requests for clarifications by the mothers. Children produced a wider range of communicative functions in the semi- scripted elicitation conversation with the clinician than in conversation with their mothers. This prompted Pennington and McConachie (1999) to conclude that interaction in children with severe motor and speech impairments becomes “fossilized”. Similar findings also emerged from the study by Carter (2003) wherein three main pragmatic functions were mainly observed in severely disabled individuals who used AAC in spontaneous communication viz., reject/ protest, request and offer.

Srinivasan (2000), observed that Indian children with disabilities protested and communicated nonverbally more often than children without disabilities. The characteristic interaction sequence of most mother-child dyads included requests from mothers with the children responding for the same. Two main interaction sequences characterizing the interactions included child complying with maternal requests, reflecting the value of obedience, and mothers' responses to child requests, reflecting maternal responsiveness.

7.3. Modes of communication in AAC users

Children with cerebral palsy, especially those with severe speech and physical impairment (SSPI) often rely on AAC devices. AAC devices are modality specific, either in its entirety such as sign language or in terms of accessibility such as finger pointing to symbols on a communication board. The preference of a particular mode or combination of modes seems to depend on various parameters. Some of the parameters that have strong link

are the conditional possibilities that determine the modalities. Other parameters include factors which play an important role in the choice of modalities such as partner with whom the nonspeaking individual is communicating, proximity of the partner, familiarity with the partner, the intent that a modality is required to convey, the context in which the communication is happening and the activity which is being used to tap the communication . To summarize, nonspeaking individuals have been found to depend on unaided modes of communication more frequently than communication boards or electronic aids (Beukelman and Yorkston 1980). Various parameters determine the choice of modality in AAC users. Some of the reported parameters include:

- Demands of the situations (Blackstone & Cassatt, 1984)
- Partners in interaction (Beukelman &Yorkston, 1980; Calculator & Dollaghan, 1982)
- Communication functions expressed Light, Collier & Parnes 1985 c)

As stated by Sandberg and Liliedahl (2008), language development has its roots in non-linguistic communication and it is reasonable to argue that children with physical impairments also have an urge to interact using these non linguistic modalities. Interpretation of communication strategies through nonverbal modalities are based on the reference in which it occurs. In some children with cerebral palsy, using nonverbal strategies could be a temporary phenomenon, whereas in other cases, nonverbal strategies are the only available means of communication. Thus nonlinguistic modes of communication are used concurrently with the development of linguistic modes and in instances wherein speech needs supplementation, nonlinguistic modes of communication continue to play a vital role or tend to get replaced by speech. Kraat (1985) suggested that the choice of modality depended on

the availability or rather the possibility of choosing a particular mode. This is true in children with cerebral palsy wherein the motor limitation causes a serious hindrance in the usage of modalities. Depending on the condition, some modality could be used precisely/accurately, while others could be used easily. Some modalities are preferred over the other. The reason being some of the strategies employed might be considered unusual, or that certain communication strategies receive better responses from the communication partners. Whatever may be the communication mode, the interpretation of communicative signal depends largely on the illocutionary nature of the communicative partner to facilitate communication to be intelligible and meaningful.

There is considerable data on the modality preference in AAC users in the literature. However the emphasis in most of the studies has been on individuals with physical disabilities and primarily those where children use aided AAC (Light, Collier & Parnes 1985c). AAC users are also multimodal communicators. Communication systems of AAC users include both aided and unaided modes. It usually includes modes that have developed naturally without any formal intervention and those that have been specifically developed with formal intervention strategies. Modality preferences were also compared in various AAC users, such as communication board users versus nonboard modes (Calculator & Dollaghan, 1982; Calculator & Luchko, 1983). Blackstone and Cassatt, (1984) examined multiple categories of mode, such as vocalization and speech, gesture, sign and pointing, eye gaze, facial expression, and augmentative communication aids. Children with severe expressive impairment, used modalities such as facial expression, posture or eye gaze to communicate (Sigafoos et. al., 2000). Among the modes of communication, Light, Collier &

Parnes (1985b) observed that children with severe speech and motor impairment tended to initiate conversation using vocalization and or gesture, thus making their signals distinctive and raising their chances of attracting the listener's attention. Again, confirmations, denials, requests for objects/actions and requests for attention, which are aided by contextual information, were expressed using gesture and or vocalization.

Pennington and McConachie (1999) observed twenty children ranging from 2 years to 10 years and reported that children predominantly used vocalizations and gestures to express most of the communication signals. Vocalizations were primarily used to initiate a conversation, whereas vocalization and gestures were used to express requests for objects/actions and physical means for acknowledgements. Miller and Kraat (1984) described the attention- getting behaviors of a 5-year old boy with cerebral palsy which comprised of a combination of vocalizations and arm-pointing. Bode (1997), also indicated a reliance on gestures either singly or accompanied with vocalizations in communication acts. Among the modes of communication, Cress et al. (2003) observed contingent interactions between parents and children with severe impairments in the age range of 15-32 months. They observed that intentional communication which was mainly elicited using eye gaze and body movements were easier to detect than non intentional communication behaviors such as facial expression. Parents responded contingently to children's non vocal acts, such as body movements and gaze as compared to vocal acts, which were contrary to that observed for typically developing children. It was also observed that non verbal signals such as eye gaze, body movement and facial expressions, were used to convey needs and wants. Parents learned to interpret these nonverbal signals as communicative acts and responded to them as

they would do to the vocalizations of typically developing children. Subtle behaviors such as eye gaze, slight body movements and facial expressions were also missed out or not responded to appropriately. It was also seen that children responded most often when parents used body movement and /or vocalization to elicit responses and very rarely to eye gaze or facial expressions alone. Falkman, Sandberg and Hjelmquist (2002) in their study of 7 non-speaking children with severe cerebral palsy using Bliss symbols as the major form of AAC, observed for their mode preferences while interacting with an unknown stranger. The study revealed that a great part of communication was achieved with the usage of some form of prelingual communication (gestures, eye-gaze, or combination of eye-gaze and vocalization/gestures, and gestures and vocalization) as compared to Bliss symbols, thus supporting Light, Collier and Parnes (1985c) and Smith (1994) findings.

7.4. Interaction patterns with reference to communication functions and modalities in AAC users

Studies by Kraat (1985) and Light (1988) highlighted the uneven nature of interaction patterns in conversations between individuals using AAC and their speaking partners. Calculator and Luchko (1983) in their study found that people who use AAC systems have fewer opportunities to communicate with others and tend to occupy a respondent role during interactions with minimal responses such as yes/ no or single-word responses. (Calculator & Dollaghan, 1982). Blackstone (1999) observed that communication partners provide few opportunities for individuals using AAC to initiate conversations or to respond during conversations. Kraat (1985) emphasized that there are problems in maintaining an active role

in conversational interactions by individuals who use aided AAC. Calculator and Dollaghan (1982) agreed upon the fact that when people who use AAC systems interact with partners who are natural speakers, the turn- taking patterns tend to be highly asymmetrical with the natural speakers dominating the conversation and the augmentative communicator forfeiting many of their communicative turns, and have difficulty initiating topics within the interactions.

Light, Collier and Parnes (1985a) in their study found that adults (teachers and caregivers) produced mainly initiating moves in conversation, choosing the topics of conversations and controlling how the conversation progresses, while children produced a high proportion of responses. The findings also suggested that children mainly produced response turns, also forfeited responses that were optional and replied only when obliged to do so. Adults tended to take more turns in conversation than children, and produced more than one unit of information within each turn as compared to children who produced only one unit per turn. Thus caregivers controlled the interaction by occupying more of the conversational space, initiating more topics, dominating the turns and demanding specific responses from the children. The nonspeaking children tended to forfeit their "optional" turns in the interaction and fulfilled their communicative turn opportunities only when they were clearly obligated to do so. A lack of conventional symbol use (e.g., speech) can also result in decreased levels of linguistic input, differing styles of input (i.e., directive input instead of responsive input (Blockberger & Sutton, 2003). There is also a possibility that communicative acts of these children might be less interpretable, which in turn may elicit a type of adult response that is less specific (Calendrella & Wilcox, 2000).

Similar dominance by parents is documented in the study by McCollum and Hemmeter (1997) and Bode (1997). Rowland (1990) proposed that use of AAC might inhibit spontaneous communication by placing additional demands on partners. There is a chance of double disadvantage, as severe disability in itself could lead to lack of spontaneity or introduction of AAC could be the causative factor. However the lack of spontaneity in severely disabled individuals has not been consistently reported by all investigators (Brady, McLean, McLean & Johnston, 1995). Several factors are reported as contributing to the unequal participation by the non speaking individual. Lack of conversational experience and dependency on communication partner for message interpretation (Culp, 1982; Colquhoun, 1982), developmental constraints, which limit the physical and cognitive experiences and restricted vocabulary sets due to system or user limitations (Yoder & Kraat, 1983) are some of the factors described in the literature.

The passivity observed in AAC users during communication interaction by various investigators could be because of the physical limitation imposed by the condition (CP) or it could be because of their dependency on AAC system. To examine this possibility, Pennington and McConachie (2001) conducted a study to evaluate the effects of speech intelligibility on communication interaction in mother and children with cerebral palsy (quadriplegic). Apart from CP, children participating in this study were verbal but they differed with respect to intelligibility of their speech. Mother-child interactions were videotaped and were analyzed for conversational structures, pragmatic functions expressed and the methods of communication used. Results showed considerable difference among the two groups. Verbally intelligible children initiated more conversations and used their

communication for a wider range of functions than did non speaking children, in whom more restricted patterns of conversations were noted. There were no significant differences observed between two groups of mothers, who initiated most of the conversations and who took the responsibility of terminating the conversation. Corresponding results were also observed with other types of speech and language impairment (Hansson, Nettelbladt & Nilholm 2000) and children with Down syndrome (Pino, 2000). This partly supports the findings of Rowland (1990) indicating that passivity in children with disability could be due to their dependence on AAC system, as compared to the condition itself. Pennington, Goldbart, and Marshall (2004) reviewed all studies on communication training for conversational partners of children with cerebral palsy and also evaluated the effectiveness of this type of intervention. Majority of the studies focused on issues related to positioning of the conversational partner and child for interaction, creating communication opportunities and responding to children's communicative signals. There were significant changes observed in the conversation patterns used by conversational partners, which facilitated the communication of children with cerebral palsy. Some of the limitations of the study included the way the subjects were described, or lack of defined criteria for eligibility, small sample size, validity of measurement tools and lack of follow up to describe maintenance of new communication behaviors. The study however threw light on the interaction between training for conversational partners of infants and older children with CP, and changes in communication of the people trained and the children with whom they interacted.

To summarize, most of the communicative functions are often evident in mothers who tend to occupy a dominant role in conversation. However communicative styles need to

be addressed with caution since the question of whether the communication dominance by mothers facilitates or inhibits communication development is not clear, as equivocal observations are made in the literature (Tomasello & Farrar, 1986 and Akhtar, Dunham & Dunham, 1991). Basil (1992), on the other hand observed that a communicative style that is both directive and responsive has more potential to enhance communication development rather than any of them singly. This is especially important in the context that social interaction involves a partner, who is more sensitive and who responds in a much better fashion. However generalization of the findings of the study was limited because the "communicative effectiveness" was not clearly defined. It could be that partners responded to communicative acts or accepted the content of communication rather than viewing the appropriateness of the outcome of the particular act to the pragmatic function. *(e.g., requesting and rejecting would cause delivery or removal of objects).*

Access to the use of any modalities depends on the preference of individuals, situations, and the motivation of the user. A critical review of research findings by Farrier, Yorkston, Marriner and Beukelman (1985) revealed numerous variables such as turn regulation, topic maintenance, communication functions/intents, modality used, grammatical forms, and message transmission rates as important in describing the patterns of communication interaction in augmentation system users and their partners. Studies by Beukelman and Yorkston, (1980); Calculator and Dollaghan, (1982), Buzolich, (1983), and Calculator and Luchko, (1983) follow the same trend. Non speaking communication augmentation users demonstrated minimal conversational control with speaking partners directing the interactions. Non speaking users generally were single word responders, have

restricted ability to obtain and maintain turns with limited communicative function range. They also had limitations in using the alternative modes optimally.

8.0. Communication behaviors in mother-child interactions

Evidence accumulated from reports on communication patterns (functions and modalities), interactional issues in typically developing children and in children with disability specific to cerebral palsy have contributed to the better understanding of the interactional style evident in mother-child communication interaction in children with SSPI and CP. However most of the studies need to be examined and interpreted with caution due to numerous reasons.

8.1. Assessing communication skills in children with SSPI and CP

A common practice during assessment of individuals using AAC is to report a child's developmental age based on a comprehensive assessment of skills across domains. Usually the developmental age is considered based on the individual's performance on motor, social, adaptive, communicative and cognitive skills (Ross & Cress, 2006). However investigators (Cole, Dale & Mills, 1992; Ross & Cress, 2006) in the area of AAC opine that use of such a procedure adopted to arrive at a developmental score tend to presume that there is parallel development across domains and language skills are also reflected in the nonverbal cognitive skills. Children who are nonverbal may have intact receptive language skills that could be masked by the poor abilities of expression or it could be that they have significant limitations

in the comprehension (Roth & Cassatt-James, 1989). Ross and Cress (2006) observed that receptive communication measures were significantly greater than both the cognitive (mental age) and overall developmental scores (developmental age). Traditional tools used for the assessment of verbal comprehension in communication are also used for assessment of comprehension in AAC users. Assessments involving such tools which consist of verbal items are based on the notion that language development follows the same pattern as in typically developing children. Further, scores obtained on such tools help to infer on how delayed the comprehension of an AAC user is from that of a typically developing child. However professionals dealing with children using AAC are apprehensive of the similarity if any in the development of speech in these children. Depending on the causative factors, children might be dependent on AAC for lifetime and assessing them on a tool which is sensitive only to verbal language development could be 'under-representing' their ability. Hence, Light (1989) has stressed on the importance of more constructive approaches in the evaluation of communication competence of individuals using augmentative and alternative communication systems, rather than comparing them against the established benchmarks used for typically developing children. Children with cerebral palsy are known to use idiosyncratic and unconventional communicative behavior. It is thus important for investigators to familiarize themselves with such behaviors before assessing them. Training, previous experiences in handling children with cerebral palsy, understanding behaviors that are communicative would ease the judgment and provide more reliable and valid results. These findings also hold true for the assessment of cognitive functions in children with severe expressive communication impairments who are at risk for being nonspeaking including children with cerebral palsy (Ross & Cress, 2006).

There is a dire need for tools/ tests for assessment of communication comprehension and expression in AAC users. The use of checklist for observation by parent and use of alternate activities to assess children's communication comprehension and expression is often recommended as alternatives and provide a better option. Kraat (1991) opines that investigators should view the communication patterns of AAC users as consisting of both "conventional and atypical developmental profiles". They should consider the use of a model of normal language acquisition in conjunction with other manifestations that may be more sensitive to the assessment of unique patterns seen in these children (Letto, Bedrosian, & Skarakis-Doyle, 1994).

8.2. Methodological issues:

Mother-child interaction in typically developing children, children with delayed speech and children with developmental delay have been extensively reviewed in the literature. Among the variables, effects of the condition of the child and the kind of language stimulation provided to the child have also been studied. Some of the contextual variables as investigated by Wetherby and Rodriguez (1992) to influence children's language include the:

- child's relationship to and familiarity with the partner;
- age of the partner relative to the child's age;
- interaction style used by the partner and
- types of toys/materials and activities used

8.3. Sampling techniques.

Procedures used to sample communication or to elicit communication in most of the studies range from free play contexts (Coggins & Carpenter, 1981), to structured situations. Investigators examining communication in typically developing children or children with developmental disability often have measured these in naturally occurring events between children and their conversational partners (Golinkoff, 1986; Yont, Hewitt & Miccio, 2002). Information on mother-child interaction is usually based on video recording of free play or structured play situation. Free play situation mimics a naturalistic situation and is representative of the communicative interaction which occurs daily. However a free play situation has the drawback of missing out a particular function due to its non occurrence during testing. Secondly, the presence of the investigator, video camera, recording context are potential threats for free play. To carry out a video recording in a comprehensive and reliable manner is often difficult. The process of video recording is in itself a disruption of the naturalness of ongoing interaction. Structured play on the other hand allows viewing a set of responses. The materials and activities are pre-fixed and provide maximum chance of occurrence. As Wetherby and Rodriguez (1992) stated, there are several possible advantages of using structured sampling procedure over free play. Firstly, it can be replicated more easily, thus lending itself to standardization. Secondly, in certain children, such sampling procedure could be instrumental in initiating communication. Thirdly, it is less time consuming as compared to sampling procedures using free play. Structured play responses are easily codable and provides less challenges to the interpreters. It could be easily replicated and standardized. The biggest disadvantage however lies in the fact that structured

play is under the total control of the investigator. Communication is a spontaneous process. In structured sampling procedure, a particular response is paired with a particular stimulus, and is not usually accounted for if it is present in response to other stimulus. Thus there is a danger in missing out such spontaneous responses. Depending on the parameters being studied, investigators feel the need to choose between free play vs. structured play. Based on which functions are assessed during communication, Coggins, Olswang and Guthrie (1987) suggest that structured procedures are more effective for sampling requests while unstructured procedures are more effective for sampling comments from young children. Regardless of the procedure being used, a failure to initiate a reasonable proportion of intentional acts when ample opportunity is provided may signal a communicative impairment.

Light (1988) based on her review of literature on available communication interaction feels that there are numerous methodological limitation such as small sample designs, descriptive studies across contexts, variation in subject selection (congenital , children vs. adults), partners in interactions and measures used to evaluate such interaction. Hence findings from most studies need to be applied with caution.

9.0. Attitudes of mothers and its relationship to communication behavior

It is evident that parents / primary caregivers play an important role in the early communication development of children with SSPI and CP. There has also been increased

interest in involving parents / primary caregivers in intervention for such children. However there have been very few attempts on the part of speech and language pathologists to explore the basic views and opinions of parents towards the speech and language difficulties of their children which could further have an impact on intervention (Glogowska, 1998). To support this, Glogowska (1998), conducted a qualitative method to evaluate the beliefs and ideas of parents about their pre-school children's speech and language difficulties. The investigation revealed that though parents agreed that there is a slow progress in the speech and language development of their children, they apparently felt that the particular skill would eventually develop over a period of time. Most parents in the study felt that among medical conditions, hearing loss is the primary causative factor for speech and language delay. However they also felt that one factor by itself did not lead to difficulties. Parents' also stressed on the significant contribution of child's environment (kind of stimulation, rearing style etc) in shaping the speech and language development. The child's personality and emotional characteristics were also considered to play an important part in language development. Some other factors pointed by parents as contributing to speech and language skills were birth order, presence of older/younger siblings, gender of the child and their own belief towards the condition.

In the area of attitudinal research to date, investigational attention has often focused on the characteristics of typically developing individuals, individuals using AAC, the various AAC systems and their influences on the speaking partner. In most of the studies, among the many variables studied, the effects of age, gender, previous experience with individuals with disabilities, and attitudes of partners and AAC users have received more focus. Beck, Fritz,

Keller and Dennis (2000) reported that grade 3 children had more positive attitudes towards AAC users than Grade 5 children. Beck, Bock, Thompson and Kosuwan (2002) however found no difference in children's attitudes in Grade 4 versus Grade 5. Similarly females reported to have more positive attitudes towards AAC user than males (Beck & Dennis, 1996; Beck et al., 2000, Beck, Kingsbury, Neff, & Dennis, 2000; Lilienfeld & Alant, 2002). Beck, Fritz, Keller and Dennis (2000) found significant correlation between age and gender. Boys in grade 1 reported more positive attitudes towards AAC users than girls. To evaluate whether experience with individuals with disabilities played a significant role in the attitudes of individuals towards AAC user, Beck and Dennis (1996); and Beck, Kingsbury, Neff & Dennis (2000) reported that children in integrated schools reported more positive attitudes than those in non integrated schools. This could be because of the familiarity and the experience of typically developing children in communicating with children with communication difficulties. Among the various systems used for communication (aided vs. unaided), Blockberger, Armstrong, O'Connor and Freeman (1993); and Beck, Kingsbury, Neff and Dennis (2000), found no significant difference in variation in attitudes towards the kind of system used. This suggested that an AAC system is probably not the only factor contributing to the attitudes towards individuals using AAC.

Most of the studies have contributed significantly towards an understanding of attitudes towards individuals with disability and towards the use of AAC. The knowledge that attitudes play an important role in selection, usage and success of communication itself is noteworthy. Investigations have provided insight into various factors that result in attitudinal barriers which in turn can hinder successful communication. The major limitations

in most of the studies which evaluate attitudes towards AAC users are that the stimulus used generally a short videotaped interaction using a predetermined method with an AAC user. For instance, in a study by Blockberger et al. (1993) and Beck and Dennis (1996), the AAC user was either a genuine individual with disability requiring AAC and in another study by Gorenflo and Gorenflo and Santer (1994) an individual without disability simulated the use of AAC. The extent to which the person using AAC are viewed by the observers also differed. Studies conducted by Beck, Fritz et al. (2000), Beck, Kingsbury, Neff and Dennis (2000); Beck, Bock, Thompson and Kosuwan (2002) used only the display of the hand which gestured the selected stimuli. The drawback of this study is the difficulty faced in evaluating attitudes of the individuals towards the communication system or the individual with disability as only a part of the communication device was visible. Attitudes vary with the partner involved in conversation, topic discussed and also the way the interactions are measured (video recording vs. live interaction). The variations in scales limitation is the scales used to measure attitudes can also contribute towards limitation.

There is substantial clinical evidence to suggest that positive outcomes are highly influenced by family involvement during assessment and intervention (Angelo, Kokoska & Jones, 1996). In spite of this, there is limited attention paid to the role of a parent specifically the mother and their influence on AAC outcomes. Given the significant role of family involvement in predicting and shaping the successful outcomes, it is necessary for the professionals to recognize the importance of the family (Angelo, Jones & Kokoska, 1995). With growing interest in family centered interventions (Andrews & Andrews, 1993), evolving the trend in intervention is to focus on family rather than the child. Since the child is

a part of the family; and disability and intervention process channeled towards rehabilitation has its impact not only on the child but the family as a whole, the focus of professionals needs to be on the needs of the family rather than only on the child requiring professional help. Professionals need to understand the needs, priorities, preferences and expectations of mothers which are the main contributing factors in the success of AAC.

There is again paucity of information regarding the attitudes of families, especially towards disability and in specific, towards cerebral palsy and issues related to cerebral palsy. Attitudes arise from specific experiences and emotions driven by cultural beliefs. In India, disability is still viewed as "tragedy" and the birth of a disabled child is viewed negatively (Vijesh & Sukumaran, 2007). Cultural beliefs about disability play an important role in determining the way in which the family perceives disability and the kind of measures it takes for prevention, treatment and rehabilitation (Sen, 1988). Gambhir, Walia, Singhi, and Prashad (1993) in their evaluation of attitudes of mothers towards children with spastic cerebral palsy in the Indian context found that the severity of disability and the IQ of children were some of the highly influencing factors. Mother's education, family income, occupational status, type of habitat had a significant contribution but were less correlated with the mother's attitudes while age, sex of the child and type of family did not influence mothers' attitudes. Cerebral palsy is invariably associated with many co morbid deficits such as mental retardation, speech and language and oromotor problems leading to feeding difficulties, motor and various sensory issues. A thorough understanding of the long standing, attitudes and beliefs would essentially aid in better explaining the dyadic interactional behavior between mother and their children with disability.

Summary:

This study aims to understand the dyadic communication interaction between the mothers and children with SSPI and CP. The primary aims of the study are to explore the different kinds of functions used by mothers; and describing the functions and modalities used by children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) during communicative interactions with their mothers; and the choice of modalities to indicate different functions. Finally it attempts to investigate if mothers and children with SSPI and CP displayed identifiable responsive styles during these interactions. The secondary objective of the study is to explore the attitudes of mothers towards various issues encountered in children with cerebral palsy. The findings of this study would be beneficial in understanding of communication behaviors in mothers and their children with SSPI and CP especially in the Indian scenario.

METHOD

The aim of the study was to analyze communication interactions of children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) with their mothers during instructed play. The primary objectives were to study:

- 'Communication functions' used by mothers and children with SSPI and CP
- Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.
- 'Communication modalities' used by the mothers and children with SSPI and CP.
- Responses of mothers and children with SSPI and CP to the 'communication modalities' used by each in the dyad.

The secondary objective of the study was to understand attitudes of the mothers towards various issues concerning their children with SSPI and CP, in order to gain insight into:

- how Indian mothers view their children's disability; specifically communication impairment linked to SSPI and CP,
- their sensitivity towards physical limitation that the condition imposes and their concerns about the condition and prognosis.

Participants

The participants were selected from various rehabilitation centers for children with physical impairment of neurological origin. Informed consent was obtained from mothers

prior to their inclusion along with their children in the study. Ten mother-child dyads participated in the study.

The following common criterion for inclusion of the participants (mother-child dyads) was adapted.

Language: The dyads spoke Kannada language (Kannada is a Dravidian language spoken in Karnataka, one of the southern states of India).

Socio-economic status: Dyads belonged to middle socio economic status [as on the adapted version of NIMH Socioeconomic status scale (NIMH, 1994)].

Specific inclusion criteria for children in the dyad:

Age: Children in the dyad consisted of 7 males and 3 females between the age ranges of 2; 1 to 3; 11 years (mean age range of 2.8 years).

Diagnosis: Children were diagnosed as having severe quadriplegic cerebral palsy (as per the evaluation of a medical and paramedical professional). Children were assessed for development quotient using Developmental Screening Test (DST), (Bharathraj, 1983) and were diagnosed as having profound developmental delay. They were not independently mobile and required assistance for most of their self-help skills.

Language: Receptive language of the children was assessed using 'Assessment Checklist for Speech and Language Skills' (Geetha, 2007). Based on the assessment checklist, the receptive language abilities of the participants were found to be within ± 3 months of their chronological age. The test by Geetha (2007) assesses for the verbal expression, and hence expressive language in the participants could not be assessed using this test. Currently, there

are no standardized Indian language tests for assessing nonverbal expressive language in the given age group. Hence a checklist was prepared to specifically assess the nonverbal receptive and expressive language skills in children included in the study. The checklist (Appendix A) was prepared based on items and guidelines from 'The nonspeech receptive and expressive language scales by Huer (1988)'. Receptive and expressive language in children was screened using the checklist by interviewing the mothers and observing the children during various rapport building and desensitization sessions**.** A note was also made on the choice of modality by the children using the checklist. Nonverbal communication was the predominant mode of communication in all these children, with instances of vocalization using few vowels and vowel-consonant combinations.

Intervention: Most of the children were enrolled in treatment programs for medical and/or physical therapy. None of the children in the dyad had undergone formal speech and language therapy except one participant who attended speech and language therapy for duration of a month.

Medical issues: As reported by parents, none of the children participating in the study presented any history of hearing or visual impairment or any other medical condition that warranted medical attention. Four out of ten children were on medication for controlling their seizure.

Specific exclusion criteria for children:

- Children with hearing and visual deficits (based on parental and other professional reports) were excluded from the study.
- Children with uncontrolled seizure disorder were also excluded from the study

Specific inclusion criteria for mothers in the dyad:

- Mothers involved in the study were in the age range of 21-30 years (mean age range of 25 years) and had a minimum qualification of 12th grade.
- None of them presented any history of sensory issues.
- None of the mothers had any speech and language impairment.

Demographic data of mother-child dyad, type of cerebral palsy (CP) and details of intervention are listed in table 1.

Table 1: Demographic details of mother-child dyads

Sl. No.	**Age of children (Yrs)**	**Diagnosis of the children**	**Age of the mothers (in years)**	**Education of mothers**	**Duration of Speech & Language intervention of children (in months)**	**Duration of Physical therapy/Early intervention of children (in months)**
1	2; 1	Spastic quadriplegic	29	Graduate	0	2 months
2	2; 2	Spastic quadriplegic	26	Graduate	0	8 months
3	2; 3	Spastic quadriplegic	23	12th grade	0	3 months
4	2; 4	Spastic quadriplegic	25	12th grade	0	4 months
5	2; 8	Dyskinetic quadriplegic	25	12th grade	0	8 months of overall stimulation
6	3; 0	Spastic quadriplegic	25	12th grade	0	9 months of overall stimulation
7	3; 7	Dyskinetic quadriplegic	28	Graduate	0	8 months
8	3; 9	Spastic quadriplegic	27	12th grade	0	2 years of overall stimulation
9	3; 11	Spastic quadriplegic	21	12th grade	0	1 yr of overall stimulation
10	3; 11	Spastic quadriplegic	25	12th grade	1	8 months of inconsistent therapy

Procedure

Materials: Toys and activities suitable for children in the selected age range were included. Guidelines from '*Toy kit for children with developmental disabilities'* (Venkatesan, 2003) was also taken while choosing the toys and activities. Dyads meeting the eligibility criteria were included in the study. The toys included were ball, building blocks, kitchen set, car, noisemakers, marker pens, doll and accessories of doll, papers, flash cards and picture books.

Tasks: Mothers were instructed on how to use a particular toy. They were encouraged to be more creative if they liked while handling a particular toy.

Rapport building, desensitizing the dyads and trial recording: The instructed play between mother-child dyads were video recorded. Prior to the actual recording, the investigator observed the dyads in various situations such as feeding, sessions by the early interventionist/physiotherapist or during the waiting period when they had to consult a professional. These observatory sessions helped the investigator in building rapport with the dyad and to profile the child's communication strategies. Few sessions of feeding, physiotherapy/infant stimulation and play were also video recorded to:

- desensitize the dyad with the video recording procedure and for the physical presence of the investigator during video recording and
- help overcome shyness / fear if any during the recording procedure.

A minimum of 2 trial recordings of interactions per child were carried out with different set of toys for familiarizing the participants to the testing procedure and desensitizing the participants towards the camera. Mother-child dyads were aware of the recordings being conducted.

Set up: A room/section of a room which was fairly quiet, with minimal distractions and where the camera could be arranged was selected for the recording purpose. In most instances, the camera was placed in a suitable place for recording and was not personally handled by the investigator. The selected toys were provided to the dyad.

Recording: Mothers were instructed to interact with their children as they would normally do at home using the toys and materials provided to them. Mother-child communication interaction was video recorded for 15-20 minutes in a comfortable setting during instructed play situation (with limited distractions). Four interactive sessions of fifteen minutes each were recorded in order to provide maximum opportunity for the occurrence of communication functions and to rule out the contextual limitations if any (as in selection of a particular toy). Consecutive recordings were carried out on different days. A minimum gap of a week's duration between the recordings and not more than a month's gap between the recordings were maintained for video recording of all the dyads. No feedback of any kind was given to the dyads in between the recordings.

After the recording sessions were completed, a semi-structured interview using a detailed questionnaire specifically prepared for the purpose (Appendix D) was used to obtain

mother's views about various factors contributing towards the acceptance of a communication system and towards communication efficiency. Questions addressed specific issues such as the mother's knowledge about children's nonverbal communication and how their children indicated needs, their children's responses, strategies that mothers preferred to improve understanding of their children's attempt to interact, impact of physical disability of their children on various developmental milestones, prognosis of their children, their (mother's) role in developing speech in their children and impact of encouraging nonverbal communication in their children. It was ensured that all statements in the questionnaire were simple and could be easily understood by the parents. Most of the questions were close ended requiring yes/no responses from the mothers. They were also given the freedom to be descriptive wherever possible. Wherever required, mothers were encouraged to ask for any clarifications/queries regarding the questions. Before conducting this semi-structured interview, mothers were informed that the investigator would note down any discussion with the investigator with regard to the questionnaire addressing issues about their children.

Phase I: *Transcription and coding*

- The first step involved the investigator viewing all the recorded data. Video recorded data were evaluated for the presence of any technical errors in recording such as lighting issues, clarity in the audio and comprehensiveness of recording. If the sample data was found to be inadequate in these respects, recording was repeated in such instance. Recording of three dyadic sessions had to be repeated due to such reasons and were then included in the study.

- The second step involved the investigator carefully viewing the videotaped sessions and transcribing in entirety the mothers' communication interaction strategies. Communication interaction was operationally defined in this study as an event that involved the mother and child employing either verbal (mother) or nonverbal (mother/child) strategies for communication. They were then segmented into communicative utterances. Counting and singing were excluded from analysis as these were not considered as communication intent (Kloth, Janssen, Kraaimaat & Brutten, 1998). Mothers used both verbal and nonverbal strategies to interact with their children, in order to understand the use of communication strategies by mothers. Thus the communication functions as used by mothers in this study was listed as those including verbal, nonverbal or combined strategies whichever was applicable at that instance. The children with SSPI and CP participating in this study were nonverbal. Hence, communicative strategies used by these children included only the nonverbal strategies. These nonverbal strategies were not identified at this stage by the investigator as transcribing these nonverbal strategies would provide details of the modalities which had to be later coded by trained judges.

Phase II: *Selection of judges and training*

Two professionals, who were post graduates in speech and language pathology and had a minimum of 2 years of experience in intervention of childhood language impairment, were selected.

Few assessment procedures are available to assess communication interaction. In the literature, taxonomy to comprehensively describe the detailed communication interactions of children who are nonverbal with their mothers (especially in children with cerebral palsy) is limited. Hence the taxonomy to describe communication interaction in dyad involving children with SSPI and CP in this study was compiled after reviewing studies cited in literature (Dore, 1974; Halliday, 1975; Lasky & Klopp, 1982; Della Corte, Benedict & Klein, 1983; Light, Collier & Parnes, 1985 b & c; Wetherby, Cain, Yonclas & Walker, 1988; Pennington & McConachie, 1999; Falkman, Sandberg & Hjelmquist, 2002; Iverson, Longobardi & Caselli, 2003). The taxonomy developed included various functions and modalities of communication interaction. The judges were familiarized with the operational definitions provided in the taxonomy for various communicative strategies used by the mothers and children (See Appendix B & C).

A sample video recorded clip of a 6-year-old child meeting all the criteria as specified for children included in this study, except for the age was selected for practice purpose. This recording was used to familiarize and train the judges with respect to the terminology and coding procedure. Both the judges were trained for a period of 4 hours. This training session was carried out with two main purposes. Firstly, this provided enough opportunity and practice for the judges and secondly, it permitted ample discussion with the investigator to familiarize them with the actual coding procedure.

The recorded samples were played to both the judges independently. The two judges were not allowed to discuss or elaborate in any form about the judgment task either before or

after the judgment task. The two judges viewed the communication interactions independently and coded the dyadic communication interaction for functions, modalities and responses of mothers and children. The investigator also participated as the third judge in the coding process.

Phase III: *Coding procedure*

Initially, the judges viewed the recording of each dyadic session at least 2-3 times to get an idea of the complete interaction. They utilized the transcription (carried out by the investigator) along with the taxonomy provided to them during the training phase as the bases for coding the communication interaction in the dyad. They were instructed to code the communicative strategies (which included verbal/nonverbal strategies or combination of both, whichever was observed at that instance) of the mothers and the nonverbal communication strategies used by children with SSPI and CP with their mothers during the instructed play. Judges coded the communicative strategies of the dyad across each transcribed communicative act. This coding required subjective judgments by the judges based on the context of the interaction in the recording. The judges coded the following:

- 'Communication functions' employed by mothers and their children,
- 'Communication modalities' employed by the children with SSPI and CP ,
- Maternal responses to the communication functions and communication modalities of children and
- Responses of children to mother's communication functions and modalities.

Judges viewed the recording completely once again to reconfirm and evaluate the coding for the communication strategies of mothers and children. Both the judges carried out this procedure separately, with the investigator helping them with the technical aspects of the recorded samples like switching off the sample at a particular point so that they could code the utterance. No discussion with the investigator regarding the coding was entertained during this process. The investigator coded the communication strategies as the third judge separately after the transcription was carried out. It was also ensured that the investigator carried out the coding prior to the other judges to avoid biasing (as the investigator assisted the other two judges in the technical aspects)

Phase IV: *Scoring*

Interactions between mothers and children with SSPI and CP were coded for this study. Communication acts included two components: function or meaning (request, denial) that the mother/child intended to convey and the actual behavior or means (e.g., vocalization). Verbal and nonverbal communication strategies of mothers; and children being nonverbal, nonverbal strategies of children were analyzed in detail for specific behaviors.

Communicative act was scored on the following dimensions:

Dimensions	Descriptions
Communication functions (Mothers and children with SSPI and CP)	Communication functions coded in mothers' and children's repertoire included: • Request for information (general) • Request for information (yes/no) • Request for attention • Request for objects • Information

	• Instruction for action • Instruction for speech • Confirmation • Denial
Communication modalities (Mothers and children with SSPI and CP)	Communication forms coded in children included: a. Vocal gestures • Vocalization • Verbalization b. Eye gestures • Looking at object • Looking at person • Looking at location • Combination of looking at object/person, location • Eye blink c. Facial gestures d. Part body gestures • Showing • Pointing • Ritualized e. Combination gestures: • Sequential (sequential usage of any of the above combination) • Simultaneous(simultaneous usage of any of the above combination)
Frequency of occurrence	The number of instances of each functions employed by mothers and children; and modalities employed by the children.
Responses (mother and child)	Responses were defined as a behavior that occurred in the receiver following the partner's communicative act and linked to the sender's preceding communicative act and /or when some component of the communicative act consisted of initiation by the sender. This involved responses/no responses or communicative acts that did not warrant any responses.
Frequency of occurrence of *responses (mother and child)*	The number of instances of responses or no responses or communicative turns that did not warrant any responses.

The definitions used to code communicative functions and modalities are described in detail in Appendix B and C.

Inter and Intra-judge reliability

1. *Inter-judge reliability for transcriptions*: Transcription of the video recorded dyadic interaction carried out by the investigator (judge 3) was given to the other two judges (judge 1 and judge 2) to assess for the reliability of the transcription. Word to word comparisons between the transcriptions by the investigator and the judges 1 and 2 was carried out and verified using alpha co-efficient. 96% reliability was observed for transcription between judge 1 and investigator and 95% between judge 2 and investigator. Wherever required, after mutual discussion with the judges, the investigator incorporated the changes in the transcriptions.

2. Inter-judge reliability for communication functions and modalities: The entire data coded by the three judges was subjected to inter-judge reliability using alpha co-efficient for the following:

- Communication functions,
- Communication modalities
- Responses of mothers' for the functions and modalities employed by children with SSPI and CP and
- Children's responses to functions and modalities employed by the mothers'.

Inter-judge reliability using alpha co-efficient for the communication functions and modalities were calculated and are presented in table 2a. Inter-judge reliability for responses of mothers' and children for various functions used by each in the dyad are presented in table 2b and inter-judge reliability for the responses of mothers' and children for various modalities used by each in the dyad are presented in table 2c. The inter-judge reliability for functions, modalities and responses were considered to be acceptable for analysis.

Intra-judge reliability: Intra-judge reliability was established for the three judges by coding the communication functions, modalities and maternal and children's responses of the two randomly selected dyads for a second time. The re-coding was carried out 8 months after the initial coding. Intra-judge reliability scores for the two dyads are given in table 3. The intra-judge reliability scores varied from 81%-98%.

Table 2a: Inter- judge reliability scores (%) for functions and modalities (mothers and children)

Communicative act Inter-judge	Functions (N=10)		Modalities (N=10)	
	Mother	Children	Mother	Children
Judge 1& judge 2	99%	89%	76%	79%
Judge 2 & judge 3	96%	86%	78%	80%
Judge 1 & judge 3	96%	85%	78%	80%

Table 2b: Inter- judge reliability scores (%) for responses of mothers and children for various functions used by each partner in the dyad.

Communicative act Inter-judge	Mothers responses (N=10)			Children's responses (N=10)		
	Responses	No responses	Turn that does not warrant any response	Responses	No responses	Turn that does not warrant any response
Judge 1 & judge 2	81%	80%	89%	78%	76%	76%
Judge 2 & judge 3	80%	79%	88%	77%	74%	75%
Judge 1 & judge 3	81%	81%	86%	71%	75%	74%

Table 2c: Inter- judge reliability scores (%) for responses of mothers and children for various modalities used by each partner in the dyad.

Communicative act Inter-judge	Mothers responses (N=10)			Children's responses (N=10)		
	Responses	No responses	Turn that does not warrant any response	Responses	No responses	Turn that does not warrant any response
Judge 1 & judge 2	86%	81%	99%	76%	78%	76%
Judge 2 & judge 3	84%	80%	98%	74%	77%	79%
Judge 1 & judge 3	81%	81%	98%	78%	71%	74%

Table 3: Intra-Judge percent reliability scores

Intra-judge Dyad	Judge 1		Judge 2		Judge 3	
	Functions	Modalities	Functions	Modalities	Functions	Modalities
Mother (n=2)	97%	85%	97%	83%	98%	84%
Child (n=2)	85%	81%	81%	81%	85%	83%
Mothers' responses (n=2)	96%	81%	95%	82%	97%	82%
Children's responses (n=2)	83%	82%	81%	81%	83%	82%

The frequencies of occurrence of nonverbal communicative strategies in terms of communication functions and modalities in mothers and children with SSPI and CP were coded. Total scores obtained for communication functions and modalities in mothers and children with SSPI and CP were calculated for all the four recordings, for all the ten participants by the three judges. Mothers' responses to various functions and modalities employed by children with SSPI and CP and children's responses to mother's communication functions and modalities were also coded.

Data analysis

Communication interaction was analyzed based on communicative functions and modalities employed by mothers' and their children with SSPI and CP during dyadic interaction.

Communicative functions: A set of analyses was carried out as follows:

- Frequency of occurrence of different communication functions (*requests, information, instruction for actions, instruction for speech, denial and confirmation*) coded by the three judges for each recording for each dyad was calculated.
- Mean scores for all the functions coded by the three judges were calculated and used for further analyses.

Communication modalities:

- For each mother and child, frequency of occurrence of different communication modalities employed (vocal, eye, facial, part body and combination gestures) as coded by the three judges for each recording for each dyad was calculated.
- Mean scores for the modalities coded by the three judges were calculated and used for further analyses.

Mothers and children's responses to various functions and modalities employed by each partner in the dyad were also coded as follows:

Responses were categorized under three main categories:

- Communicative turns (functions and modalities) that warranted and successfully gained a response and coded as '*response*'.
- Communicative turns (functions and modalities) that warranted a response but did not succeed in getting a response were coded as *'no response'*.
- Communicative turns (functions and modalities) that did not warrant a response from the partner in the dyad were coded as '*not expected*'.

The frequency of occurrence of communication functions and communication modalities used; responses towards the communication functions and modalities used by each partner in the dyad were calculated and tabulated. Profiling of modalities to depict various communication functions in children was also carried out. Results obtained were depicted graphically wherever possible using the statistical software SSPS 16.

The secondary objective of the study was to describe how Indian mothers' viewed their children's disability; specifically communication impairment linked to SSPI and CP, their sensitivity towards physical limitation that the condition imposes and their concerns about the condition and prognosis. To meet this objective, a semi structured interview for questionnaire (Appendix D) was carried out by the investigator. Mother's responses on this questionnaire were noted down and were later categorized under ten subheadings namely:

- Indicating needs by their children
- Various functions utilized by their children
- Responses from children for various maternal functions
- Modalities that facilitate understanding of the communication attempt of children
- Impact of physical disability in children in various spheres of development
- Prognostic expectations by mothers about their children's condition
- Role of various strategies in rehabilitation
- Concerns that mothers' have about their children
- Knowledge about aids
- Impact of nonverbal communication in later communication development

Responses of each mother were calculated and discussed. Further, qualitative comparisons were carried out between maternal responses on the questionnaire versus judges coding for the three main parameters namely:

- communication functions in children
- communication modalities in children
- children's responses for mother's communication functions

Mothers' responses to the questionnaire were analyzed to understand the maternal attitudes towards various issues in children with SSPI and CP as well as their knowledge about the condition. Variations in responses of mothers' on the questionnaire versus the communication acts at as coded by the judges were presented with respect to two main parameters namely:

- communication functions and modalities employed by children with SSPI and CP and
- children's responses to various communication functions by the mothers.

The results as obtained under two main sections are presented and discussed in the next chapter.

RESULTS AND DISCUSSION

The study aimed to analyze communication interaction in mothers and children with SSPI and CP. The primary objective of the study was to analyze communication interactions of children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) with their mothers during instructed play. The findings of the study are presented under 2 sections (Section A and B) and further reported as follows:

Section A:

Section I: 'Communication functions' used by mothers and children with SSPI and CP

Section II: Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.

Section III: 'Communication modalities' used by the mothers and children with SSPI and CP.

Section IV: Responses of mothers and children with SSPI and CP to the 'communication modalities' used by each in the dyad.

Section B:

The secondary objective of the study was to describe the attitudes of the mothers in the dyad towards their children's disability. It specifically aimed to study issues linked to SSPI and CP in terms of:

- Indication of needs by their children
- Various communication functions utilized by their children

- Responses from children for various maternal functions
- Modalities that facilitate understanding communication attempts of children
- Impact of physical disability in children in various spheres of development
- Prognostic expectations by mothers about their children's condition
- Role of various strategies in rehabilitation
- Concerns that mothers have about their children
- Knowledge about aids
- Impact of nonverbal communication in communication development of their children

Section A

Section I. Communication functions used by mothers and children with SSPI and CP

Various communication functions used by mothers and children with SSPI and CP were coded by the judges, based on a defined taxonomy (Refer Appendix B) provided to the judges. Communication functions used by the mothers during interaction with their children were coded and tabulated. Table 4 depicts the presence/absence of various communication functions used by mothers (represented as M1 to M10) as coded by the judges [(+) = presence and (-) = absence]. As observed in table 4, among the various communication functions, all the ten mothers used *request for information (general)*, *instruction for action, request for attention, provision of information* and *confirmation* during interaction with their children. *Instruction for speech* was not used by M1 and M4

while *denial* was not used by M1 and M6. *Request for information (yes/no)* was used by all the mothers except M4. *Request for object* was not used by M1, M3, M4, M6, M7, M8 and M10.

Communication functions used by children were also observed during dyadic interactions. Table 5 depicts the presence/absence of various communication functions used by the children (represented as C1 to C10) as coded by the judges [(+) = presence and (-) = absence]. As observed in table 5, all the children used provision of information while the other functions were variably used in the communication repertoire of children as compared to mothers.

Table 4: Presence or absence of communication functions used by mothers

F / M	RI(G)	RI(Y/N)	RA	RqO	Info	Ins(ax)	Ins(sp)	Conf	Den
M1	+	+	+	-	+	+	-	+	-
M2	+	+	+	+	+	+	+	+	+
M3	+	+	+	-	+	+	+	+	+
M4	+	-	+	-	+	+	-	+	+
M5	+	+	+	+	+	+	+	+	+
M6	+	+	+	-	+	+	+	+	-
M7	+	+	+	-	+	+	+	+	+
M8	+	+	+	-	+	+	+	+	+
M9	+	+	+	+	+	+	+	+	+
M10	+	+	+	-	+	+	+	+	+

F: Functions; M: Mothers; **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: *Information*; **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Conf**: *Confirmation*; **Den**: *Denial*

Table 5: Presence or absence of communication functions in children with SSPI

F / C	RI(G)	RI(Y/N)	RA	RqO	Info	Ins(ax)	Ins(sp)	Conf	Den
C1	-	-	-	+	+	+	-	-	+
C2	-	-	-	+	+	+	-	-	+
C3	-	-	-	+	+	-	-	-	+
C4	-	-	-	-	+	-	-	-	+
C5	+	-	+	+	+	-	-	+	+
C6	-	-	+	+	+	-	-	-	-
C7	-	-	-	-	+	-	-	+	-
C8	-	-	-	+	+	-	-	-	+
C9	-	-	-	+	+	+	-	-	+
C10	-	-	+	-	+	-	-	-	-

F: Functions; **C**: Children; **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: Information: **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Conf**: *Confirmation*; **Den**: *Denial*

All the children used *provision of information* during interaction with their mothers. *Instruction for action* was used by C1, C2 and C9; *request for attention* was used by C5, C6 and C10; *request for information (general)* was used only by C5 while *confirmation* was used by C5 and C7. Among other functions, *request for object* was not observed in C4, C7 and C10; *denial* was not used by C6, C7 and C10. *Request for information (yes/no)* and *instruction for speech* was not used by any of the children.

Based on the coding carried by the three judges, the mean (of three judges) percentage of occurrence of each communication function was calculated for each dyad. Table 6 and 7 depicts the mean percentage of occurrence of communication functions in each mother and child respectively.

Table 6: Mean percentage of occurrence of communication functions in each mother

Functions	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
RI(G)	14.80	35.69	23.15	16.50	28.40	35.53	33.97	5.38	26.11	26.12
RI(Y/N)	4.70	4.89	5.69	0	2.83	14.47	10.83	6.61	3.24	1.63
RA	23.66	5.07	23.53	33.33	9.42	2.28	5.10	15.68	8.70	4.90
RqO	0	1.63	0	0	0.85	0	0	0	0.34	0
Info	30.93	21.20	18.79	14.64	23.58	8.19	18.68	5.57	11.60	8.37
Ins(ax)	25.16	26.27	25.33	35.19	25.00	33.69	19.53	49.00	36.23	37.14
Ins(sp)	0	0.54	0.09	0	0.99	4.19	9.34	7.19	1.25	18.57
Conf	0.75	1.09	2.47	0.11	8.22	1.65	2.34	4.34	11.15	3.06
Den	0	3.62	0.95	0.22	0.71	0	0.21	6.22	1.37	0.20

M: Mothers (M1-M10); **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: Information; **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Conf**: *Confirmation*; **Den**: *Denial*

Table 7. Mean percentage of communication functions used by each child

Functions	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
RI (G)	0	0	0	0	0.93	0	0	0	0	0
RI(Y/N)	0	0	0	0	0	0	0	0	0	0
RA	0	0	0	0	0.93	6.67	0	0	0	28.57
RqO	5.00	61.54	64.91	0	9.26	6.67	0	25.64	29.66	0
Info	27.50	15.38	17.54	50	71.30	86.67	96.36	25.64	62.71	71.43
Ins(ax)	7.50	15.38	0	0	0	0	0	0	4.24	0
Ins(sp)	0	0	0	0	0	0	0	0	0	0
Conf	0	0	0	0	0.93	0	3.64	0	0	0
Den	60	7.69	17.54	50	16.67	0	0	48.72	3.39	0

F: Functions; **C**: Children (C1-C10); **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: Information: **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Conf**: *Confirmation*; **Den**: *Denial*

Communication functions in mothers: As observed in table 6, *request for information (general)* was predominantly used by M2 (35.69%) as compared to M6 (35.53%), M7 (33.97%), M5 (28.40%), M10 (26.12%), M9 (26.11%), M3 (23.15%), M4 (16.50%), M1 (14.80%) and M8 (5.38%). *Instructions for actions* were observed more frequently in M8 (49%) as compared to M10 (37.14%), M9 (36.23%), M4 (35.19%), M6 (33.69%), M2

(26.27%), M3 (25.33%), M1 (25.16%), M5 (25%) and M7 (19.53%). *Provision of information* was observed in most instances in M1 (30.93%) while *request for attention* was observed in M4 (33.33%). Other communication functions in mothers were seen to occur with a frequency of less than 25% of instances. Amongst these less frequently occurring functions in mothers, *request for information (yes/no)* was observed predominantly in M6 (14.47%) as compared to M7 (10.83%), M8 (6.61%), M3 (5.69%), M2 (4.89%), M1 (4.70%), M9 (3.24%), M5 (2.83%) and M10 (1.63%) while it was not observed in M4. *Request for object* was observed predominantly in M2 (1.63%), while it was observed minimally in M5 (0.85%) and M9 (0.34%). *Request for object* was not observed in M1, M3, M4, M6, M7, M8 and M10. *Instructions for speech* was observed predominantly in M10 (18.57%) as compared to M7 (9.34%), M8 (7.19%), M6 (4.19%), M9 (1.25%), M5 (0.99%), M2 (0.54%) and M3 (0.09), while it was not observed in M1 and M4. *Confirmation* was predominantly observed in M9 (11.15%) as compared to M5 (8.22%), M8 (4.34%), M10 (3.06%), M3 (2.47%), M7 (2.34%), M6 (1.65%), M2 (1.09%), M1 (0.75%) and M4 (0.11%). On similar lines, *denial* was most frequently observed in M8 (6.22%) as compared to M2 (3.62%), M9 (1.37%), M3 (0.95%), M5 (0.71%), M4 (0.22%), M7 (0.21%) and M10 (0.20%). *Denial* was not observed in M1 and M6's communication repertoire.

Communication functions in children: As observed in table 7, *provision of information* was observed in all the children. C7 used *provision of information* predominantly (96.36%) as compared to C6 (86.67%), C10 (71.43%), C5 (71.30%), C9 (62.71%), C4 (50%), C1 (27.50%), C8 (25.64%), C3 (17.54%) and C2 (15.38%). *Request for object* was another function used by most children. C3 (64.91%) used it more frequently as

compared to C2 (61.54%), C9 (29.66%) and C8 (25.64%). C4, C7 and C10 never used *request for object* while C5 (9.26%), C6 (6.67%) and C1 (5%) used it sparingly. *Denial* was also observed in most children. C1 used it predominantly (60%) as compared to C4 (50%), and C8 (48.72%). C3 (17.54%), C5 (16.67%), C2 (7.69%) and C9 (3.39%) used it less frequently while C6, C7 and C10 never used it during interactions with their mothers. *Request for attention* was observed predominantly in C10 (28.57%). It was observed minimally in C6 (6.67%) and C5 (0.93%); while it was never observed during the communication interactions of C1, C2, C3, C4, C7, C8 and C9. *Instructions for actions* were evident predominantly in C2 (15.38%) as compared to C1 (7.50%) and C9 (4.24%); while it was not observed in C3, C4, C5, C6, C7, C8 and C10. *Confirmation* was observed more frequently in C7 (3.64%) as compared to C5 (0.93%) while it was not observed in C1, C2, C3, C6, C7 and C10. *Request for information (general)* was observed only in C5 (0.93%) while i*nstruction for speech* and *request for information (yes/no)* was not observed in any child.

Communication interactions in the dyads:

Comparison of communication functions used by each mother and child were carried out to view the interactions across the dyads and the same is represented in figures 1, 2, 3, 4 and 5. As observed in figure 1, *request for information (general)* was observed in all the mothers, while it was evident only in C5. *Request for information (yes/no)* was observed in all the mothers except M4 but never in children. As observed in figure 2, r*equest for attention* was observed in all the mothers while it was observed in C5, C6 and C10. *Request for object* was sparingly observed in M2, M5 and M9 while in

children (C1, C2, C3, C5, C6, C8 and C9) it was observed in higher percentages as compared to mothers.

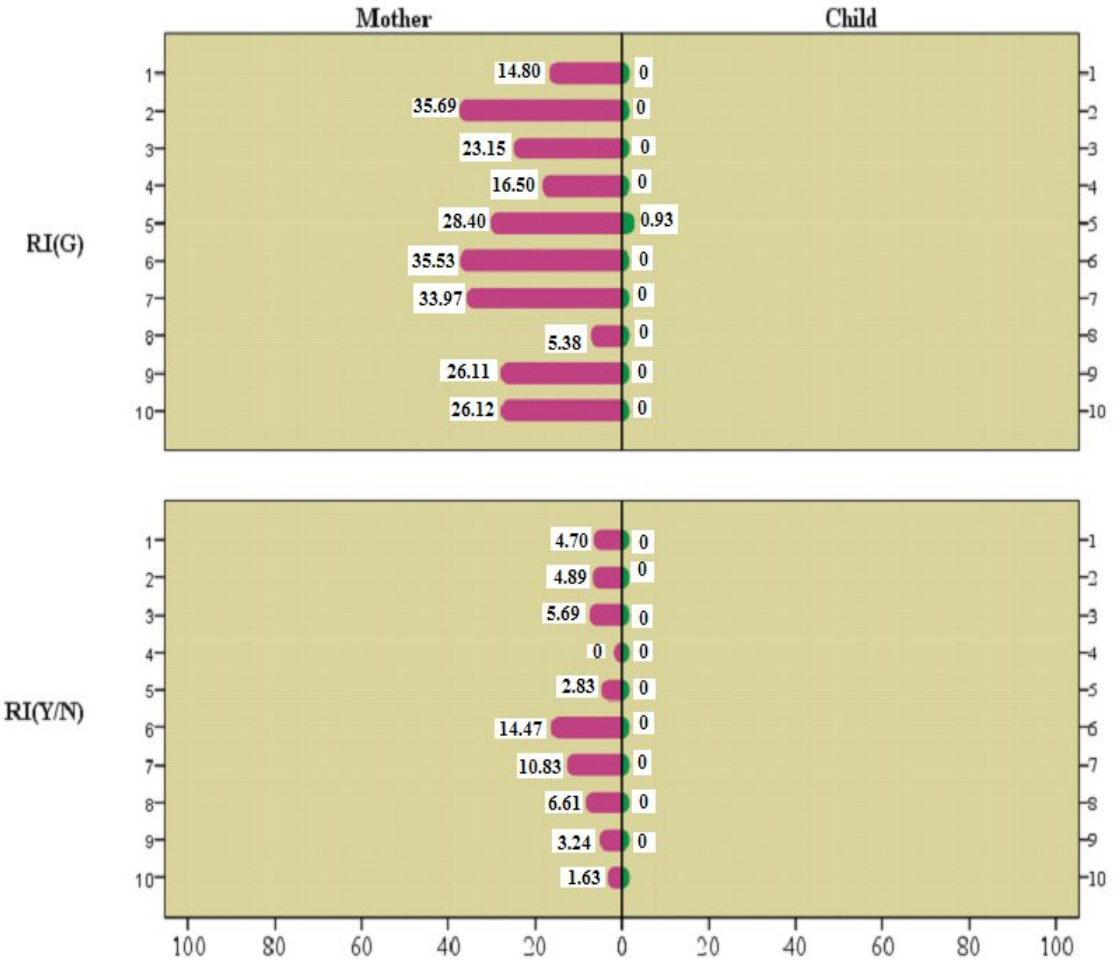

Figure 1: Communication functions used by dyads –RI (G) and RI(Y/N)

1-10-*Mother and child*; **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*

From figure 3 it is evident that i*nstructions for actions* were observed in C1, C2 and C9, while it was observed in all mothers. *Instructions for speech* were observed in all mothers except M1 and M4, while it was not observed in children.

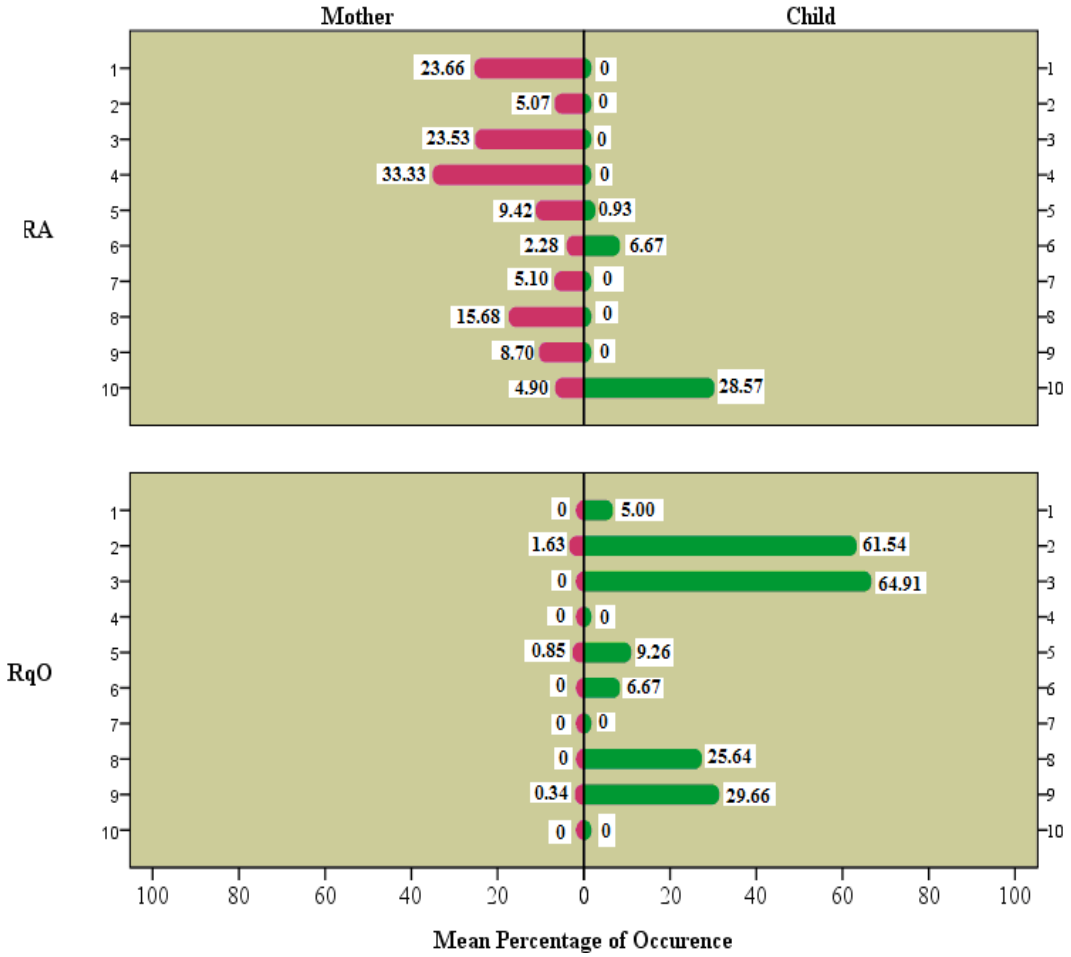

Figure 2: Communication functions used by dyads –RA and RqO

1-10; *Mother and Child*; **RA:** *Request for attention*; **RqO:** *Request for object*

Provision of information (figure 3) was the only function that was used by both mothers and children. However in children, the presence of *provision of information, denial* and *request for object* was more predominant than in mothers. *Instructions for actions* (figure 4) were predominantly observed in mothers as compared to children. Among the children, only C1, C2 and C9 used *instructions for actions* while it was observed predominantly in M8 as compared to other mothers. *Instruction for speech* was never observed in children (figure 4), while it was observed minimally in mothers.

Among the mothers, M10 used *instructions for speech* most frequently as compared to other mothers, while it was not observed in children. *Confirmations* again were observed in all mothers while it was observed in only C5 and C7. M6 and C6 did not use *denial* during interactions while *denial* was not observed in M1 and C7 respectively (refer figure 5).

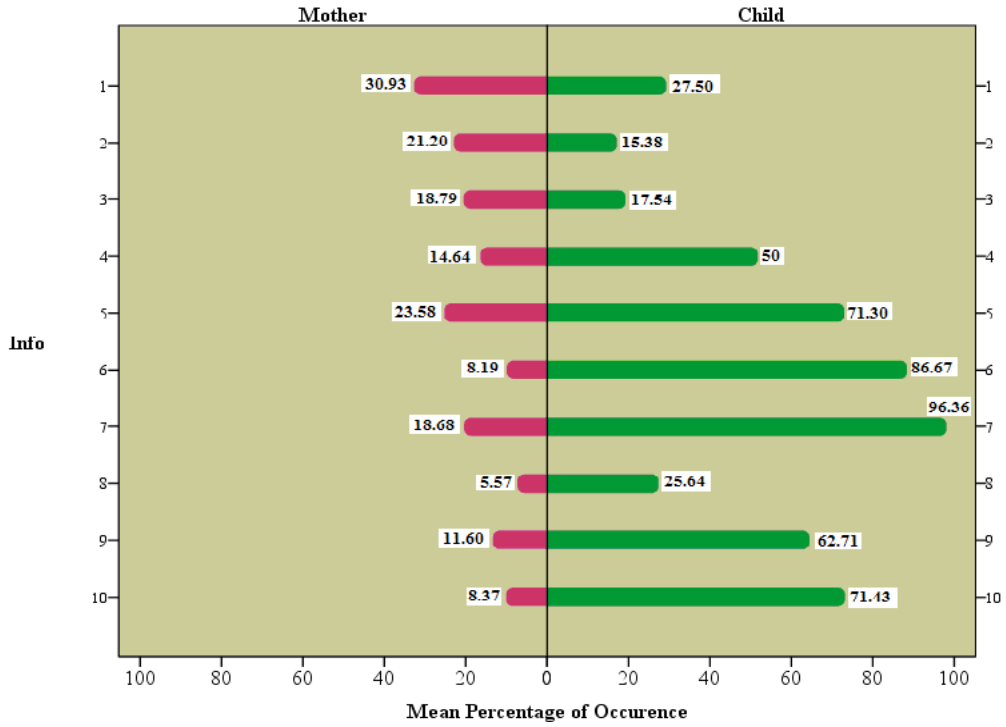

Figure 3: Communication function used by the dyad-Info

1-10; *Mother and Child***; Info**: *Information*;

From table 5, table 6 and figure 1, 2, 3, 4 and 5 it is evident that during interactions, mothers and children in the dyad used varied communication functions. The types of communication functions employed by mothers were more varied as compared to children with SSPI and CP. Children employed fewer communication functions and used them less frequently.

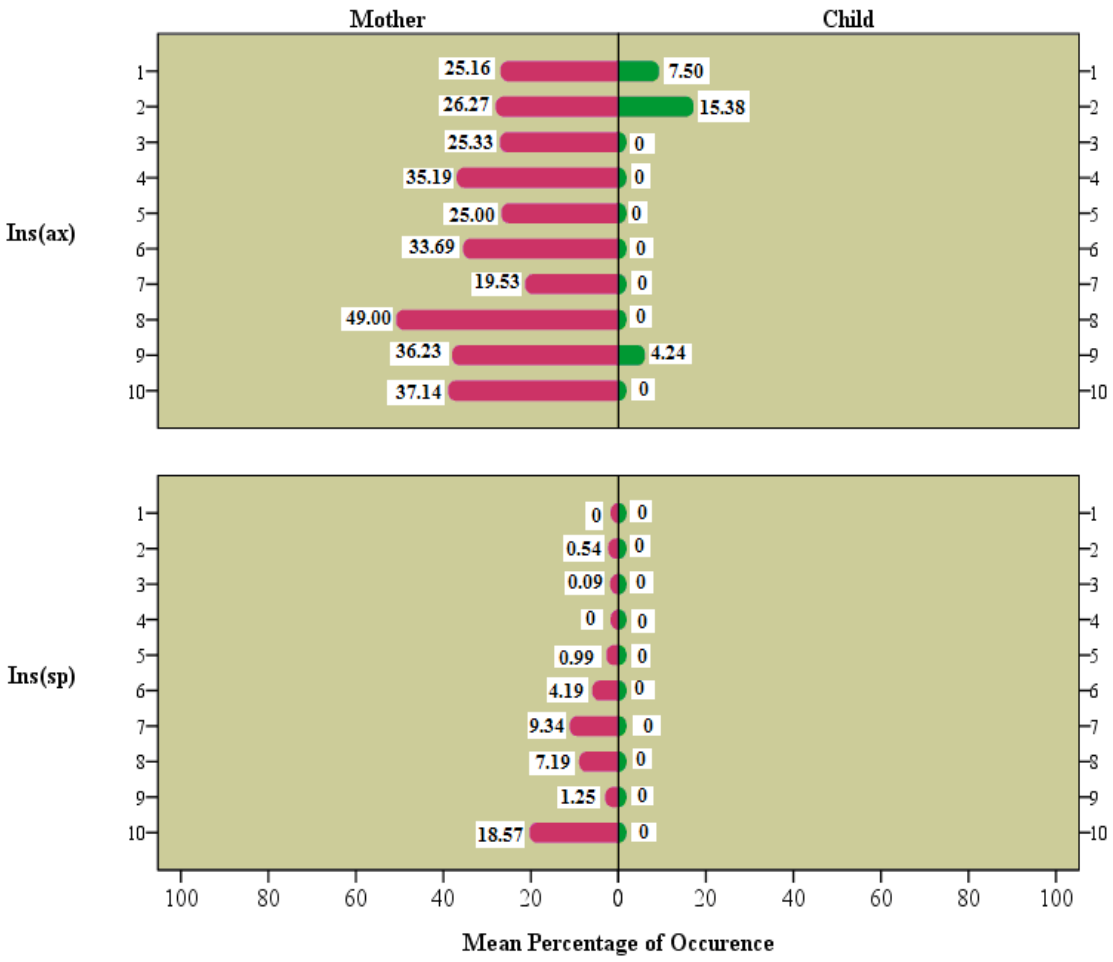

Figure 4: Communication function used by the dyad-Ins (ax) and Ins (sp)

1-10; *Mother and Child***; Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*

The total scores as coded by the judges for the communication functions of mother-children dyad were combined and percentage occurrences of each of the communicative functions were calculated. The mean and standard deviations for each communicative function are presented in table 7.

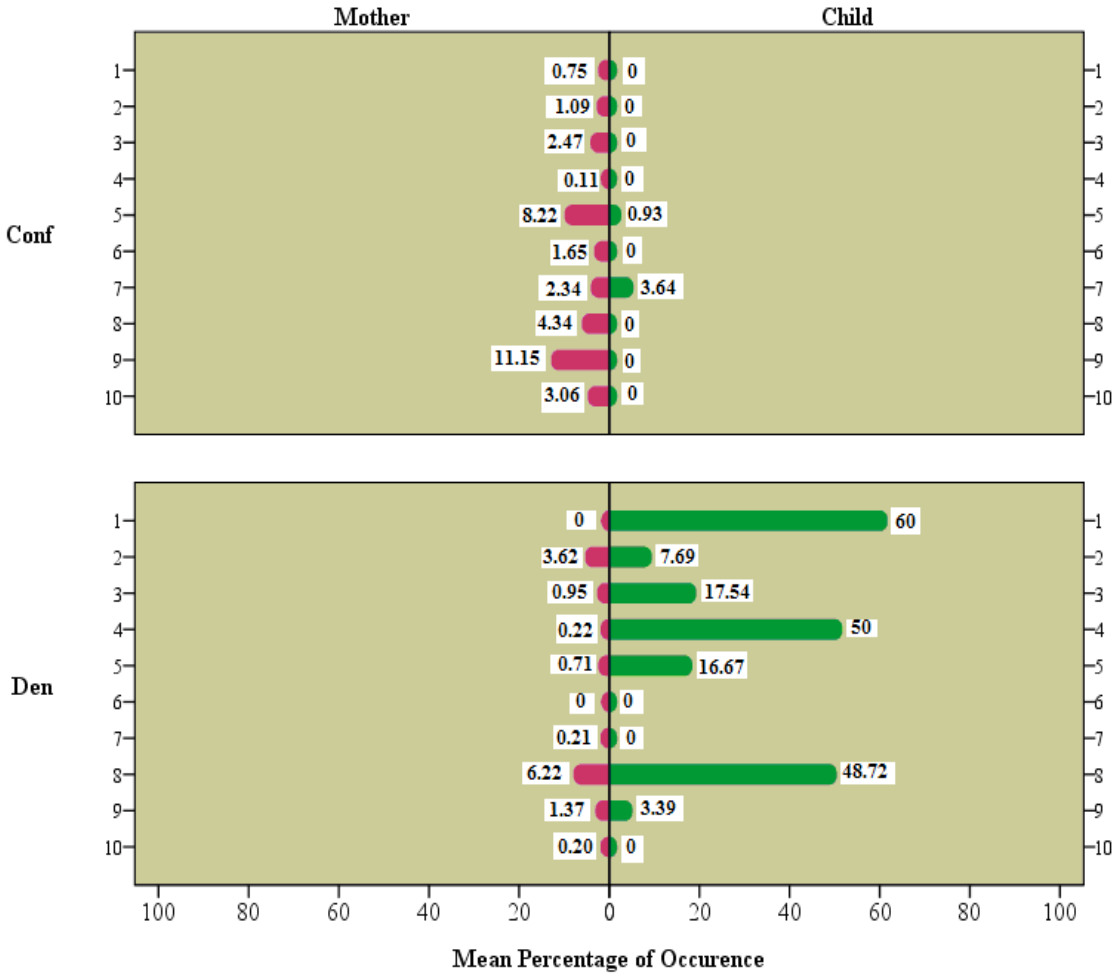

Figure 5: Communication function used by the dyad-Conf and Den

1-10; *Mother and Child*; **Conf***: Confirmation;* **Den***: Denial*

The higher standard deviation for most of the communication functions employed by the mothers and children with SSPI and CP (table 8), suggests individualistic variations in the use of communication functions by both mothers and children. The mean percentage occurrences of each communication function employed by the dyad were further compared across mothers and children with SSPI and CP and this is shown in table 8 and figure 6.

Table 8. Means and SD's of 'communication functions' used by mothers and children with SSPI and CP.

Functions	Mothers (n=10)		Children with SSPI and CP (n=10)	
	Mean	**S.D.**	**Mean**	**S.D.**
Request for information (general)	24.56	9.90	0.09	0.29
Request for information(yes/no)	5.49	4.32	0	0
Request for attention	13.17	10.45	3.62	9.01
Request for object	0.28	0.55	20.27	24.91
Information	16.16	7.97	52.45	29.55
Instruction for action	31.25	8.63	2.71	5.13
Instruction for speech	4.22	6.02	0	0
Confirmation	3.52	3.53	0.46	1.15
Denial	1.35	2.07	20.40	23.49

a) 'Communication functions' employed by mothers

As seen in figure 6, amongst the communication functions that emerged in the dyadic interactions, *requests* (combining all the three kinds of requests) were more predominantly used by mothers as compared to other functions. In mothers, the total percentage of occurrence for *request for information* was 30.50%, while *request for attention* was 13.17%. *Request for object* was sparingly used and occurred only 0.28% of times in the interaction. *Provision of information* was 16.16%, while *instructions for action* were 31.25%, which was relatively higher than other functions (if *requests* were not considered as one category of functions). *Instruction for speech, confirmation* and *denial* occurred less frequently, with the percentage occurrence being 4.22%, 3.52% and 1.35% respectively.

b) 'Communication functions' used by children with SSPI and CP.

Comparing the percentage occurrences of communication functions with that of mothers, the mean percentage occurrence of 'communication functions' employed by children with SSPI and CP were lesser. Children also employed limited types of 'communication functions'. Amongst the functions seen in children with SSPI and CP, *requests for information* were sparingly used with a total percentage occurrence of 0.09%, while *request for attention* attained 3.62%. *Request for object* had a total percentage occurrence of 20.27%; thus being the most frequently occurring function as compared to other types of requests. *Provision of information* occurred predominantly in the repertoire of 'communication functions' in these children with a total percentage occurrence of 52.45%. *Instructions for speech* were never employed as a communication function during these interactions whereas *instruction for actions*, *confirmations* and *denials* occurred sparingly with a total percentage occurrence of 2.71%, 0.46% and 20.40% respectively.

The other point of interest in viewing dyadic communication behavior is to evaluate how each partner in the dyad influences the other (Conti-Ramsden, 1994) through contingency responses. To examine this type of influence, the data was further analyzed to study the emerging interactive features in the dyadic communication interactions of mothers with their children with SSPI and CP.

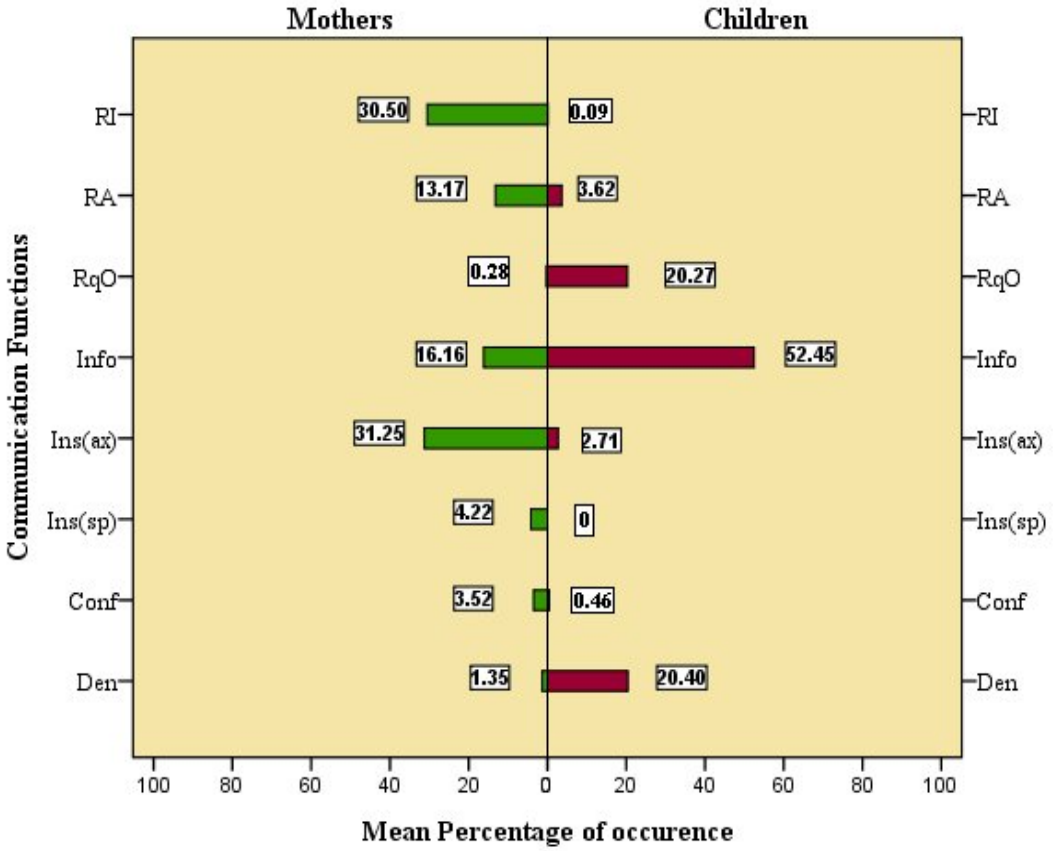

Figure 6: Mean percentage occurrence of 'communication functions' in mothers and children with SSPI and CP.

RI: Request for Information	**Ins(ax):** Instruction for action
RA: Request for attention	**Ins(sp):** Instruction for speech
RqO: Request for object	**Conf**: Confirmation
Info: Information	**Den:** Denial

This was carried out specifically to study the probable influence of certain communicative functions on the responses received for the same from the communicative partner (that is the mother to child and child to mother). It was observed that certain communication behaviors elicited greater contingency responses from the mothers.

Section II: Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad

The responses of children towards communicative functions employed by the mothers and similarly the responses of mothers towards communicative functions employed by the children were analyzed. 'Communication functions' in both, mothers and children with SSPI and CP were operationally defined as those:

- that received a response;
- that did not receive a response; and
- where responses were not expected.

Individualistic descriptions in terms of children's responses for various communication functions used by mothers are shown in table 9. Functions that were not observed in mothers' communication repertoire are marked with an asterix symbol (*). The total responses for various communication functions were computed per dyad based on the coding provided by the judges. The total percentage responses of mothers and children with SSPI and CP were compared.

Table 9. Mean percentage of children's responses to mother's communication functions

C / F	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
RI (G)	2.89	0.51	3.28	0.66	25.94	2.14	20.63	1.2	16.56	8.59
RI(Y/N)	2.27	3.7	16.67	*	25	6.14	17.65	8.82	7.02	12.5
RA	4.06	17.86	1.61	6.23	0	5.56	4.17	2.07	8.5	4.17
RqO	*	0	*	*	16.67	*	*	*	0	*
Info	1.04	0	2.02	0.75	6.01	0	12.5	0	0	0
Ins(ax)	3.82	9.66	3.37	0.62	15.3	2.07	5.43	11.64	43.01	5.49
Ins(sp)	*	33.33	0	*	50	12.12	25	3.6	27.27	20.88

(Note: *indicates that the particular function was not observed in the mother and hence there was no scope for occurrence of response from children for this function)

F: Functions; **C (1-10)**: Responses of children; **RI (G)**: *Request for information (general)*; **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: Information: **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*.

Amongst the nine functions studied, *confirmation* was the only function that did not necessitate a response from the partner in interaction. Hence while calculating the responses, *confirmation* was excluded and remaining eight (except *denial* which is discussed in detail in the later part separately and not included in the table 9) functions were evaluated and are discussed under the respective headings as follows

Request for information (general): As compared to other children, C5 responded better to M5's *request for information (general)*. Based on the decreasing order of responses, C5 responded 25.94% of times, C7 responded 20.63% of times and C9 responded 16.56% of times. Other children i.e. C1, C2, C3, C4, C6, C8, C9 and C10's responses for this function were less than 10%.

Request for information (yes/no): Responses of C5 were better among the children included for the study. C5 responded 25% of times, C7 responded 17.65% of times, C3 responded 16.67% of times and C10 responded 12.5% of times for mothers' *request for information (yes/no)*. Responses of other children i.e. C8 (8.82%), C9 (7.02%), C6 (6.14%) C2 (3.7%) and C1 (2.27%) were poor.

Request for attention: C2 responded 17.86% of times for M2's *request for attention*. Other children namely C9 (8.5%), C4 (6.23%), C6 (5.56%), C7 and C10 (4.17%), C1 (4.06%), C8 (2.07%) and C3 (1.61%) responded poorly to this function. C5 did not respond to M5's *request for attention.*

Request for object: Except for C5 none of the other children (i.e. C2 and C9) responded to their mothers' *request for object*. C5 responded 16.67% of times for mothers' *request for object*.

Provision of information: As a function, *provision of information* does not really warrant a response. Though responses of all the children were low for this function C7 (12.5%) responded better than C5 (6.01%), C3 (2.02%), C1 (1.04%) and C4 (0.75%). C2, C6, C8, C9 and C10 failed to respond to their mothers' *provision of information*.

Instruction for actions: C9 responded maximally (43.01%) to M9's *instructions for actions*, while C5 responded 15.30% of times to *mother's instructions for actions*.

Among the other children, C8 (11.64%) responded better than C2 (9.66%), C10 (5.49%), C7 (5.43%), C1 (3.82%), C3 (3.37%), C6 (2.07%) and C4 (0.62%).

Instruction for speech: Though children selected for the study were nonverbal, they attempted to respond to mothers' *instructions for speech*. This was evident in responses of C5 (50%), C2 (33.33%), C9 (27.27%) and C10 (20.88%). C7 (25%) responses were better than C6 (12.12%) and C8 (3.6%). C3 did not respond to M3's *instruction for speech.*

Denial: This was the only function in which responses, no responses and responses not expected were analyzed. M1 and M6 did use *denial* while interacting with their children. Hence responses were not calculated for the same. M2, M3, M4, M5, M7, M8, M9 and M10 did not provide a choice for their children to respond. *Denial* was used mostly when children were preoccupied with a particular toy or when they drooled. In those instances, mothers either snatched the toy from their hand or forcibly wiped their face, not giving an opportunity for their children to respond to these denials. Thus mothers' *denial* as a function actually did not expect any response from children.

To summarize, individualistic variations were evident in terms of responses of the dyads to various functions. There was a notable paucity of responses for various functions used by mothers in C1 and C4 with none of the functions attaining more than 10% of responses from these children. C2, C6, C9 and C10 responded better to mothers' *instruction for speech* while C3, C7 and C10 responded better to mother's *request for*

information (yes/no). C5, C7 and C9 responded better to mothers' *request for information (general)*. C5, C8 and C9 responded better to mothers' *instruction for action*s while C2 responded better to *request for attention*. None of the children responded to mothers' *denial*.

Mothers' responses to children's communication functions were coded by the judges. Among the limited functions that children used, mothers' responses varied across these functions as seen in table 10. Functions that were not observed in mothers' and children's communication repertoire are marked with an asterix symbol (*).

Table 10. Mean percentage of mother's responses to children's communication functions

M / F	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
RI(G)	*	*	*	*	100	*	*	*	*	*
RI(Y/N)	*	*	*	*	*	*	*	*	*	*
RA	*	*	*	0	100	100	*	0	0	0
RqO	0	87.5	4.05	*	30	100	*	80	100	*
Info	18.18	50	65	100	42.86	46.15	100	0	97.3	0
Ins(ax)	0	0	*	*	*	*	*	*	100	*
Ins(sp)	*	*	*	*	*	*	*	*	*	*
Den	37.5	0	40	100	22.22	*	*	26.32	100	*

(Note: *indicates that the particular function was not observed in the child and hence there was no scope for occurrence of response from mothers' for this function)

F: *Functions*; **M (1-10)**: *Responses of mothers;* **RI (G)**: *Request for information (general);* **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: Information: **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Den**: *Denial*

Request for information (general): M5 responded every time that C5 *requested for information*.

Request for attention: M5 and M6 always responded for *request for attention* attempts by C5 and C6. M4, M8 and M9 did not respond to their children's *request for attention*.

Instructions for action: M9 always responded to C9's *instructions for actions*.

Request for object: For children's *request for object*, M6 and M9 responded 100% of times, M2 responded 87.5% of times, M8 responded 80% of times, M5 responded 30% of times, while M3 responded only 4.05% of the times. M1 did not respond to their children's *request for object.*

Denial: Denial as a function was always responded by M4 and M9. M3 responded 40% of times, M1 responded 37.5% of times, M8 responded 26.32% of times and M5 responded 22.22% of times. M2 did not respond to C2's *denial.*

To summarize, responses for *request for object* and *denial* varied across mothers. *Request for information (yes/no)* and *instructions for speech* were not observed in children and hence did not warrant any responses. *Confirmation*, as discussed earlier is a nonobligatory function and thus does not require any response from mothers. Individual variations were evident in terms of responses to various functions and across the mothers included in the study.

The mean percentage responses of the dyad were also calculated to view the group responses and this is presented in table 11. Standard deviations of the responses of mothers and children are quite high revealing greater individual variation in the dyad. In order to view the responses of children for the communication functions employed by

mothers, the same was graphically represented as the 'responses', and 'no responses' of children for mothers' communication functions (Refer figure 7).

Table 11: Mean percentage responses, standard deviations for the communication functions by the dyad.

Functions	Responses	Mean %	SD
Request for information (general)	Mothers'	100	33.33
	Children	9.50	9.75
Request for information (yes/no)	Mothers'	0	0
	Children	9.50	7.88
Request for attention	Mothers'	75	5.00
	Children	4.38	4.20
Request for object	Mothers'	43.31	44.09
	Children	5.56	5.27
Information	Mothers'	67.57	38.73
	Children	2.46	4.05
Instruction for action	Mothers'	75	31.62
	Children	12.31	12.44
Instruction for speech	Mothers'	0	0
	Children	22.24	17.03
Denial	Mothers'	33.64	14.05
	Children	0	0

Children's responses to maternal *request for information (general)* were 9.50%. *Request for information (yes/no)* attained 9.50% responses while *request for attention* was responded 4.38% of times. Further, children responded to mothers' *request for object*, 5.56% of times. Children responded to *provision of information* by mothers only 2.46% of times. *Instruction for action* by the mothers elicited 12.31% of responses from

children while *instruction for speech* was responded 22.24% of times. *Denial* by mothers did not elicit any responses from these children.

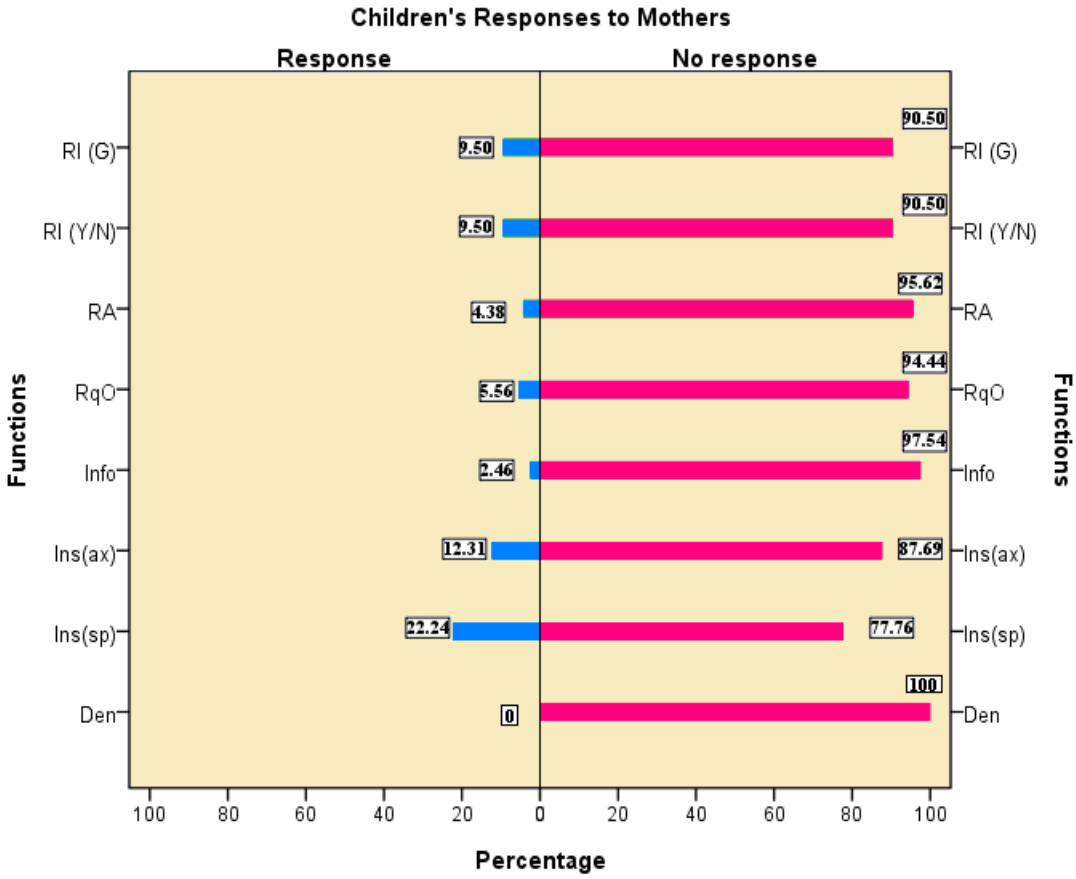

Figure 7: Children's responses to mother's communicative functions

RI (G): *Request for information (general)*; **RI(Y/N)**: Request for *information (yes/no);* **RA***: Request for attention;* **RqO***: Request for object;* **Info***: Information;* **Ins *(ax)***: *Instruction for action;* **Ins (sp)***: Instruction for speech;* **Conf***: Confirmation;* **Den***: Denial*

Mother's responses to children's communication functions (combination of 10 dyads) were also observed in detail and are graphically depicted in Figure 8. Mothers always responded 100% of times to their children's *request for information (general)*, while their responses to *request for attention* were around 75%.

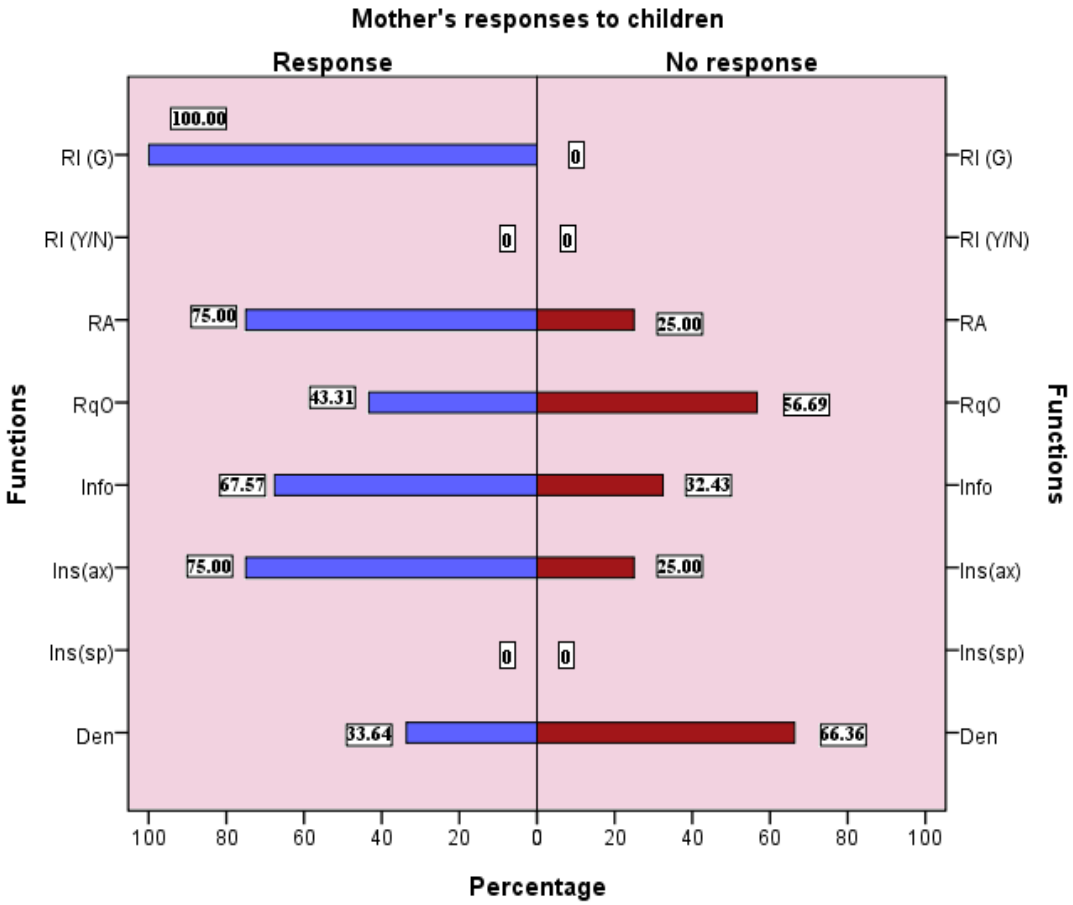

Figure 8: Mother's responses to children's communicative functions

RI (G): *Request for information (general)*; **RI(Y/N)**: Request for *information (yes/no);* **RA***: Request for attention;* **RqO***: Request for object;* **Info***: Information;* **Ins** ***(ax)****: Instruction for action;* **Ins (sp)***: Instruction for speech;* **Conf***: Confirmation;* **Den***: Denial*

Mother's responses to *request for object* were only 43.31%. *Provision of information* was responded 67.57% of times. *Instruction for action* was responded 75% of times by the mothers and *denial* was responded only 33.64% of times.

Section III. Communication modalities used by mothers and children with SSPI and CP

Judges coded the communication modalities utilized by mothers and children with SSPI and CP based on the taxonomy provided (Appendix C). Various modalities used by mothers and children were tabulated to indicate various communication functions by each during interaction. The total raw score for each modality as identified by the judges was tabulated and converted to percentage scores. The mean percentage occurrence of each communication modality used by mothers and children with SSPI and CP were calculated.

Various modalities studied are as follows:

a. Vocal gestures

- Vocalizations
- Verbalizations

b. Eye gestures

- Looking at object
- Looking at person
- Looking at location
- Combination of looking at object/person/location
- Eye blink

c. Facial gestures

d. Part body gestures

- Showing

- Pointing
- Ritualized

e. Combination gestures:

- Sequential (specify)
- Simultaneous (specify)

(Refer Appendix C for detailed description of the terminology)

Modalities used by mothers: Mothers use of modalities was profiled based on the taxonomy specified except for exclusion of verbalizations. Mothers being the verbal partner in interaction used either verbal or non verbal modalities or combination of verbal and nonverbal modalities. In most instances, the combinations of verbal and nonverbal modalities were quite high. There were practical limitations in segregating the same and in identifying them, as they occurred simultaneously. Hence only nonverbal modalities and the combination of verbal and nonverbal modalities were analyzed. The simultaneous use of verbal and nonverbal modalities was the predominant mode of communication in most of the mothers. Table 12 depicts the mean percentage occurrence of the nonverbal modalities used by mothers during interactions with their children. As observed in table 12, it is evident that mothers tended to use various nonverbal modalities to indicate their needs. However such instances were limited when compared to the simultaneous use of verbal and nonverbal modalities.

Table 12. Nonverbal modalities used by mothers (excluding speech) during interactions with children

Mo \ M	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Vg	0	11.11	0	0	0	16.67	5.26	7.14	0	8.33
L(O)	12.50	22.22	7.14	0	14.29	0	10.53	21.43	6.67	25.00
L(P)	0	0	0	0	0	0	10.53	0	0	0
L(L)	12.50	11.11	7.14	14.29	42.86	0	0	21.43	13.33	25.00
L(O+P)	0	0	0	0	0	0	0	0	0	0
L(P+L)	0	0	0	0	0	0	0	0	0	0
L(O+L)	0	0	0	0	14.29	0	10.53	3.57	20.00	8.33
EB	12.50	0	0	14.29	0	0	5.26	0	6.67	0
FE	0	22.22	57.14	0	0	41.67	0	28.57	20.00	0
SH	25.00	0	28.57	0	0	16.67	26.32	0	6.67	8.33
Ptg	0	0	0	28.57	28.57	8.33	10.53	3.57	20.00	0
Ritu	37.50	33.33	0	42.86	0	16.67	21.05	14.29	6.67	25.00
Vg+ Ptg	-	-	-	-	-	-	-	-	-	-
Vg+ L(O)	-	-	-	-	-	-	-	-	-	-
Vg+ L(P)	-	-	-	-	-	-	-	-	-	-
Vg+ Ritu	-	-	-	-	-	-	-	-	-	-

Mod: *Modalities*; **Vg**: *Vocal gestures*; **L(O)**: *Looking at object;* **L(P)**: *Looking at person;* L(L): *Looking at location*; **L(O+P)**: *Looking at object and person*; **L(P+L)**: *Looking at person and location*; **EB**: *Eye blink;* **FE**: *Facial expressions;* **SH**: *Showing;* **Ptg**: *Pointing*; **Ritu**: *Ritualized gestures*; **Vg+ptg**: *Simultaneous use o*f *vocal gestures and pointing*; **Vg+L(O):** *Simultaneous use of vocal gestures* and *looking at objects;* **Vg+L(P)**: *Simultaneous use* of *vocal gestures* and *looking at person*; **Vg+Ritu**: *Simultaneous use of vocal gestures* and *ritualized gestures*

Based on the video recordings, it was evident that most of the nonverbal modalities were mainly used to emphasize or substitute speech as a part of multiple repetitions of functions. *Part body gestures* or *eye gestures* were the predominant modes of communication employed by most of the mothers except M3. M3 showed predominant use of *facial expressions*. M1, M2, M4 and M7 used *part body gestures* while M5, M8, M9 and M10 used *eye gestures* predominantly. M6 used facial gestures predominantly.

Communication attempts of M2 were characterized by equal usage of *part body gestures* and *eye gestures*. M2, M6, M7, M8 and M10 used *vocal gestures* such as 'uh-huh', 'oh-ho' or 'ah' during interactions with their children. Simultaneous use of gestures was not coded in mothers.

Modalities used by children: Various modalities used by children with SSPI and CP were analyzed to evaluate if any predominant pattern emerged. Table 13 depicts the modalities employed by children with SSPI and CP during interaction with their mothers. The presence/usage of a particular modality is depicted using plus sign (+) while absence of the usage of a particular modality is depicted using a minus sign (-).

Observation based on table 13 reveals that the children selected for this study used *vocal gestures*. Apart from the use of *vocal gestures*, children with SSPI and CP showed a great deal of variation in the use of other modalities. Among the ten children, as observed in table 14, *vocal gestures* were predominantly used by C1 (87.50%) as compared to other children. In the decreasing order of frequency, C5 (84.26%) used *vocal gestures* as compared to C10 (80.95%), C7 (80%), C3 (78.95%), C8 (74.36%), C4 (50%), C6 (46.67%), C2 (38.46) and C9 (16.95%).

Based on the predominant patterns that emerged, *looking at object* was observed in C9 (28.91%) as compared to C2 (23.08%), C10 (9.52%), C1 (7.50%), C5 (5.56%) and C7 (5.45%). *Looking at person* was observed in C2 (23.08%), C9 (6.78%) and C5

(2.78%) and *looking at object and person* was observed in C9 (3.39%) and C5 (2.78%). Other *eye gestures* were not observed in children. Among the *body gestures*, only *ritualized gestures* were evident in children. Though C9 used it predominantly, the mean percentage occurrence was less (16.10%). Other children used it less frequently (C8 (15.38%), C7 (14.55%), C10 (9.52%), C2 (7.69%) and C1 (5%)). Children with SSPI and CP utilized simultaneous use of *vocal gestures* along with *body gestures* namely *ritualized gestures* and *pointing*, and *vocal gestures* and *eye gestures* namely *looking at object* and *looking at person*.

Table 13: Presence and absence of modalities employed by children with SSPI and CP

Mod / C	Vg	Ritu	L(O)	L(P)	L(O+P)	Vg+ptg	Vg+L(O)	Vg+L(P)	Vg+Ritu
C1	+	+	+	-	-	-	-	-	-
C2	+	+	+	+	-	+	-	-	-
C3	+	-	-	-	-	-	+	+	+
C4	+	+-		-	-	-	-	-	-
C5	+	-	+	+	+	-	+	+	+
C6	+	-	-	-	-	-	+	-	+
C7	+	+	+	-	-	-	-	-	-
C8	+	+	-	-	-	-	-	-	+
C9	+	+	+	+	+	+	-	-	-
C10	+	+	+	-	-	-	-	-	-

C: *Children*: **Mod**: *Modalities*; **Vg**: *Vocal gestures*; **Ritu**: *Ritualized gestures*; **L(O)**: *Looking at object;* **L(P)**: *Looking at person*; **L(O+P)**: *Looking at object and person*; **Vg+ptg**: *Simultaneous use of vocal gestures* and *pointing*; **Vg+L(O):** Simultaneous use of *vocal gestures and looking at objects;* **Vg+L(P)**: *Simultaneous use of vocal gestures* and *looking at person*; **Vg+Ritu**: *Simultaneous use* of *vocal gestures and ritualized* gestures

Table 14. Mean percentage of occurrence of the modalities used by each child

C / Mod	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Vg	87.50	38.46	78.95	50.00	84.26	46.67	80.00	74.36	16.95	80.95
Vb	0	0	0	0	0	0	0	0	0	0
L(O)	7.50	23.08	0	0	5.56	0	5.45	0	28.81	9.52
L(P)	0	23.08	0	0	2.78	0	0	0	6.78	0
L(L)	0	0	0	0	0	0	0	0	0	0
L(O+P)	0	0	0	0	2.78	0	0	0	3.39	0
L(P+L)	0	0	0	0	0	0	0	0	0	0
L(O+L)	0	0	0	0	0	0	0	0	0	0
EB	0	0	0	0	0	0	0	0	0	0
FE	0	0	0	0	0	0	0	0	0	0
SH	0	0	0	0	0	0	0	0	0	0
Ptg	0	0	0	0	0	0	0	0	0	0
Ritu	5.00	7.69	0	50.00	0	0	14.55	15.38	16.10	9.52
Vg+Ptg	0	7.69	0	0	0	0	0	0	27.97	0
Vg+L(O)	0	0	8.77	0	1.85	46.67	0	0	0	0
Vg+L(P)	0	0	8.77	0	1.85	0	0	0	0	0
Vg+ ritu	0	0	3.51	0	0.93	6.67	0	10.26	0	0

C (1-10): *Children*: **Mod**: *Modalities*; **Vg**: *Vocalizations*; **Vb**: *Verbalizations*; **L(O)**: *Looking at object;* **L(P)**: *Looking at person*; **L(L)**: *Looking at location*; **L(P and L)**: *Looking at (person and location)*; **L(O and P)**: *Looking at (object and person)*; **L(O and L)**: *Looking at object and location*; **EB:** *Eye blink*; **FE:** *Facial expressions*; **SH:** *Showing*; **Ptg**: *Pointing*; **Ritu**: *Ritualized*; **Vg+ ptg**: *Simultaneous use of vocal gestures* and *pointing*; **Vg+L(O):** *Simultaneous use of vocal gestures* and *looking at objects;* **Vg+L(P**): *Simultaneous use of vocal gestures* and *looking at person*; **Vg+ ritu**: *Simultaneous use of vocal gestures* and *ritualized gestures*

Among these gestures, C9 showed *simultaneous use of vocal gestures and pointing* (27.97%) and C8 showed *simultaneous use of vocal gestures and ritualized gestures (10.26%)*. Similarly C6 showed *simultaneous use of vocal gestures and looking at object* (46.67%) and C3 showed *simultaneous use of vocal gestures and looking at person*.

The mean (modalities used by all the ten children) and standard deviations of the communication modalities employed by children with SSPI and CP were calculated to understand the group behavior. Since children with SSPI and CP showed high variability in the use of modalities, the raw scores of the modalities used by the children were converted into mean percentage scores. Mean percentage scores and standard deviations for the same is depicted in table 15 and represented in figure 9.

Table 15: Means and SD's of modalities used by children with SSPI and CP.

Modalities	Mean	SD
Vocal Gestures	63.81	24.03
Facial expressions	0	0
Ritualized gestures	11.82	14.85
Looking at object	8.00	10.17
Looking at person	3.27	7.30
Looking at object & person	0.61	1.30
Vocal gestures (Vowels /Vowels and consonants) +Pointing	3.57	8.90
Vocal gestures (Vowels/Vowels and consonants) & looking at object	5.73	14.65
Vocal gestures (Vowels/Vowels and consonants) & looking at person	1.06	2.77
Vocal gestures (Vowels/Vowels and consonants) & ritualized gestures	2.13	3.61

From figure 9, it can be inferred that children with SSPI and CP predominantly used *vocal gestures* (63.81%) during instructed play with their mothers. Two kinds of *vocal gestures* were evident in the communication acts of children with SSPI and CP. Use of only *vowels* (Vw) to produce *vocal gestures* was evident in 53.93% while a combination of *vowels and consonants* (Vg_Vc) were used by 9.87% of the children. Other modalities were sparingly observed (0% to 11.82%) in the communication interaction as compared to *vocal gestures*. Among the kinds of modalities that were observed,, none of the participants used *facial expressions* to communicate; while modalities such as *simultaneously looking at object and person* (1.06%) and *voicing and*

ritualized gestures (2.13%) were minimally used by the participants. *Simultaneous* use of *voicing and looking at object* and *voicing and pointing* were found to be 5.73% and 3.57% times respectively during the instructed communication interaction. Communication attained by *looking at person* was evident in 3.27%; *ritualized body gestures* were evident in 11.82%; while *looking at object* were evident in 8%.

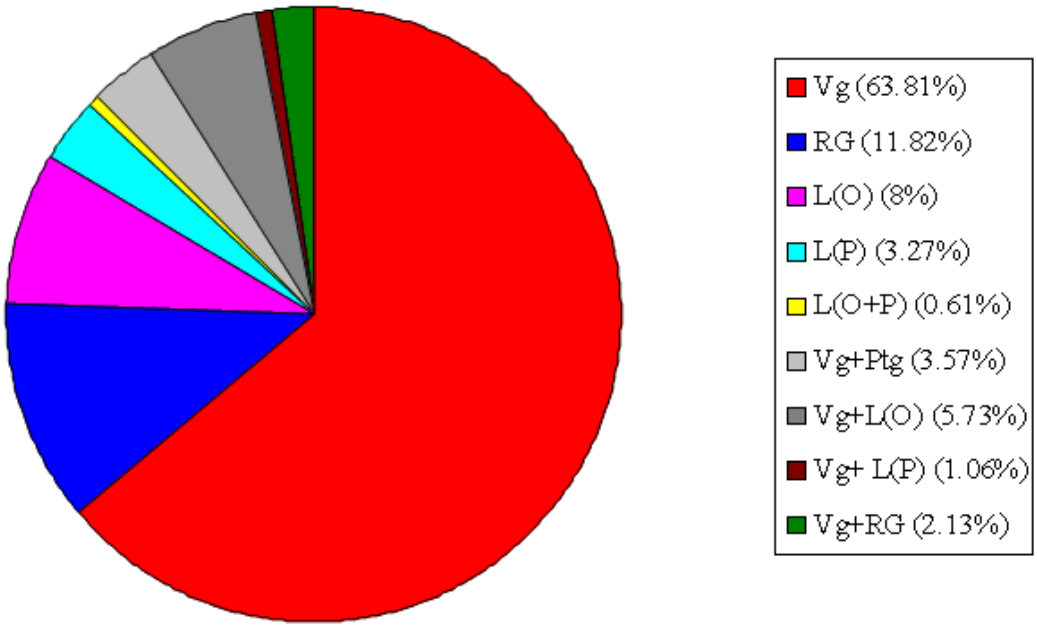

Figure 9: Modality usage in children with SSPI and CP**.**

Vg: *Vocal gestures;* **Ritu**: *Ritualized gestures;* **L(O)**: *Looking at object;* **L(P)**: *Looking at person;* **L(O+P)**: *Looking at object and person;* **Vg+ptg**: *Simultaneous use of vocal gestures and pointing;* **Vg+L(O)**: *Simultaneous use of vocal gestures and looking at object;* **Vg+L(P)**: *Simultaneous use of vocal gestures and looking at person;* **Vg+Ritu**: *Simultaneous use of vocal gestures and ritualized gestures*

From figure 9, it is evident that *vocal gestures* were predominantly evident in the modalities used by children. In an attempt to further evaluate the kind of *vocal gestures* used, these were further calculated for the use of *vowels* and *vowels and consonant* usage.

Such a dichotomy was devised as use of *vowels* (Vw) and *vowel and consonants* (Vw_Vc) combinations reflects the different levels of complexity that is employed in terms of motor co-ordination required in producing them. The graphical representation of the use of *vocal gestures (vowels)* and *vocal gestures* (*vowel and consonants*) are illustrated in Figure 10.

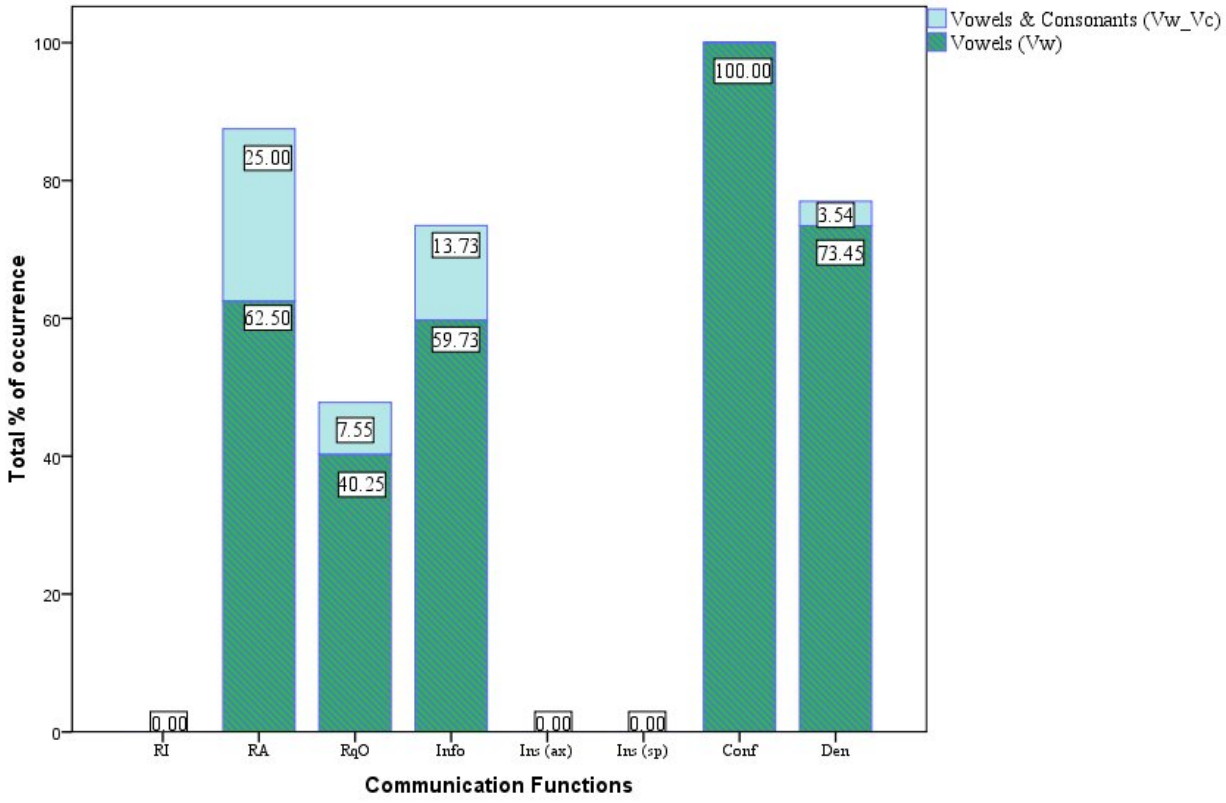

Figure 10: Vocal gestures (*vowels*) and vocal gestures (*vowel and consonant*) and function depiction in children with SSPI and CP.

RI (G): *Request for information (general);* **RI(Y/N)**: *Request for information (yes/no)*; **RA**: *Request for attention;* **RqO**: *Request for object*; **Info**: *Information;* **Ins (ax)**: *Instruction for action;* **Ins (sp)**: *Instruction for speech;* **Conf**: *Confirmation;* **Den**: *Denial*

Amongst the functions, *vocal gestures* were employed either singly or in combination to indicate *request for attention* and *object*; *provision of information*,

confirmation and *denial*. Children with SSPI and CP used higher percentages of *vocal gestures* (*vowel*) as compared to *vocal gestures* (*vowel and consonant* combinations). *Request for attention* was attained 62.25% of times using *vocal gestures* (*vowel*) as compared to 25% using *vocal gestures* (*vowel and consonant* combinations). Similar dominance (40.25%) in using *vocal gestures (vowels)* vs. *vocal gestures* (*vowel and consonant combinations*) (7.55%) was observed while *requesting object*. *Provision* of *information* (59.73%) again showed higher percentage of usage of *vocal gestures* (*vowel*) as compared to (30%) *vocal gestures* (*vowel and consonant* combinations). *Confirmation* by the participants were always attained by *vocal gestures* (*vowel*), while *denial* was elicited 73.45% using *vocal gestures* (*vowel*) as compared to 3.54% through the use of *vocal gestures* (*vowel and consonant* combinations).

Section IV: Responses of the mothers and children with SSPI and CP to the communication modalities used by each in the dyad.

Responses of children to various modalities used by mothers were analyzed. For each modality, the responses were analyzed on the following three parameters. These responses are tabulated in table 16.

- Response: Modality employed by mothers that was responded by children.
- No response: Modality employed by mothers that did not receive any response from the children.
- Not expected: Modality employed by mothers' for which responses from the children were not expected.

Vocalization: M1, M3, M5 and M9 did not use *vocalization* while interacting with their children. Hence responses were not calculated for these mothers. As evident from table 16, C2 did not respond to M2's attempt for *vocalization*, while C6 responded 50% of the times for M6's *vocalization*. C7, C8 and C10's response were not expected for mothers' *vocalization* as it was used to convey non obligatory functions.

Looking at object: Responses of C4 and C6 for this modality were not observed as their mothers did not utilize *'looking at object'* as a modality. As observed in table 16, C1 responded to all the communication attempts of M1, while C2 responded 50% of the times that M2 utilized *looking at object*. C3, C7 and C9 did not respond while C8 and C10 responded only 33.37% of the times to their mother's communication attempt using *looking at object.*

Looking at person: Among the dyads, only C7's responses to M7's *looking at person* was analyzed. C7 did not respond to M7's *looking at person* as a modality to communicate.

Looking at location: Responses of children (except for C6 and C7) to mother's usage of *looking at location* as a modality was analyzed based on the video recording. C1, C2, C3, C4, C8, C9 and C10 did not respond, while C5 responded only 33.33% of times that mothers used *looking at location* as a modality to communicate.

Looking at object and location: As observed in table 16, responses to M1, M2, M3, M4 and M6's '*looking at object and location'* as a modality was not analyzed. C8 responded to M8's all the attempts of communication using this modality. C7 responded only 50% of the times; C9 responded only 33.33% of the times, while C5 and C10 did not respond to their mothers' use of this modality.

Eye blink: C1, C4, C7 and C9 did not respond to their mothers' *eye blink*, while other mothers did not use this modality to convey their needs.

Facial expressions: C2, C3, C6, C8 and C9 did not respond to their mothers' use of *facial expressions* to communicate, while it was not observed in other mothers.

Showing: C6, C9 and C10 did not respond, C1 and C3 responded only 50% of times, while C7 respond to only 20% of times when their mothers used *showing* as a modality to communicate. Other mothers did not utilize this modality and hence children's response to this modality was not analyzed.

Pointing: M4, M5, M6, M7, M8 and M9 were the only mothers who used *pointing*, while communicating to their children. C4, C5, C6, C7, C8 and C9 did not respond to any of their mothers' attempts to communicate using *pointing* as a modality.

Table 16. Mean percentage of children's responses for mothers' nonverbal modalities.

C	R/NR /NE	VG	L(O)	L(P)	L(L)	L(O+L)	EB	FE	SH	PTG	RITU
C1	R	*	100	*	0	*	0	*	50.00	*	0
	NR	*	0	*	100	*	100	*	50.00	*	33.33
	NE	*	0	*	0	*	0	*	0	*	66.67
C2	R	0	50.00	*	0	*	*	0	*	*	0
	NR	100	50.00	*	100	*	*	100	*	*	66.67
	NE	0	0	*	0	*	*	0	*	*	33.33
C3	R	*	0	*	0	*	*	0	50.00	*	*
	NR	*	100	*	100	*	*	100	50.00	*	*
	NE	*	0	*	0	*	*	0	0	*	*
C4	R	*	*	*	0	*	0	*	*	0	0
	NR	*	*	*	100	*	100	*	*	100	66.67
	NE	*	*	*	0	*	0	*	*	0	33.33
C5	R	*	0	*	33.33	0	*	*	*	0	*
	NR	*	0	*	66.67	100	*	*	*	100	*
	NE	*	0	*	0	0	*	*	*	0	*
C6	R	50.00	*	*	*	*	*	0	0	0	0
	NR	50.00	*	*	*	*	*	100	100	100	50.00
	NE	0	*	*	*	*	*	0	0	0	50.00
C7	R	0	0	0	*	50.00	0	*	20.00	0	0
	NR	0	100	100	*	50.00	100	*	80.00	100	50.00
	NE	100	0	0	*	0	0	*	0	0	50.00
C8	R	0	33.33	*	0	100	*	0	*	0	0
	NR	0	66.67	*	100	0	*	100	*	100	50.00
	NE	100	0	*	0	0	*	0	*	0	50.00
C9	R	*	0	*	0	33.33	0	0	0	0	0
	NR	*	100	*	100	66.67	100	100	100	100	0
	NE	*	0	*	0	0	0	0	0	0	100
C10	R	0	33.33	*	0	0	*	*	0	*	0
	NR	0	67.67	*	100	100	*	*	100	*	0
	NE	100	0	*	0	0	*	*	0	*	100

Note: * indicates that the modalities were not observed in mothers and hence did not have any scope for responses from children.

C (1-10)*: Responses of children:* **Mod***: Modalities;* **Vg**: *Vocalizations*; **Vb**: *Verbalizations*; **L (O)**: *Looking at object;* **L (P)**: *Looking at person*; **L (L)**: *Looking at location*; **L (O+L)**: *Looking at object and location*; **EB:** *Eye blink*; **FE:** *Facial expressions*; **SH:** *Showing*; **Ptg**: *Pointing*; **Ritu**: *Ritualized*;

Ritualized gestures: C1 did not respond 33.33% of the times when M1 used *ritualized gestures*. On the contrary, C2 and C4 did not respond 66.67% of times that M2 and M4 used these gestures to communicate; while 33.33% it was used to convey non obligatory functions. C6, C7 and C8 did not respond 50% of times while 50% of the times, it was used to represent a non obligatory function. M9 and M10 used *ritualized gestures* to indicate non obligatory functions while it was not evident in M3 and M5's communication repertoire while interacting with their children. To summarize, children's responses to mothers' use of various modalities varied with the choice of modality and the function it depicted.

The choice of modalities by children with SSPI and CP could be because of the type of responses that they receive from their mothers. Mother's themselves might have personal preferences in the use of responses based on their ideas, beliefs, interactional nature and parenting issues which can further contribute to their being responsive to the modalities employed by children. To evaluate this notion further, the responses of mothers was examined on three parameters namely;

- Response: Modality employed by children that was responded by mothers.
- No response: Modality employed by children that did not receive any response from the mothers.
- Not expected: Modality employed by children for which responses from the mothers were not expected.

From table 17, it can be inferred that mothers' responses for different modalities employed by children depicted variations across modalities. Individual variations in mothers' responses were also evident from table 17.

Vocal gestures: As evident from table 17, M2 and M4 responded for all the *vocal gestures* attempts of their children. For their children's *vocal gestures*, M7 (95.45%) responded better than M9 (94.12%) and M10 (88.24%). M1, M3, M5 and M7 responded poorly to their children's *vocal gestures* (37.93%, 35.16%, 31.43% and 23.33% respectively). M6 never responded to C6's *vocalization*.

Ritualized gestures: M4, M7, M9 always responded to children's *ritualized gestures* while M1, M8 and M10 never responded to their children's *ritualized gestures*. M2, M3, M5 and M6 did not respond to their children's *ritualized gestures* as the modality was chosen to depict functions that did not warrant a response.

Looking at object: M7 responded to all the attempts of C7's *looking at object*, while M1 never responded to their children's *looking at object*. M5 (83.33%) responded better than M2 (66.67%) and M10 (50%) for their children's *looking at object*.

Looking at person: M9 responded to all the attempts of C9's *looking at person,* while M2 responded 66.67% of times for *looking at person* by children. M5 never responded to C5's *looking at person*. Responses of M3, M4, M6, M7, M8 and M10 were not warranted for children's attempt at '*looking at person'*.

Table 17. Mother's responses for various modalities used by children

M	R/NR/ NE	VG	Ritu	L(O)	L(P)	L(O + P)	Vg+ Ptg	Vg+ L(O)	Vg+ L(P)	Vg+ Ritu
M1	R	31.43	0	0	*	*	*	*	*	*
	NR	68.57	100	100	*	*	*	*	*	*
	NE	0	0	0	*	*	*	*	*	*
M2	R	100	0	66.67	66.67	*	100	*	*	*
	NR	0	0	33.33	33.33	*	0	*	*	*
	NE	0	100	0	0	*	0	*	*	*
M3	R	23.33	*	*	*	*	*	10.00	20.00	0
	NR	76.67	*	*	*	*	*	90.00	80.00	100
	NE	0	*	*	*	*	*	0	0	0
M4	R	100	100	*	*	*	*	*	*	*
	NR	0	0	*	*	*	*	*	*	*
	NE	0	0	*	*	*	*	*	*	*
M5	R	35.16	*	83.33	0	33.33	*	0	100	0
	NR	4.40	*	16.67	100	66.67	*	50.00	0	0
	NE	60.44	*	0	0	0	*	50.00	0	100
M6	R	0	*	*	*	*	*	100	*	100
	NR	100	*	*	*	*	*	0	*	0
	NE	0	*	*	*	*	*	0	*	0
M7	R	95.45	100	100	*	*	*	*	*	*
	NR	0	0	0	*	*	*	*	*	*
	NE	4.55	0	0	*	*	*	*	*	*
M8	R	37.93	0	*	*	*	*	*	*	50.00
	NR	62.07	100	*	*	*	*	*	*	50.00
	NE	0	0	*	*	*	*	*	*	0
M9	R	94.12	100	0	100	100	100	*	*	*
	NR	5.88	0	5.88	0	0	0	*	*	*
	NE	0	0	94.12	0	0	0	*	*	*
M10	R	88.24	0	50.00	*	*	*	*	*	*
	NR	11.76	100	50.00	*	*	*	*	*	*
	NE	0	0	0	*	*	*	*	*	*

(Note: *indicates that the particular modality was not observed in the child and hence did not have a scope for responses from mothers to occur)

M (1-10): *Mothers' responses*: **Mod**: Modalities employed; **Vg**: *Vocal gestures*; **Ritu**: *Ritualized gestures;* **L(O)**: *Looking at object;* **L(P)**: *Looking at person*; **L(O+P)**: *Looking at object and person;* **Vg+ptg**: *Simultaneous use of vocal gestures* and *pointing*; **Vg+L(O):** *Simultaneous use of vocal gestures and looking at objects;* **Vg+L(P)**: *Simultaneous use of vocal gestures* and *looking at person*; **Vg+ritu**: *Simultaneous use of vocal gestures* and *ritualized gestures*.

Looking at object and person: M9 responded to all the attempts of C9's *looking at object and person* while M5 responded to the same 33.33% of times. Responses of M1, M2, M3, M4, M6, M7, M8 and M10 were not warranted as this modality never occurred in children during interaction.

Vocal gestures and pointing: M2 and M9 always responded to their children's vocal gestures and pointing. Responses of M1, M3, M4, M5, M6, M7, M8 and M10 were not expected as their children never used *vocal gestures and pointing* during interactions with their mothers.

Vocal gestures and looking at object: Among the mothers, M6 responded to all the attempts of C6's use of *vocal gestures and looking at object*; while M3 responded 10% of times for the same. M5 did not respond 50% of times to C5's use of vocal gestures and pointing, while the remaining times, the responses was not expected. In the remaining mothers the responses were not expected as this function did not occur in their children.

Vocal gestures and looking at person: C5's use of *vocal gestures and looking at person* was always responded by M5; while C3's were responded only 20% of times. In the remaining mothers, the responses were not expected as this function did not occur in their children.

Vocal gestures and ritualized gestures: M6 responded for all the attempts of C6's use of *vocal gestures and ritualized gestures* simultaneously. However M8 responded only 50%

of times when C8 used *vocal gestures and ritualized gestures* simultaneously. M3 never responded to C3's use of this modality, while the response was not expected in M5.

To summarize, certain modalities always attained responses from mothers while other modalities never attained responses from mothers. *Vocalization* in C2 and C4, *ritualized gestures* in C4, C7 and C9, *looking at object* in C7, *looking at person* and *looking at object and person* in C9, simultaneous use of *vocalization and pointing* in C2 and C9, simultaneous use of *vocalization and looking at object* in C6, simultaneous use of *vocalization and looking at person* in C5 and simultaneous use of *vocalization and ritualized gestures* in C6 always attained responses from their mothers. On the contrary, *ritualized gestures* and *looking at objects* by C1 never attained responses from M1, while simultaneous use of *vocalization and ritualized gestures* in C3, *vocalizations* in C6, and *ritualized gestures* in C8 also never attained responses from their mothers. Other modalities used by children also attained variable responses as evident from table 18.

Responses of the ten mothers were calculated for different modalities used by their children. The mean, standard deviations, minimum and maximum percentages of responses are presented in table 18.

Table 18: Mean, standard deviations for mothers responses towards different modalities

Modalities	Mean %	SD
Vg	61.15	39.02
Ritu	30.00	48.30
L(O)	33.33	45.13
L(P)	16.66	36.00
L(O+P)	13.33	32.20
Vg+Ptg	20.00	42.16
Vg+L(O)	1.00	3.16
Vg+L(P)	12.00	31.55
Vg+Ritu	15.00	33.74

Vg*: Vocal gestures;* **Ritu***: Ritualized gestures;* **L(O)***: Looking at object;* **L(P)***: Looking at person;* **L(O+P)***: Looking at object and person;* **Vg+ptg***: Simultaneous use of vocal gestures and pointing;* **Vg+L(O)***: Simultaneous use of vocal gestures and looking at object;* **Vg+L(P)***: Simultaneous use of vocal gestures and looking at person;* **Vg+Ritu***: Simultaneous use of vocal gestures and ritualized gestures*

Mothers' responses for various modalities used by children are presented in figure 11. Figure 11 depicts the mothers' responses categorized as 'responses', 'no responses' and responses 'not expected'. From figure 11, it is evident that mothers responded 50.2% of times and 27.18% of times they did not respond while 22.62% of times, this modality did not expect any responses based on the functions they conveyed. Part body gestures included *ritualized* gestures for which mothers responded 80.39% and did not respond 15.69% of times, while only 3.92% of times, the modality employed depicted functions for which responses were not expected. *Eye gestures* included *looking at object*s/ *persons* (L (O)/L (P)) and *objects and persons* (L (O+P)). Mothers' responses for the same included 83.08% responses and 16.92% of times no responses for *looking at object*s. Mothers' responses for *looking at person* derived responses 60% of times, 30% no responses and 10% involved functions that did not expect a response. Mothers responded

60% of times for *looking at object and person* while did not respond 40% of times, thus not involving depiction of any functions that did not warrant a response.

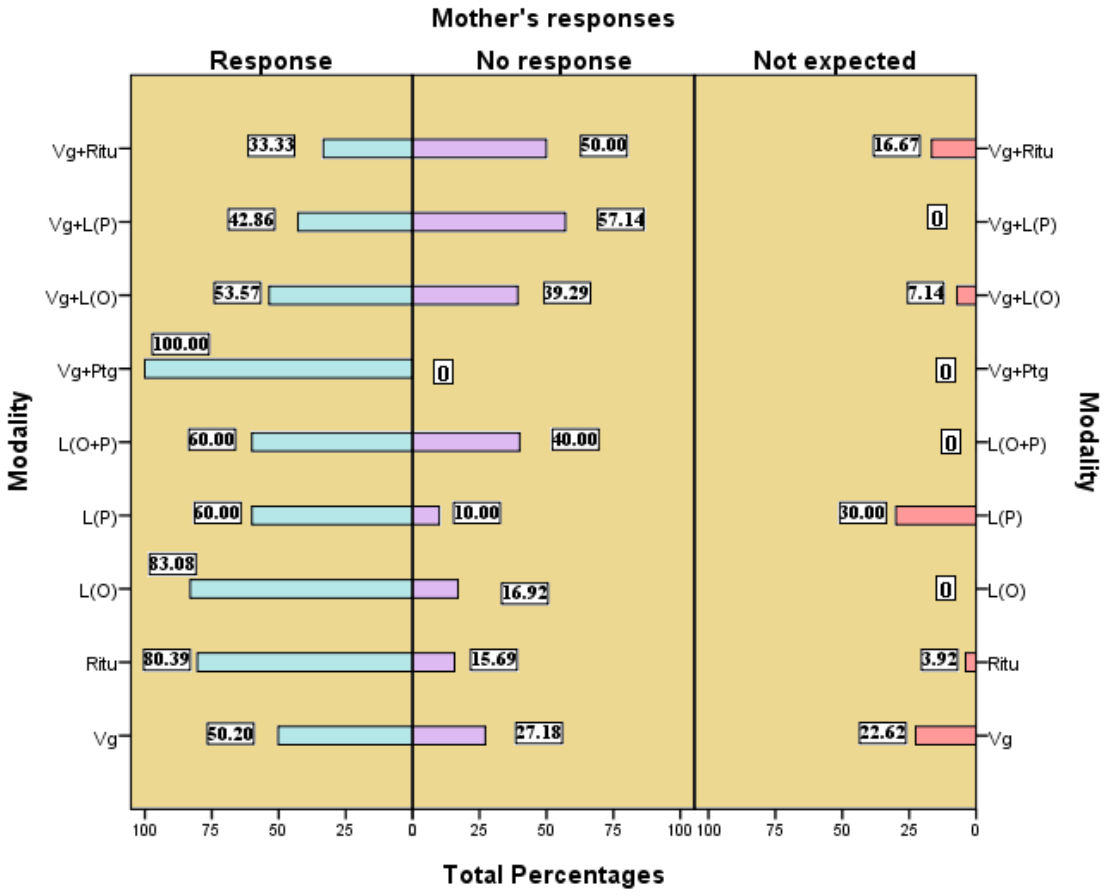

Figure 11: Mothers' responses to modalities employed by children with SSPI and CP.

Vg: *Vocal gestures;* **Ritu**: *Ritualized gestures;* **L(O)**: *Looking at object;* **L(P)**: *Looking at person;* **L(O+P)**: *Looking at object and person;* **Vg+ptg**: *Simultaneous use of vocal gestures and pointing;* **Vg+L(O)**: *Simultaneous use of vocal gestures and looking at person;* **Vg+L(P)**: *Simultaneous use of vocal gestures and looking at person;* **Vg+Ritu**: *Simultaneous use of vocal gestures and ritualized gestures*

Simultaneous gestures involved simultaneous co-ordination of complex motor and *vocal gestures*. Simultaneous use of gestures reveals a much later stage of communication and is preliminary to emergence of speech in typically developing

children. *Vocal gestures* along with *pointing* always obtained responses while *vocal gestures* along with *looking at object* obtained mothers' responses 53.57% of times and 39.29% no responses from mothers and 7.14% mothers' responses were not expected. *Vocal gestures* along with *looking at person* again were responded by mothers 42.86% of times, 57.14% were not responded and did not depict any function that did not expect a response. *Vocal gestures* along with *ritualized gestures* were responded 33.33% of times not responded by mothers 50% of times and 16.67% of times depicted functions that did not expect any responses from mothers.

Communication functions and modalities used to depict the function.

There is a strong link between the communication efficiency with the physical effort required in relation to the individual's physical capability, different goals in interactions, linguistic skills and the partner in the interaction. Profiling the modalities used provides details about the functional ability and functional usage in individuals who are dependent on nonverbal communication strategies. However information regarding functions depicted through these modalities enlightens the usability of these modalities. In literature, there are limited studies discussing the use of particular gestures to achieve particular intention.

Thus different communication functions evident in children with SSPI and CP were studied to determine whether a particular modality attained predominance in their communication acts. The communication modality employed by each child with SSPI and CP as identified by the judges to depict each function was tabulated and percentages

were calculated for the same. The choice of modality of each functions for all the ten children were combined to profile the functions represented by each gesture. This is graphically represented in figure 12

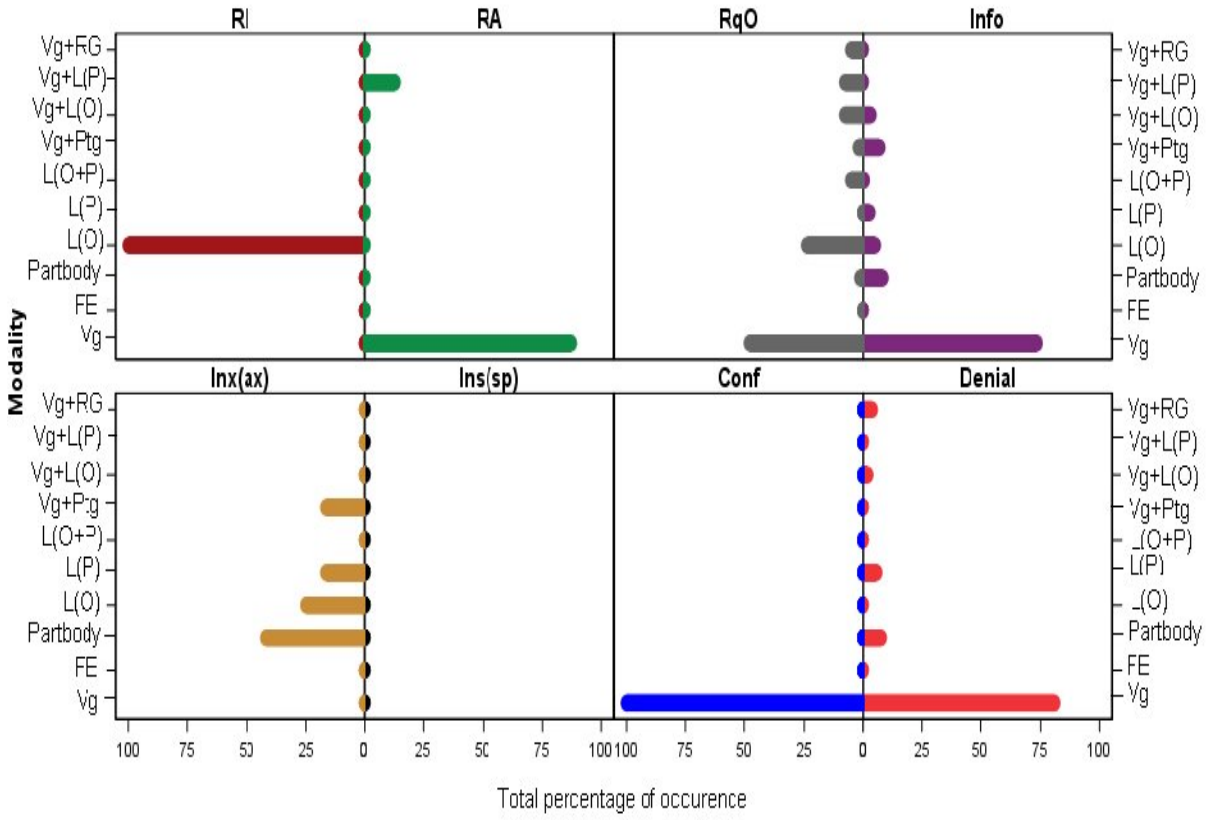

Figure 12: Modality usage in depicting communication functions

Vg: *Vocal gestures;* **Ritu**: *Ritualized gestures;* **L(O)**: *Looking at object;* **L(P)**: *Looking at person;* **L(O+P)**: *Looking at object and person;* **Vg+ptg**: *Simultaneous use of vocal gestures and pointing;* **Vg+L(O)**: *Simultaneous use of vocal gestures and looking at object;* **Vg+L(P)**: *Simultaneous use of vocal gestures and looking at person;* **Vg+ritu**: *Simultaneous use of vocal gestures and ritualized gestures*
***RI*: *Request** for information*; **RA**: *Request for attention*; **RqO**: *Request for object*; **Info**: *Information*; **Ins (ax)**: *Instruction for action*; **Ins (sp)**: *Instruction for speech*; **Conf**: *Confirmation;* and **Denial**

From figure 12, it is evident that *request* for *information* by children were always attained by *looking at object* (100%). *Request for attention* was attained using *vocal*

gestures 87.5% and 12.5% of times by simultaneous use of *vocal gestures* and *looking at person* respectively. *Request for object* showed the usage of various modalities. The modalities evident in *request for object* was *vocal gestures* (47.80%), *ritualized gestures* (1.26%), *looking at object* (23.90%), *looking at object and person* (5.03%), simultaneous use of *vocal gestures* using *vocal gestures* and *pointing* (1.89%), simultaneous use of *vocal gestures* and *looking at object*s (7.55%), simultaneous use of *vocal gestures* and *looking at person* (7.55%) and simultaneous use of *vocal gestures* and *ritualized* gestures (5.03%). *Information* as another communication function was attained using a wide array of modalities. *Vocal gestures* were used to convey *information* 73.46% of times, *ritualized* gestures 8.24% of times, *looking at object*s, 5.03% of times; *looking at persons,* 2.75% of times; *looking at object*s and *persons* , 0.46% of times; simultaneous use of *vocal gestures* and *pointing*, 6.86% of times and *vocal gestures* and *looking at object*s 3.20% of times.

Instruction for action was attained mainly through use of *ritualized gestures* (41.67%), *looking at object* (25%), *looking at person* (16.67%) and simultaneous use of *vocal gestures* and *pointing* (16.67%). *Confirmation*s were always attained using *vocal gestures* (100%). *Denial* was predominantly attained using *vocal gestures* (81.31%), *ritualized gestures* (7.48%), *looking at person* (5.61%), simultaneous use of *vocal gestures* and *looking at object*s (1.87%) and simultaneous use of *vocal gestures* and *ritualized* gestures (3.74%).

Section B

Maternal attitudes towards various issues in children with SSPI and CP

The secondary objective of the study was to describe how mothers participating in the study viewed their children's disability; specifically communication impairment linked to SSPI and CP, their sensitivity towards physical limitation that the condition imposes and their concerns about the condition and prognosis. A semi-structured interview using a detailed questionnaire specifically prepared for the purpose (Appendix D) was used to obtain mothers' views about various factors contributing to the acceptance of a communication system and contributing towards communication efficiency. Questions addressed specific issues such as the mothers' knowledge about children's nonverbal communication and how their children indicated needs, their children's responses, strategies that mothers preferred to improve understanding of their children's attempt to interact, impact of physical disability of their children on various developmental milestones, prognosis of their children, their (mothers) role in developing speech in their children and impact of encouraging nonverbal communication in them. All statements in the questionnaire were made as simple as possible for the parents to understand. Most of the questions were close ended requiring yes/no responses with mothers given the freedom to be descriptive wherever possible. Wherever required, mothers were encouraged to ask for clarifications/queries regarding the questions. Before conducting this semi-structured interview, mothers were informed that the investigator would note down any discussion with the investigator with regard to the questionnaire

addressing issues about their children. Mothers' responses to the questionnaire are discussed under the following headings:

- Indication of needs by their children
- Various communication functions utilized by their children
- Responses from children for various maternal functions
- Modalities that facilitate understanding communication attempts of children
- Impact of physical disability in children in various spheres of development
- Prognostic expectations by mothers about their children's condition
- Role of various strategies in rehabilitation
- Concerns that mothers' have about their children
- Knowledge about aids
- Impact of nonverbal communication in communication development of their children

Responses of each mother on the questionnaire was marked as 1 if they answered 'yes', and if they answered 'no' it was marked as 0. Individualistic responses of mothers on each domain are tabulated in table 19.

Indication of needs by their children:

Mothers were asked whether their wards indicated their needs. They had to choose among the options provided i.e. eye, facial, body, vocal and / or combination gestures. All the ten mothers responded by saying that their children indicated their needs using various non verbal strategies.

Table 19. Responses of mothers of children with SSPI and CP on the questionnaire

Domains	Sub- domains	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	Total % of responses
Indicating needs	Eye gestures	1	0	0	1	0	1	0	1	1	1	60
	Facial gestures	1	1	1	0	0	0	0	0	0	1	40
	Body gestures	1	0	1	0	1	0	0	0	0	1	40
	Vocal gestures	1	0	1	1	1	1	1	1	0	1	80
	Combination	1	1	1	1	1	1	0	1	1	1	90
Utilize function	Request for information	1	1	1	0	1	0	0	1	1	0	60
	Request for object	0	0	1	0	0	1	1	1	0	0	40
	Request for attention	1	0	0	0	0	1	0	0	1	1	40
	Instruction for action	0	1	0	1	0	1	0	1	1	0	50
	Denial	0	1	1	1	1	1	1	0	0	1	70
	Confirmation	0	1	1	0	0	0	0	1	0	1	40
Responses	Request for information	1	1	1	0	1	0	0	1	1	0	60
	Request for object	0	0	1	0	0	1	1	1	0	0	40
	Request for attention	1	0	0	0	0	1	0	0	1	1	40
	Instruction for action	0	0	1	0	0	1	1	1	0	0	40
	Denial	0	0	1	0	0	1	1	1	0	0	40
Facilitate understanding	Eye gestures	0	1	1	0	0	0	0	0	0	0	20
	Facial gestures	0	0	0	1	0	0	0	0	0	0	10
	Body gestures	1	0	0	0	0	1	1	0	0	0	30
	Vocal gestures	1	1	1	0	0	0	0	0	0	0	30
	Combination	1	0	1	0	0	0	1	0	0	0	30
Physical disability	Sucking and swallowing	1	0	1	1	1	1	0	0	1	1	70
	Speech	0	1	1	1	1	1	1	1	1	1	90
	Eye gestures	0	1	1	0	1	0	1	0	0	0	40
	Facial gestures	0	1	0	1	0	1	1	0	1	0	50
	Body gestures	1	1	1	1	0	1	1	0	1	1	80
	Vocal gestures	1	1	1	1	0	0	0	1	1	0	60
	Combination	1	1	1	0	1	1	0	1	1	0	70
	Social interaction	1	1	1	1	0	1	1	1	1	0	80
Prognosis	Will speak in future	1	1	1	0	1	1	1	1	1	1	90
	Do not require help from	1	0	1	0	1	0	1	0	0	0	40

	specialists											
	With the help of specialists	**0**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	70
Role	**Speaking more**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	90
	Playing with toys	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	50
	Encouraging nonverbal communication	**0**	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	40
Concern	**Eating and swallowing**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	30
	Head control and sitting	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	70
	Speech development	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**0**	80
	Schooling	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	40
Aids	**Physiotherapy**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	90
	Occupational therapy	**0**	**1**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	40
	Speech and language pathologist	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	70
	Sign language	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	20
	Communication board	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
	Computer programs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
Impact	**Combination of gestures-benefit**	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	50
	Combination of gestures-hinder	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	10
	Combination of gestures-No effect	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	30
	Social interactions	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	40

Note: The shaded boxes for certain sub-domains indicate the following:

	Indicates those sub-domains where judges observed the communication act while mothers did not report of its presence
	Indicates those sub-domains in which mothers reported of its presence while judges did not code for its presence

However the ways in which each child responded specifically differed. M1, M4, M6, M8, M9 and M10 reported that their children used eye gestures; M1, M2, M3 and

M10 reported that their children used facial gestures; M1, M3, M5 and M10 reported that their children indicated using body gestures while except for M7, the rest of the mothers reported that their children communicated using combination of gestures.

Various communication functions utilized by their children:

Further, mothers were queried about whether children indicated any of the functions namely request for information, attention, action and object; providing information, denial and confirmation. Mothers again responded by saying that children did employ communication functions. Eight out of ten mothers (except for M4 and M6) stated that their children requested for information, attention and object, while seven out of ten mothers (except M1, M8 and M9) stated that their children denied. On similar lines, M2, M4, M6 and M8 stated that their children instructed them to perform an action such as winding a toy or switching on the fan etc while M2, M3, M8 and M10 reported that children confirmed to their requests.

Responses from children:

On querying, whether children's responses varied with functions of mothers; M1, M2, M3, M5, M8 and M9 stated that their children usually responded for their request for information. M3, M6, M7, M8 and M9 indicated that their children responded for request for object while M1, M6, M9 and M10 reported that their children responded for request

for attention. On similar lines only M3, M6, M7 and M8 stated that their children responded to their denials.

Modalities that facilitate understanding communication attempts of children

Mothers were enquired as to which gestures they felt would facilitate their understanding of child's attempt to communicate. M1 responded by reporting that either body or vocal gestures or combination would facilitate their understanding of child's attempts to communicate. M2 reported that use of vocal gestures, while M3 reported that use of vocal or combination gestures, M4 indicated use of facial gestures while M6 reported that use of body gestures would facilitate understanding. M7 reported that use of body gestures and combination gestures would facilitate understanding their children's attempt to communicate. M5, M8, M9 and M10 did not feel the use of any of the above could contribute in their understanding of their child's attempts.

Impact of physical disability in children in various spheres of development:

A set of questions were asked to mothers to evaluate whether mothers are aware of the limitation imposed by the physical disability in areas/domains other than attaining motor milestones. All except one mother (M1) strongly felt that physical disability limits speech development. Except for M5 and M8, the rest of the mothers reported that physical disability impairs body movements while except for M5 and M10, rest of the mothers reported that it limits social interaction. M1, M3, M4, M5 M6, M9 and M10

reported that they were aware of the fact that physical disability affects vegetative functions such as sucking and swallowing abilities in children. M1, M2, M3, M5, M6, M8 and M9 reported that physical disability impairs use of combination gestures. M1, M2, M3, M4, M8 and M9 reported that physical disability limits use of vocal gestures, while M2, M4, M6, M7 and M9 felt that it affects production of facial gestures. M2, M3, M5 and M7 reported that physical disability affects production of eye gestures such as looking at an object or person.

Prognostic expectations by mothers about their children's condition:

An attempt was made to identify the mothers understanding of the prognosis in terms of speech development in these children. All except M4 strongly believed that their children would speak in future. M1, M3, M5 and M7 felt that they required help from the specialist for developing speech in children. M2, M4, M5, M6, M8, M9 and M10 reported that they do not require any help from speech pathologist.

Role of various strategies in rehabilitation:

In order to understand whether mothers felt that they had any role to play in developing speech, mothers were questioned on the different ways that they think would contribute to speech development in their children. Except for M4, all the mothers strongly believed that they can facilitate later speech development by speaking extensively to their children. M1, M3, M7, M9 and M10 felt that exploration of toys and

surrounding environment would encourage speech development, while M2, M3, M5 and M6 felt that encouraging nonverbal communication would facilitate later speech development.

Concerns that mothers have about their children:

Depending on the issues that mothers are concerned about, they would require information and suggestion towards intervention for the same. M1, M2, M3, M5, M6, M7, M9 and M10 reported that they were concerned about the child's speech development. Except for M8, M9 and M10, rest of the mothers were concerned about impaired motor milestones such as head control and sitting. Schooling was an area of concern in M3, M5, M8 and M9 while only M1, M3 and M5 were concerned about eating and swallowing issues.

Knowledge about aids:

To assess whether mothers were aware of different professionals involved in rehabilitation, they were asked whether they thought services from professionals such as physiotherapist, occupational therapist and speech and language pathologist would be beneficial for the development of their children. Nine out of ten (except M1) mothers felt that their children would benefit from physiotherapy, while except M1, M2 and M4, rest of the mothers felt that their children would benefit from speech and language therapy. M2, M3, M6, and M7 felt that their children would benefit from occupational therapists.

The questionnaire also attempted to evaluate whether mothers have information about sign language, communication boards and various software's available as a viable option for communication. Though M3 and M6 agreed that they have heard about sign language as an alternative system, they strongly felt that it is useful for children with hearing impairment. None of the mothers had ever heard about communication boards or any other computer programs for communication.

Impact of nonverbal communication in communication development of their children:

Most investigations in the area of non verbal communication believe that encouraging nonverbal communication strategies in children facilitate speech development in children (in cases where it can develop). Whether mothers too felt the same or not was assessed using a set of questions specifically addressing this issues. M2, M3, M5, M6 and M7 reported that encouraging use of nonverbal strategies would facilitate speech development in later stages, while M3, M4 and M5 felt that encouraging nonverbal strategies do not have any impact on speech development in later stages. M1, M2, M4 and M7 felt that encouraging nonverbal strategies in their children would help them interact with others while M1 felt that encouraging nonverbal strategies would actually hinder speech development. M8, M9 and M10 did not comment on this section as they reported that they had no clue about it. M1, M2, M4 and M7 felt that encouraging nonverbal communication has an impact on social interactions in these children.

Judges coding versus mother's responses on the questionnaire

A comparison was made between judges coding based on the video recording versus mothers reporting on the questionnaire on 3 main domains namely;

- Communication functions
- Communication modalities
- Responses of children to various communication functions utilized by mothers

Among the communication modalities, C2 and C5's use of eye gestures, C2, C4, C7, C8 and C9's use of body gestures, C2 and C9's use of vocal gestures reflected an incongruence in terms of judges coding and their mothers' reporting on the questionnaire. The mothers (M2, M4, M7, M8, and M9) did not report of these modalities to be present when it was actually observed in various instances by the judges in their children. Request for object in C1, C2, C5 and C9, instruction for actions and denial in C1, confirmation in C5 and C7 also revealed similar incongruence with mothers not reporting its presence while judges coding for its presence. Responses for request for information by C4, C6, C7 and C10, and responses for request for object by C5, responses for request for attention by C2, C3, C4, C7 and C8 and responses for instruction for action in C1, C2, C4, C5, C9 and C10 also showed similar incongruence (mothers not reporting while judges observing it during interactions).

In certain instances, mothers reported that certain communicating acts were present in their children but judges did not observe the same in the multiple recordings of

these children. Use of eye gestures in C4, C6, C8 and C10; use of facial gestures in C1, C2, C3 and C10; use of body gestures in C3 and C5 and use of combination gestures in C1, C4, C9 and C10 also revealed similar incongruence. Similar incongruence in terms of mothers' reporting for their functions while judges not observing them were evident in the usage of communication functions. Request for information in C1, C2, C3, C8 and C9, request for object in C7, request for attention in C1, C9 and C10, instruction for action in C4, C6 and C8; and denial in C6, C7 and C10 revealed incongruence.

To summarize, the study analyzed various communication functions employed by mothers and children with SSPI and CP. It further provided a comparison, in an attempt to view the differences in the communication functions used by mothers and children with SSPI and CP. Responses of mothers towards communication functions used by these children and children's responses to mother's communication functions were also analyzed. The study also profiled the various modalities used by mothers and children with SSPI and CP along with their responses to these modalities. Profiling of the choice of modalities to depict various communication functions in children was also carried out. Mother's responses to the questionnaire specifically prepared to view the maternal attitudes towards various issues in children with SSPI and CP and regarding their knowledge about the condition was probed. An attempt was also made to compare the judges coding of the children's communication function, modalities and responses to various functions with that of mothers responses to the questionnaire. The findings are discussed in detail with respect to the Indian context.

DISCUSSION

The findings of the present study are discussed under sections A and B.

SECTION A

The main results of this study indicated that the mothers and children with SSPI and CP showed qualitative (table 4 and 5) and quantitative variation (table 6, 7 and figure 1, 2, 3, 4 and 5) in the use of various communication functions and modalities during interactions. These differences could be primarily because of mothers being the verbal partner in interactions with children who had severely restricted motor ability and no speech. Although the results emanate from only ten mother-child dyads they are nevertheless interesting, because they primarily provide an understanding of the dyadic interaction in children with SSPI and CP who have not undergone any formal speech and language therapy. Thus it provides baseline information about the characteristics of the interaction in terms of functions, modalities and responses of this dyad.

Communication functions:

Analysis of the data revealed that M1 used *provision of information* (figure 3) more frequently, M2, M5, M6 and M7 used *request for information (general)* (figure 1), M3, M4, M8, M9 and M10 used *instructions for actions* (figure 4) most frequently. As observed in table 8 and figure 6, it is evident that most mothers in the dyad used more of *instruction for actions,* while interacting with their children with SSPI and CP. Other

most frequently used function was *requests for information*, followed by *provision of information*, *request for attention*, *instruction for speech* and *confirmations*. Functions such as *denial* (figure 5), were used less frequently by mothers, while *request for object* (figure 2) was minimally used during the interaction. Children with SSPI and CP on the other hand provided *information* (figure 3) most frequently, *requested for object* (figure 2) to a relatively higher extent and used *denial* (figure 5) more as compared to *request for attention* (figure 2). They seldom *instructed* their mothers to perform an *action* (figure 4), rarely *confirmed* (figure 5) and *requested for information* (figure 1) and never *instructed* their mothers to speak during these interactions (figure 4). Results indicated large individual differences in the use of different communicative functions in both children and their mothers.

Among the communication functions used by children, (table 7), C1, C5, C6, C7, C9 and C10 used *provision of information* more frequently (figure 3); C2 and C3 used *request for object* (figure 2), C8 used *denial* (figure 5) more frequently while C4 used *denial* and *provision of information* (figure 2) equally. Thus *request for object* as a communication function showed a difference in the use, wherein most children with SSPI and CP used it more frequently as compared to mothers (figure 2). Similarly, *provision of information was* more frequently observed in children as compared to mothers. Other functions such as *instructions for actions*, *instructions for speech* and *confirmations* were seen more frequently in mothers during interactions as compared to children with SSPI and CP. *Instructions for speech* were never seen in children's interaction with their mothers while mothers *instructing* their children to *speak* were infrequently used during

interaction. During interaction, mothers *confirmed* more frequently as compared to children. *Denial* was the second most frequently used function after *information* in the functions employed by children while it was evident in mothers minimally.

Dyadic communication functions were also compared as a group (table 8 and figure 6). Communication functions used by mothers and children with SSPI and CP as a group revealed differences in the 'communication functions' employed by the mothers and children with SSPI and CP. *Instructions for actions* were observed in most mothers while most children used *provision of information*. Mothers *requested for information* more frequently while only in few children, *request for information* was observed. Similar dominance in *request for attention, instructions for speech* and *confirmation* by mothers was evident as compared to children with SSPI and CP. *Denial* was used more frequently by children as compared to mothers.

Predominance of certain functions in mother's repertoire actually reflects their dominance in communication interactions forcing children to take a passive role. Further observation of the samples (based on the video recording) indicated that most of the topic initiations were actually carried out by mothers while children usually followed the mother's conversation moves. On the other hand, children's communicative functions were limited and comprised of single function. Most of the verbal communication was carried out by the mothers and they often consisted of multiple utterances with same functions repeated or comprising of multiple functions. Mothers of nonspeaking children take a larger proportion of communicative turns as evident by the higher frequency of

occurrence of communicative functions, thus depicting unequal partnership dominating the communication interaction. Higher frequency of occurrence of varied communicative functions observed in mothers as compared to children is also supported by other studies (Light Collier & Parnes, 1985 a & b; Pennington & McConachie, 1999 & 2001). However higher instances of use of *instructions* were also reported in mother-child interaction in typically developing children in Indian mothers (Sanagavarapu, Elliott & Relich, 1994). Thus, maternal dominance in the usage of certain communication functions might not be specific to conditions such as SSPI and CP, but might also reflect a feature of mother-child interactions in Indian context.

Request for information were seldom seen in the conversation of these children again supporting the findings of McConachie and Ciccognani (1995). Typically developing children do not tend to ask questions, until the age of 18 months with a subsequent spurt in their ability. Variations in the occurrence of certain functions could be reasoned based on the fact that certain functions might require complex language systems which are delayed/ absent in these children; while others could easily be produced with the naturally available communication system. Infrequent use of other communication functions may also be due to the maternal control exerted resulting in limited opportunities for acquiring these skills. Motor dysfunction, (Falkman, Sandberg & Hjelmquist, 2002) can be offered as at least a part of an explanation for the limited communication functions evident in the participants in this study. The physical dependence of these children due to their limited motor function could be compelling mothers to be over protective and attain a dominant role in their life in all spheres

including communication. Thus mothers being natural speakers tend to adapt to their children's' ways of communicating by being a dominant partner in conversation. It is also reasonable to argue that the lack of experience, as suggested by Falkman, Sandberg and Hjelmquist (2002), both of physically manipulating the environment and of social interaction on the part of these children can be offered as a partial explanation for the very low level linguistic complexity displayed by these nonspeaking children.

Responses of children to mother's communication functions and mother's responses to children's communication functions were also analyzed in detail (table 9 and 10). It is evident from table 9 that only few communicative attempts of mothers were responded to by these children during communication interaction. Certain functions such as *provision of information* by the mothers or *denial* and *confirmation* did not compulsorily warrant any responses from children as they are considered non obligatory functions. Certain observations were noted based on the video recorded sessions. For instance, *provisions of information* by the mothers were quickly succeeded by some other function elicitation by the mother. Hence there was less opportunity for children to respond to these functions. Further, it is observed that *provisions of information* as a function does not necessarily oblige children for a response and are thus not successful in prompting the children to take a turn in conversation (Pennington & McConachie, 1999). *Provisions of information* by mothers usually generated response from children in the form of imitation of the information provided within the children's limitation, or adding on to the provided information, either using gestural reciprocation or *vocal gestures* as attempts to describe it. Increased instances, of '*provision of information*' in most of the

children (C1, C5, C6, C7, C9 and C10) as evident in table 7 actually supports this notion. Again, this is one of the most common communicative functions reported among children at this age (Falkman, Sandberg & Hjelmquist, 1992).

Provision of information was high in children amongst other communication functions. The most likely probe which generates this function is *request for information*. To evaluate whether *provision of information* occurred most frequently in those children where this probe was used more frequently, *request for information (general)* and *request for information (yes/no)* were combined. Among the mothers as evident from figure 1 and 3, M6's repertoire revealed a higher percentage occurrence of *request for information* while interacting with C6 while C6 used fairly higher percentage of occurrence of *provision of information*. Similar findings were noted in M7-C7 dyad. However, when *requests* were limited in mothers, children still seemed to be providing *information*. For e.g. M2 *requested for information* more frequently as compared to M1, but *provision of information* was more frequently observed in C1 as compared to C2. These patterns also existed in other dyads such as M3, M4, M8, M9 and M10. One possible explanation for this asymmetry could be that certain *requests* from mothers were difficult for the children to respond to. When responses were compared across dyad for the functions used, it was observed that M7 responded better to C7's *provision of information*. Any behavior that is responded to has the tendency to occur more frequently. Thus, more of responses from M7 could have resulted in higher frequency of occurrence of *provision of information* in C7. Similar trends did not exist in other dyads.

Further observation of the samples revealed that, *denial* (though used sparingly by M2, M3, M4, M5, M7, M8, M9 and M10) was used by the mothers mostly to bring about change in focus of the children either in the activity/toy, postural changes (e.g., *Do not look down, lift your head*), or any other activity which was not possible for children to conduct. In most instances, mother's actually forced children to respond to them by snatching a toy if they indulged in it when they were conversing about some other toy, thus rarely giving a chance to respond (or positioning the child herself forcefully). *Instruction for speech* by the mothers mainly consisted of instructions as in '*say yes*' or '*produce a cat cry*' and resulted in fairly higher responses in terms of vocalizations from the child as compared to responses for actions. Probably, *instructions for actions* were much more complex and most of the time was motorically impossible for the child to produce (e.g., '*show how the crow flies*').

Mother's expectations were also different for *instruction for speech* vs. *instruction for action,* probably because none of the children had attended speech and language therapy while they attended considerable number of sessions of physiotherapy/ occupational therapy leading to increased motoric demand from them. Poor responses by children to maternal *request for attention* again necessitated further probing. In most instances, mothers usually exhibited a tendency to direct children's attention to an activity when they were already attending to it. Mothers might have used this as a strategy to emphasize and ensure that the material or activity that is being attended to remains in the children's focus. Such attention directing strategies have been discussed in detail by various researchers such as Akhtar, Dunham and Dunham, (1991); Tannock,

Girolametto and Siegel (1992) and Vigil and Hwa-Froelich (2004). It is not however clear whether such attention directing strategies actually contribute to communication development in the later stages or not. In this study, in certain instances (as evidenced from the samples) *request for attention* was used to initiate communication rather than actually generating children's attention towards the task/themselves. In other instances they were usually tagged with phrases which were mainly endearments such as (look, my dear). Such endearments are reported to be used by Indian mothers and are consistent features in mother-child interactions in Indian scenario (Sanagavarapu, Elliott & Relich, 1994).

Request for object by the mothers, as evident from table 9, again obtained poor responses from children in most instances and they were attributed to motoric limitations. Mothers *request for object* required children either to pick up a toy or release a toy which they were already possessing. These tasks by themselves are impossible; or if possible is time consuming and effortful for the children. Mother's hardly provided the required time for children to respond and moved on to the next activity or provided new functions thus preventing children from responding. *Confirmations* as a function in general, did not necessitate a response and hence was not evaluated for responses. Functions such as *requests for attention*, *requests for objects* and *confirmation* are reported as non solicitors of responses from children and rely heavily on contextual evidence in interpretation, and are thus not really helpful in developing children's conversational skills further (Pennington & McConachie, 1999).

In general, it is likely that poor responses by the children as compared to mothers could be due to the condition (SSPI) in itself or due to passivity of these children, which in turn probably led to the mothers assuming a dominant role in the communication interaction to maintain the communication cycle. Pennington and McConachie (2001) observed restricted patterns of communication in children between two and ten years of age with mothers taking over the conversation. Corresponding results were also observed with other types of speech and language impairment (Hansson, Nettlebladt & Nilholm., 2000) and children with Down syndrome (Pino, 2000).

Though there were individual variations observed; responses by the mothers and children were specific to the communication functions (figure 8). Certain functions (table 10) such as *request for information* by children were able to generate a wide range of responses from mothers ranging from 'nil' as observed in M1, M2, M3, M4, M6, M7, M8, M9 and M10 to responses "all the times" in M5; while functions such as *request for object* ranged widely (4.05%-100%). P*rovision of information* also generated a wide range of response from mothers. However this range should be considered keeping in mind that this function basically does not really warrant a response most of the times. Functions such as *instruction for speech, request for information (yes/no)* were not observed in the children's repertoire and hence responses were unwarranted in such cases. M5 always responded to *request for information (general),* while M5 and M6 always responded to *request for attention*. *Instructions for actions* in C9 were always responded by mothers.

Table 9 reveals that children with SSPI and CP also showed variation in responses for communication functions used by mothers. Instruction for speech by the mothers was attempted by all children, though the frequency of responses was poor. Among the children, C5's responses were better for *request for information (general)*. C7 showed better responses for *request for information (yes/no)*. C2's responses were better for *request for attention*, while *request for object* was better in C5. Responses for *provision of information* were better in C7, *instruction for action* in C9 and *instruction for speech* in C5.

Responses of mothers and children (as a group) for the functions were also compared. Children responded poorly to most of the mothers' communication function (figure 7) while mothers' when compared to children were more responsive to the communication functions used by children (figure 8). Children being non verbal possibly lacked the ability to respond or when they responded, mothers' failed to reciprocate their responses. However in most of the instances, mothers in general failed to respond to their children's attempt. It is possible that deficits in prelinguistic communication experienced by children with SSPI and CP have a transactional impact on the responses of the mothers (Yoder & Warren, 1999, 2001a). Mothers' responses play a larger role in the development of language in children (Tamis-LeMonda, Bornstein, & Baumwell, 2001). It also facilitates the transition to symbolic communication for children with disabilities. Unlike typically developing children, the transactional processes that support this shift may be difficult to accomplish due to their inherent condition. This is because, children with disabilities may either have delays in attaining milestones in prelinguistic

communication (Warren & Yoder, 1998) or utilize unconventional modes of prelinguistic communication that are not easily interpretable by the caregiver (Romski & Sevcik, 1996). The resulting delay in the use of conventional symbols further exacerbates the breakdown in the transactional process that supports linguistic development. A lack of conventional symbol use (e.g., speech) can also result in decreased levels of linguistic input, differing styles of input (i.e., directive input instead of responsive input (Blockberger & Sutton, 2003).

The limited ability to communicate also affects the opportunity available for the caregiver's to use intuitively known strategies to read these potentially communicative signals (Trad, 1994). Responses from mothers reflects that children's communicative act have an impact on communication and ensures motivation and attention by focusing on the immediate context (Girolametto, Weitzman, Wiigs & Pearce, 1999). By responding to their children's communicative move, mothers create a context around the children permitting easier extraction of language information that is useful for language development (Conti-Ramsden, 1994). From figure 8, it is evident that there were numerous occasions which mothers could have responded to, but did not respond. A failure to do so as indicated by no response could be explained on the lines of "idiosyncratic feedback cycle" (Leonard, 1998) in which the language delay of children may elicit less than optimal parental input as overcompensation, which in turn may further exacerbate the children's language-learning difficulties. Corresponding results have been reported in studies involving children with speech and language impairment wherein mothers were provided with a different set of linguistic stimuli that, in turn

affected the mother's input to children (Conti-Ramsden & Friel-Patti, 1984). Possibly, children themselves may be contributing in some ways, thus generating such input from mothers, which is not known. An alternative explanation could be that mothers might have communicated at a level that they felt the children could understand. In most instances, mothers of children with SSPI and CP felt that the children hardly communicated (expecting verbal output from them). There is also a possibility that communicative acts of these children might be less interpretable, which in turn may elicit a type of adult response that is less specific (Calendrella & Wilcox, 2000). Mothers are motivated to converse rather than teach language. Unfortunately such kinds of modifications or provision of contingent responses are not evident in mothers while interacting with their nonspeaking children. In contrast, behaviors such as asynchronous communication in terms of topic changes, missed response opportunities (Falkman, Sandberg & Hjelmquist, (2002), asymmetric conversational interaction may exacerbate the communication difficulties and in turn communication development.

Modalities used by mothers and children were also analyzed. While analyzing modalities, since children participating in the study are nonverbal, an attempt was made to compare the non verbal modalities of both mothers and children. Among the non verbal modalities in mothers, *vocal gestures* included any kind of vocalizations used by mothers. Simultaneous usage of *vocal gestures* with other modalities was not evident in mothers as they most often used speech with gestures. On the whole, mothers used few non verbal modalities as an individual entity while communicating with children.

Individual variations were also high in mothers' use of modalities as evident from table 12.

In most instances, due to postural difficulties, children had difficulty looking at mothers. Mothers often had to physically balance the child during interaction, or supporting them by their trunk or head. It is also likely that this tendency could have resulted in comparatively poorer usage of non verbal modalities. Mothers being verbal partners tended to use more of verbal modalities while communicating. They also used a combination of verbal and nonverbal modalities which is a natural phenomenon.

Children with SSPI and CP depicted a whole range of modalities to indicate their needs as evident from table 13, 14 and figure 9. As stated by Sandberg and Liliedahl (2008), language development has its roots in non-linguistic communication and it is reasonable to argue that children with physical impairments also have an urge to interact using these non linguistic modalities. Non-disabled children are quite competent in using a wide range of linguistic expressions by the time they reach preschool (Falkman, Sandberg, & Hjelmquist 2002). Children participating in this study, in the absence of speech had no means of communication except depending on the non verbal modalities. Amongst the modalities employed, there was a predominant use of *vocal gestures* as compared to other motoric gestures such as *part body gestures*, *eye gestures*, *facial gestures* etc. The predominant use of *vocal gestures* can be further attributed to its close resemblance to speech or being known as a preliminary step in communication development in typically developing children. In the absence of speech, it is likely that

vocal gestures seem to be the most acceptable strategy by these children. Children, in spite of having an alternative communication strategy in his or her communication repertoire which could be easily understood by the listener; preferred using *vocal gestures* because they are considered socially and contextually appropriate (Johnston, Reichle & Evans, 2004). Decreased use of other modalities as compared to *vocal gestures* could also be a reflection of the increased pressure on such children to speak to the extent that other communication strategies are possibly ignored or misunderstood (Carter & Hook, 1998) or that previous use of the same has not been responded to by mothers resulting in fading out of these from the communication repertoire.

Paucity of *facial gestures*, *limb gestures*, etc does not mean that it is sparingly being used for communication. It could be because such communicative acts are more difficult to be judged as compared to *vocal gestures*. Children with CP frequently use unconventional, ambiguous, and idiosyncratic movements. Depending on the configuration of the behavior, that convey the intent, either singly or in the combined form; there is obvious confusion in mothers to interpret the children's behaviors and associate meanings. Mothers in these situations must make inferences on the basis of other available source of information such as the context, basic understanding of the nature of the child and previous experiences of interacting with the child. The other option is that the caregivers or the communication partners have to adapt to other kinds of expressions (Iacona, Carter & Hook 1998) and attribute meanings to the same (Yoder, Warren, Kim & Gazdag, 1994).

In typically developing children, representational gestures emerge within familiar games and routines and later become less context bound (Caselli, 1990). Motor and vocal behaviors such as babbling and simple games of turn-taking expose children to a wide range of opportunities for active participation in interaction. Children who have physical disabilities do not have independent mobility or functional manipulation skills, thus restricting independent access to the environment and severe limitations in their experience to physical elements such as books, toys, etc. (Light & Kelford Smith, 1993). Children with SSPI and CP experience problems due to motor dysfunction and lack of speech (Falkman, Sandberg, & Hjelmquist 2002) resulting in lack of exposure to such familiar games and routines. Much of the early learning also involves physically acting on the world, which is difficult for children with physical impairment. Early and familiar communicative routines involve hand or vocal skills, both of which are unavailable for such children. Motor delays in children's behaviors and response may limit early awareness of the relationship between their own behaviors and other events. Such lacunae in physically manipulating the environment and social interactions can be the reason for the reduced use of the modalities, which is otherwise possible for the children.

Reduced use of other gestures could also be because of the motoric complexity and involvement of complex co-ordination of movements reflecting their inherent physical limitation as in extending hand to get an object or pushing an object to indicate *denial* (Cress et al., 2000). It is also possible that earlier communication attempts might have been unsuccessful resulting in development of passivity in these children (Cress et al., 2000). Though *simultaneous* uses of gestures along with speech are generally seen in

typically developing children, children with cerebral palsy are unable to combine *voicing* along with other gestures such as *looking at person* or with *ritualized gestures* due to motor limitation. Combining *voicing* and *gestures* requires greater coordination and effort than producing any of the modes singly. Ideally, *voicing* coupled with *gestures*, would improve the clarity of the intended message. But this likelihood does not seem to be successful with these children. It could be that coupling of *voicing* and other gestures simultaneously is time consuming and the co-occurrence of motor impairment, contributes to the unconventional, time consuming and effortful communicative act. Thus they hardly seem to be contributing towards improving the intelligibility, but rather cause distortion of the intended message; possibly inviting lesser contingent response from the mothers or being ignored by mothers (Bode, 1997).

Children's responses to mothers' nonverbal modalities (table 16) also revealed individual preferences. On similar lines, mothers' responses for children's modalities also revealed individualistic variations as evident from table 17.

Possibly, signals of these children were very weak and subtle and parents had difficulty noticing these signals leading them to ignore these, resulting in children giving in to the parent's will. Infants with severe disability fail to exert control, because of caregiver's problems in reading their early signals or the infants' ability to act on objects (Kraat, 1985). This was evident in many instances in the samples. Mothers respond by providing contingency responses to intentional communication acts more frequently because it is more sociable and interpretable (Wilcox, Kouri & Caswell, 1990; Yoder &

Warren, 1999). This could be one of the reasons for mothers not responding to most of these children's attempts (figure 11) as they were not able to attribute meaning to them. Sandberg and Liliedahl, (2008) stated that in instances where in children's acts are missed or ignored; usually the initiatives are directed towards an activity or goal other than the one that was the focus of the parent resulting in parents redirecting the children's attention to the ongoing activity.

On one hand, such missed opportunities by mothers' leads to failure in developing motivation in these children to act on the environment. This in turn further initiates a cycle of learned helplessness (Schweigert, 1989). The long term effect of this learned helplessness leads to children being passive in communication or even a failure to develop intentional communication in them (Basil, 1992). Behaviors such as asynchronous communication in terms of topic changes, missed response opportunities (Falkman, Sandberg & Hjelmquist, (2002), asymmetric conversational interaction exacerbate the communication difficulties in children with SSPI and CP and in turn hamper communication development. Poor responses of children to mothers' modalities thus reflect their inability to respond due to lack of skills due to severe speech and motor impairment.

Most of the learning in the use of modalities and responsive behavior happens during interaction. Learning when to refrain from producing particular communicative acts involves conditional use requiring children to evaluate potential communicative opportunities to determine the relative efficiency of each of the available modality

(Johnston, Reichle, & Evans 2004). Such interactive experience is not available for children with SSPI and CP possibly due to reduced exposure to communication opportunities and may be due to communication dominance from partners. Investigators such as Mundy and Gnomes (1998) have credited children with intent to communicate when they produce gestures, vocalizations and/or eye contact to direct attention/actions of their interactive partners. Further, intentionality as described by Wilcox, Hadley and Ashland (1996) means an expectation of a response as evidenced by waiting after a communication attempt and persistence in communication attempts that may be revised if necessary to improve clarity. Such waiting for a response and revision of the communication skills were also absent while interacting with children with SSPI and CP.

The use of *vocal gestures* as discussed earlier revealed by its predominance in the communication repertoire in the children could be because of its close resemblance to speech. Mothers respond to *vocal gestures* and interpret them as they would interpret vocalization in the illocutionary stages (Bates, Camaioni & Volterra, 1975) or preintentional stages as suggested by Wilcox, Kouri and Caswell 1990 (as interactive partners recognize and attribute meaning to young children's behavior). Thus most functions are identified by the involvement of *vocal gestures* either singly or in combination. Pairing of *vocal gestures* along with other gestures to depict most functions could be due to the fact that these *vocal gestures* from their prior experience were capable of getting the mother's attention to their requests/interests. Some of the modalities such as *looking at object/person object and person* requires mothers' attention or expectation. These gestures are so subtle and context based that the interpretation of these gestures

requires either prior experience of interacting with children, or a thorough understanding of the context.

Findings reveal that *request for object* was interpreted based on the context and activity in which it occurred. *Provision of information* was again an activity which was on demand from the mothers. Hence there were chances of recognizing it more frequently as mother's anticipated the response of children. Modality usage again was task specific as in showing the object for mother's enquiry about the object/person. Children in the study employed *requesting attention* most frequently by using *vocal gestures* and minimally by using *vocal gestures* combined with *looking at the person*. Similar findings are noted in Pennington and McConachie (1999) study wherein children were reported to initiate conversation using *vocalization* and /or *gesture*, thus making their signals distinctive and raising their chances of getting the listener's attention. Other functions such as *confirmations*, *denial*s, *requests for objects/actions* and *requests for attention* are aided by contextual *information* and are expressed using *gesture* and/or *vocalization* (Pennington & McConachie, 1999).

Non verbal communication consists of a wide range of motoric including *vocal gestures*. Though these infants rely on vocalizations, eye-gaze and gestures while interacting with communication partners, these signals may be ignored or incorrectly interpreted because of their inherent unintelligibility. As Iacono, Carter and Hook (1998) state, depending on the configuration of the behaviors that convey the intent, either singly or in combined form, there is obvious confusion about how to interpret children's

behaviors and associated meanings and his or her communication intention. That could be the reason why certain functions as evident to the judges and identified as modalities were missed out by the mothers as expressed by them on the questionnaire. Bode, (1997) also accounts for ignoring or misinterpreting these signals because of the inherent intelligibility. Interpreting nonverbal signals are more complex as it usually involves a combination of multiple behaviors of different configuration arranged in a particular manner (Weinberg, Gianino & Tronick, 1989).

Use of modalities to depict various communication functions

Children with SSPI and CP employed various modalities to depict various communication functions as observed in figure 12. Among the modalities used, children with SSPI and CP showed predominance for *vocal gestures* as compared to other gestures. *Part body gestures* such as *pointing and ritualized gestures* were used less frequently. Children with SSPI and CP predominantly used single gestures as compared to combination gestures (sequential /simultaneous). *Facial gestures* were never used for communication, while *looking at object and/or person* were seldom used for communication. *Vocal gestures* were the chosen mode for *confirming*, while it was predominantly used to indicate *request for attention, information* and *denial*. Other gestures such as *part body gestures* and *combination gestures* (*simultaneous*) were seldom used to indicate *instruction (action)* and *denial*, while *looking at object* was the preferred mode to indicate *request for information*. *Request for object*, though was attained mostly by use of *vocal gestures*; *looking at object, looking at object and person,*

and *simultaneous usage of vocal gestures, looking at object/person,* or with *ritualized gestures* was also evident in these children. Mothers' responses for *vocal gestures*, *looking at object* and *simultaneous* use of *vocal gestures* along with *ritualized* gestures did not reveal significant differences. On the same line, mothers' responses for children's *looking at object*, *looking at person*, *looking at object and person*, *simultaneous* use of *vocal gestures* with *looking at object*, *looking at person*, *pointing* and *ritualized* gestures again did not reveal any significant differences.

SECTION B

The responses to the questionnaire (table 19) highlight the fact that mothers recognized the ability of their children to communicate various functions through different modalities in spite of being nonverbal. Among the modalities, mothers noted that children used combination gestures (except for M7), thus understanding that communication is multimodal and acknowledging these aspects of communication. A considerable percentage of mothers (except M2 and M9) stated that their children used *vocal gestures*, which again could be because they expected children to speak. The same group of mothers stated that their children also responded by using *body gestures*. In the absence of speech, they felt *vocal gestures* mimicked speech more closely and conveyed information. *Body gestures* were most obvious gestures as compared to other gestures and gained attention towards it more easily than *eye* or *facial gestures*. *Eye gestures* and *facial gestures* are quite difficult to be perceived. Most often mothers attributed communication through *eye gestures* as compared to *facial gestures*. It could be because

facial gestures are more difficult to be recognized and more contorted as compared to *eye gestures*. Thus most mothers felt that *eye gestures* provided more information as compared to *facial gestures* which might necessarily not be the case.

Mothers also reported that children employed various communication functions. Amongst the functions most mothers stated that their children *requested for information*, *object* and *attention*. C4, C6, C7 and C10 did not *request for information* and C2, C3, C4, C5, C7 and C8 did not *request for attention* while C1, C2, C4, C5 and C9 did not *request for object* as stated by their mothers. C1, C8 and C9 did not *deny* as reported by mothers. They also reported that *instructions for actions* and *denial* were sparingly used by all the children.

Mothers also recognized that certain functions such as *requests for information* are better responded to by children (except for C4, C6, C7 and C10) as compared to other functions while there were limited responses for *request for object*, *instructions for action* and *denial*. Among the modalities discussed, mothers were not really aware of the fact that certain modalities when used in combinations with others could actually facilitate better understanding of the communicative attempt of their children. Probably the lack of awareness about the existence of non verbal communication strategies and knowledge about how to shape them for communication effectiveness could be the reason for poorer maternal responses. On the contrary, 50% of mothers believed that encouraging combination of gestures benefit speech development, while only 10% felt that it hinders

speech development. 30% mothers reported not having any information about the role of encouraging combination gestures in later speech development.

Physical disability has its impact on various spheres of development. Mothers understanding of this fact would play a key role in the prognostic expectations of these children. Majority of mothers acknowledged the fact that the major impact of physical disability is on the development of speech-language skills (except M1). Except for M2, M7 and M8, the rest of the mothers also reported that deficits in sucking and swallowing were due to the impact of physical disability. However they attributed this difficulty to poor neck control or difficulty in sitting. The fact that physical disability has an impact on oromotor weakness as reflected in inability to suck, swallow and poor co-ordination between physiological processes are unknown to these mothers. Majority of the mothers (except for M5 and M10) also felt that physical disability has an impact on social interactions in the form of inability to play with typically developing peers due to the disability. Further, all the mothers reported that an extensive part of the daily routine is spent on attending various intervention programs in different centers and this hardly permits time for social interactions with others.

Regarding development of speech in future, majority of mothers (except M4) had hopes that speech would emerge. Since children had delayed motor milestones, and they were picking up these skills over time, mothers assumed that speech would also emerge with time. The role of speech and language pathologist in the development of speech and language skills was acknowledged by a limited number of mothers. In clinical practice,

the assumption that speech would develop without any speech and language pathologists help generally leads to the hazard of getting referred to a professional at a much later stage when mothers have lost hope on development of speech. M2, M4, M6, M8, M9 and M10 believed that their children would speak without the help of the specialists which again is a dangerous trend. Except for M4 all the other mothers believed that speaking more to their children would help in developing speech at a later stage. Playing with toys was also believed to develop speech development. Though this is quite acceptable, mothers should also be aware of the ways in which they should speak and respond along with instructions on how to play with their children with SSPI and CP. In most of the instances, mothers need to be sensitized regarding this matter to facilitate speech development within the limitation of the condition. M2, M3, M5 and M6 acknowledged that encouraging nonverbal strategies facilitates speech-language development in later stages.

Mothers were concerned about various issues, with lack of speech being the major concern. M1, M3 and M5 were concerned about their children's eating and swallowing difficulties. M8, M9 and M10 were also concerned about motor milestones such as head control and sitting ability. M4 and M10 were concerned about their children's speech development. M3, M5, M8 and M9 had concerns about the schools where they can place their children in future. All the participating dyads were attending physical interventions but did not have any mobility devices. Most of intervention was focused on strengthening, decreasing/increasing tonicity in the muscles whichever was applicable. Mothers were physically carrying their children, which was causing greater difficulty to

them and causing concern. Schooling was another concern that mothers faced. Lack of information about schools that cater to the needs of these children along with the physical difficulty of taking these children to schools caused a major concern for mothers. Mothers were again not familiar with the eligibility criteria in these schools (e.g. children did not achieve age appropriate milestones such as sitting and walking, speech and toilet control, mothers felt that they would not be eligible for schooling).

Among the professionals involved in the rehabilitation of their children, M1 was the only mother who was not aware of the role of physiotherapist possibly, because she was included in the study during her early few visits to the centre. Mothers' also acknowledged the role played by each of the professionals in the rehabilitation of their children. Most of the rehabilitation centers that these children were attending already had physiotherapist/ occupational therapist. They were guided to consult a speech and language pathologist for their children's difficulty in speech. M3 and M6 reported to have heard about sign language as one of the nonverbal strategies but felt that its usefulness was limited to hearing impaired individuals. Communication boards and other dedicated software programs were unheard of by the mothers. In India, centers catering to the speech and language needs of these children are actually handful. Most of these centers extensively use communication boards and other dedicated soft wares. But poor awareness and lack of accessibility to these centers leads to mother's ignorance about these facilities.

M2, M3, M5, M6 and M7 felt that combination of gestures along with speech would benefit speech and language development in future in their children. M1 was the only mother who felt that such combination would hinder speech and language development in future. M3, M4 and M5 did not feel any differences in using such combination. Lack of knowledge about the benefits of encouraging nonverbal communication strategies requires serious attention from interventionists as this attitude would hinder the acceptance of AAC strategies in the intervention program.

Judges coding versus mothers reporting on the questionnaire

M1, M2, M3, M8 and M9 responded to the questionnaire by stating that their children *requested for information*, but it was not coded by the judges. Similarly M1, M2, M9 and M10 responses on the questionnaire on *request for attention*, again showed a disagreement wherein judges did not code while mothers reported that children used this function, while M5 reported that is C5 used request for attention, while judges did not code for its presence. Communication function namely *request for object* also showed disagreement between mothers' responses and judges coding. M1, M2, M5 and M9 responded by stating that their children never *requested for objects* while judges observed this function in their repertoire. On the contrary, M7 reported that C7 *requested for objects*, while it was not coded by the judges. Such disagreements were also observed in functions such as *instructions for actions*, wherein disagreement was observed in M1 (mother did not report, however judges observed); and M6 and M8 (mothers' reported while judges did not code). Similarly, M1 did not report to their child using *denial*, while

it was coded by the judges, while M6, M7 and M10 reported that their children used *denial* while judges did not code them based on the video recording. Incongruence in terms of judges observing while mothers not reporting for the presence of modalities such as eye gestures in 20% of instances, body gestures in 50% of the instances, vocal gestures in 20% of instances were noted. In certain instances, eye gestures (40%), facial gestures (40%), body gestures (20%), combination gestures (40%) were reported to be present by mothers while judges failed to observe them in the video recording.

M5 and M7 also reported that their children never *confirmed*, while it was coded by the judges, while M2, M3, M8 and M10 stated that their children *confirmed*, while it was not coded by the judges. There were instances where mothers did not report of use of certain modalities by their children but was coded for the presence by the judges such as *vocal gestures* (M2 and M9), and *body gestures* (M2, M4, M7, M8 and M9). Mothers also reported that their children used *facial gestures* (M1, M2, M3, and M10), *body gestures* (M3 and M5), *eye gestures* (M4, M6, M8 and M10) and *combination gestures* (M1, M4, M9 and M10), which was not coded for the presence by the judges. To summarize, the percent responses of mothers on the questionnaire versus the judges coding were compared. Judges did not code for the presence of functions such as *requests for information* (50%), *request for attention* (30%), *and instruction for actions* (30%), *denial* (30%) and *confirmation* (40%) which was reported by mothers to be present in their children's repertoire. In the same lines, judges observed the presence of certain functions such as *request for object* (40%), *request for attention* (10%), *instructions for*

actions (10%) and *denial* (10%) which mothers did not report to be present in their children.

Responses of children as observed by the judges when compared to mother's reporting also showed certain discrepancies. Responses for *request for information* (40%), *request for object* (10%), *request for attention* (50%) and *instructions for actions* (60%) were coded by the judges while the same was not reported by mothers. On the other hand, *request for object* in children was coded by mothers in 40% of instances, while it was not coded by the judges. Since three judges separately coded for the presence of these functions and modalities based on the video recordings, it is quite unlikely that these functions could be misinterpreted. Again, the higher frequency of occurrences of these functions strengthens the judges' observation for the presence of these functions in children with SSPI and CP selected for the study. This aspect warrants a serious thought because though certain functions and modalities were present in their children's repertoire, they were not recognized by mothers. Such non recognition of functions and modalities by the mothers may most likely lead to children's attempts not being shaped or fine tuned to improve their strength and clarity. It may also become extinct in the children's repertoire for not being encouraged or reinforced. It is possible that mothers' expectation from children with SSPI and CP might also play a key role in determining the communication acts. Mothers fail to associate the modalities representing various functions in attributing meaning to their children's feeble attempt to communicate, often ignoring them as persistent or pathological reflexes.

Mothers also indicated that there is scope for improvement of the current communication strategies utilized by the children and certain endeavors of children could actually facilitate better understanding of their communication attempts. In addition to that, mothers acknowledged the fact that physical disability has an impact on a range of areas, with its major impact on speech. Majority of the mothers were optimistic about speech development in future. This is again an issue that needs to be addressed by therapists addressing AAC. Such optimistic attitude towards speech development reflects on an urgent need to educate and sensitize mothers towards nonverbal communication strategies and its benefits in the long term management of such children. The centers from where these mothers were contacted did not have speech and language pathologist in their intervention team and none of them had speech and language intervention except one. In such a scenario, for mothers to appreciate the role of speech and language pathologist in speech development is commendable. The issues faced by mothers during children's development period such as feeding, motor issues and other medical issues either places speech development under lesser priority or possibly certain issues such as not having head control would have strengthened their belief that speech, like other developmental skills is just delayed and would also develop over a period of time. However, such beliefs reflect the lack of information about speech development and their role in the process of communication development. The impact of physical disability on social interaction also deserves attention. Mothers who responded to the impact of physical disability on social interaction however reasoned out by stating that children being nonverbal do not have opportunities to mingle with other typically developing children and mostly lead a life of isolation.

The study discussed the differences in the usage of various communication functions by the mothers and children with SSPI. It also profiled the usage of various modalities within the conditional limitation and specifically for depicting certain functions. The study discussed in detail the variations in maternal responses for various communication functions and modalities; and children's responses to mother's communication functions. Mothers' responses to the questionnaire provided an insight into the various issues that mothers are concerned about along with their impression about children's communication potential. The lack of awareness about the condition (SSPI and CP) needs urgent attention from professionals. The impact that the condition imposes along with role of various professionals in the rehabilitation of the children is an area that needs to be addressed by professionals dealing with these dyads. Communication among professionals and working as a team would provide long-term and effective management of these children. The need for information regarding mobility devices, communication systems and schooling is also highlighted.

SUMMARY AND CONCLUSIONS

Cerebral palsy is a disorder with nonprogressive motor impairments that are identified at birth or in early childhood. Children with cerebral palsy present speech, language and communication disorders along with other associated impairment. In severe cases, individuals have poor motor control and are usually non verbal. Severe speech and language impairment (SSPI) seen in children with CP could be because of the physical limitation (Cress, et al., 2000) imposed by the condition along with the other associated issues.

The major objective of the study was to analyze communication interactions of children with severe speech and physical impairment (SSPI) and cerebral palsy (CP) with their mothers during instructed play. The specific aims were to study:

Section A:

- 'Communication functions' used by mothers and children with SSPI and CP
- Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.
- 'Communication modalities' used by the mothers and children with SSPI and CP.
- Responses of mothers and children to the communication 'modalities' used by each in the dyad.

Section B:

The secondary objective of the study was to describe how mothers' participating in the study viewed their children's disability; specifically communication impairment linked to SSPI and CP, their sensitivity towards physical limitation that the condition imposes and their concerns about the condition and prognosis.

Method

The participants were selected from various rehabilitation centers. Informed consent was obtained from mothers prior to their inclusion along with their children in the study. Ten Kannada speaking dyads between the age ranges of 2; 1 to 3; 11 years (mean age range of 2.8 years) with the diagnosis of severe quadriplegic cerebral palsy belonging to middle socio economic status [as on the adapted version of NIMH Socioeconomic status scale (NIMH, 1994)] participated in the study. Receptive language of the children were found to be within ± 3 months of their chronological age as assessed using 'Assessment Checklist for speech and language skills' (Geetha, 2007). A checklist was prepared to specifically assess the nonverbal receptive and expressive language skills and choice of modality by the children in children included in the study. None of the children in the study had undergone formal speech and language therapy except one participant who attended speech and language therapy for duration of a month. Mothers involved in the study were in the age range of 21-30 years (mean age range of 25 years) and had a minimum qualification of 12^{th} grade.

Toys and activities suitable for children in the selected age range were provided to mothers and they were told to interact with their child as they would normally do at home. Few trial recordings of interactions were carried out with different set of toys for familiarizing the participants to the testing procedure and desensitizing the participants towards the camera. Mother-child interaction was video recorded in a quiet room with limited distraction for 15-20 minutes in a comfortable setting during instructed play situation. Four interactive sessions of fifteen minutes each were recorded in order to provide maximum opportunity for the occurrence of communication functions and to rule out the contextual limitations if any (as in selection of a particular toy). Following this, a semi-structured interview was carried out using a detailed closed ended questionnaire. It was specifically prepared for the purpose to obtain mother's views about various factors contributing towards the acceptance of a communication system and towards communication efficiency.

The investigator (also the third judge) transcribed the mothers' communication interaction strategies by viewing the video recorded samples. Communication functions used by mothers included verbal, nonverbal or combined strategies whichever was applicable at that instance. The children with SSPI and CP participating in this study were nonverbal. Hence, communicative strategies used by these children included only the nonverbal strategies. The nonverbal strategies used by mothers and children were not identified at this stage by the investigator.

Two professionals, who were post graduates in speech and language pathology and had a minimum of 2 years of experience in intervention of childhood language impairment, were selected as judges. The investigator also participated as the third judge in the coding process. Taxonomy to describe communication interaction in dyad involving children with SSPI and CP was compiled after reviewing studies cited in literature. The judges were familiarized with the operational definitions for the various communicative strategies used by the mothers and children. Training was provided to the judges using a sample video recorded clip of a 6-year-old child meeting all the criteria as specified for children included in this study, except for the age. The actual recorded samples were played to both the judges. The judges viewed the communication interaction and coded the dyadic communication interaction for functions, modalities and responses of mothers and children to the functions and modalities used by each in the dyad.

The judges utilized the transcription along with the taxonomy provided to them during the training phase as the bases for coding the communication interaction in the dyad. The judges coded the following:

- 'Communication functions' and 'communication modalities employed by mothers and their children,
- Responses of mothers and children with SSPI and CP to the communication functions and communication modalities used by each in the dyad.

Communication acts included two components: function or meaning (request for information, request for attention, request for objects, information, instruction for action, instruction for speech, confirmation and denial) that the mother/child intended to convey and the actual behavior or means (vocal, eye, facial, part body and combination gestures). Responses of mothers and children to the various functions and modalities used were analyzed based on 'response', 'no response' and 'response not expected'. Frequency of occurrence of functions, modalities and responses for various functions and modalities were also calculated.

Results and Discussion

The salient findings of the study are discussed under two sections (A & B). Section A includes section I-IV:

Section I: 'Communication functions' used by mothers and children with SSPI and CP

Section II: Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.

Section III: 'Communication modalities' used by the mothers and children with SSPI and CP.

Section IV: Responses of dyad to the 'communication modalities' used by each in the dyad.

Section A

Section I: 'Communication functions' used by mothers and children with SSPI and CP

Communication functions used by the mothers' and children (as a group) as observed from the coding offered by the judges revealed differences. Table 20 reveals the comparison of communication functions in mothers and children with SSPI and CP, based on their frequency of occurrences in a decreasing order.

Table 20. Communication function in mothers and children with SSPI and CP

Mothers	**Children with SSPI and CP**
Instruction for action	Information
Request for information	Denial
Information	Request for object
Request for attention	Request for attention
Instruction for speech	Instruction for action
Confirmation	Confirmation
Denial	Request for information (general)
Request for object	Instruction for speech*
	Request for information (yes/no)*

(* indicates that these functions did not occur in children)

Section II: Responses of mothers and children with SSPI and CP to the 'communication functions' used by each in the dyad.

Responses of mothers and children (as a group) for various communication functions are listed in the decreasing order in Table 21.

Table 21. Responses of the dyads for communication functions

Mothers	Children with SSPI and CP
Request for information(general)	Instruction for speech
Request for attention**	Instruction for action
Instruction for action**	Request for information (general)**
Information	Request for information (yes/no)**
Request for object	Request for object
Denial	Request for attention
Instruction for speech*	Information
Request for information(yes/no)*	Denial*

(** indicates similar responses in terms of frequency of occurrence; * indicates no responses)

Section III: 'Communication modalities' used by mothers' and children with SSPI and CP

Various modalities employed by mothers' and children with SSPI and CP during interactions were analyzed to see if there is any choice of modality. Table 22 reveals the comparison of communication 'communication modalities' in mothers and children (as a group) with SSPI and CP, based on their frequency of occurrences in decreasing order.

Table 22. 'Communication modalities' used by mothers and children with SSPI and CP

Mothers	Children with SSPI and CP
Ritualized gestures	Vocal gestures
Facial expressions	Ritualized gestures
Looking at location	Looking at object
Showing	Vocal gestures and looking at object
Pointing	Vocal gestures and pointing
Looking at location	Looking at person
Vocal gestures	Vocal gestures and ritualized gestures
Eye blink	Vocal gestures and pointing
Looking at person	Looking at object and person

Children with SSPI and CP chose to opt for specific modalities to depict certain communication functions. The choice of modality to represent various communication functions are depicted in table 23.

Table 23: Modalities to depict various communication functions

Functions	**Modalities**
Information	Vocal gestures Ritualized gestures Looking at objects Looking at persons Looking at object and persons Vocal gestures and pointing Vocal gestures and looking at objects
Denial	Vocal gestures Ritualized gestures Looking at person Vocal gestures and looking at objects Vocal gestures and ritualized gestures
Request for object	Vocal gestures Ritualized gestures Looking at object Looking at object and person Vocal gestures and pointing and Vocal gestures and looking at person
Request for attention	Vocal gestures Vocal gestures and looking at person
Instruction for action	Ritualized gestures Looking at object Looking at person Vocal gestures and pointing
Confirmation	Vocal gestures
Request for information (general)	Looking at object
Instruction for speech	Not observed in children with SSPI and CP

Section IV: Responses of dyad to the communication 'modalities' used by each in the dyad

- Vocal gestures, looking at object, were responded better by children as compared to mothers
- Looking at person, ritualized gestures were responded better by mothers as compared to children
- Responses for eye gestures, facial expressions, showing, pointing in children and simultaneous gestures in mothers could not be compared.

Individualistic variations in 'communication functions', 'communication modalities' and responses of mothers' and children for the various communications and modalities used were evident.

Section B:

Maternal attitudes towards various issues in children with SSPI and CP were tapped using a specific questionnaire prepared for this purpose. The responses of the mothers' to the questionnaire highlighted few issues as follows:

Mothers' responses to the questionnaire highlighted few issues.

- Majority of mothers stated that children indicated their needs by using vocal gestures while others indicated their needs using eye gestures. Few mothers responded by stating that their children indicated their needs by either using body or facial gestures. Mothers stated that use of body or vocal gestures or

combination of these by their children facilitated understanding of the children's attempts to communicate, while few mothers felt that use of eye gestures and facial gestures facilitated understanding of their children's attempt to communicate.

- Children indicated various communication functions such as request for information, attention and object; and denial. Fifty percent of mothers stated that their children instructed them to perform an action while few mothers reported that children confirmed to their requests.
- Responses of children occurred more frequently for mothers' request for information as compared to request for object.
- Majority of mothers strongly felt that physical disability in their children limited speech development as well as social interaction. They also felt that physical disability affected sucking, swallowing abilities and production of various gestures including combination gestures.
- Most mothers strongly believed that their children would speak in future while some of them felt that they required help from the specialist for developing speech in children. Few mothers felt that they do not require any help from speech pathologist and believed that speech in these children would also emerge with time. Majority of mothers strongly believed that they can facilitate later speech development by speaking extensively to their children. Fifty percent of the mothers felt that exploration of toys and surrounding environment would encourage speech development in their children, while few of them felt that

encouraging nonverbal communication would facilitate speech development at a later date.

- Majority of mothers were concerned about their children's speech development and impaired motor milestones such as head control and sitting. Schooling was an area of concern in some mothers while others were concerned about eating and swallowing issues.
- Most of them also felt that their children would benefit from physiotherapy while others felt that their children would benefit from speech and language therapy. Few mothers felt that their children would benefit from occupational therapists. Regarding information about sign language, communication boards and software's available; few mothers agreed that they have heard about sign language as an alternative system but they strongly felt that it is useful for children with hearing impairment. None of the mothers had ever heard about communication boards or any other computer programs for communication.
- Majority of mothers felt that encouraging use of nonverbal strategies would facilitate speech development in later stages, while remaining had a mixed opinion about it.

The responses of mothers on the questionnaire versus judges coding were compared. Incongruence between mothers reporting and judges coding were observed in most of the sub-domains and are presented in table 24.

Table 24. Comparing of judges coding (based on video recording) versus mothers reporting (on the questionnaire)

Domains	Sub-domains	Judges observed-mothers did not report	Mothers reported - judges did not code
Modalities	Eye gestures	20%	40%
	Facial expressions	0%	40%
	Body gestures	50%	20%
	Vocal gestures	20%	0%
	Combination gestures	0%	40%
Functions	Request for information	0%	50%
	Request for object	40%	10%
	Request for attention	10%	30%
	Instruction for action	10%	30%
	Denial	10%	30%
	Confirmation	20%	40%
Responses	Request for information	40%	0%
	Request for object	10%	40%
	Request for attention	50%	0%
	Instruction for action	60%	0%

As observed in table 24, there were instances wherein few mothers reported of certain 'functions', 'modalities' and children's ability to 'respond' to their mothers communication function to be present when it was not coded by the judges and vice versa.

To summarize, mother-child interaction strategies reflected both the usual features of typical mother-child interaction and specific features due to disabilities of the children with SSPI and CP. Mothers were found to be more directive and controlling in their conversational styles of mothers while children revealed a restricted range of communication skills. Mothers used more varied communication functions as compared

to children. Mothers and children also displayed a wide array of modalities during interaction including vocal gestures, eye gestures, body gestures and combination gestures; however children predominantly communicated using vocal gestures. Certain modalities were specifically chosen to depict certain functions. Responses of mothers and children were specific to the functions and modalities used by each in the dyad. Individualistic variations in the use of communication functions, modalities and responses for various functions and modalities were also evident. Incongruence between mother's responses on the questionnaire versus judges coding (in terms of presence of certain 'functions', 'modalities' and children's ability to 'respond' to mothers communication function) was observed. Clinical implications of the same are discussed.

Future recommendations:

- To study the various communication functions and modalities in a larger subject pool of children with SSPI and CP in order to verify whether such findings are evident in nearly all the children with SSPI and CP.
- To replicate the study with controlled play activity to generate active physical involvement and not passive exploration of the play material in these children.
- As an extension of the study, it would be useful to determine parental interaction styles in order to understand if they could serve as significant predictors of later language attainment in children with SSPI and CP and also help in identifying potential treatment targets.

- It could also be useful if the study is extended to understand the use of repair strategies in communication, age at which gestures emerge and influence of generalizing the skills to different contexts and partners.

References

Acredolo, L., & Goodwyn, S. (1988). Symbolic gesturing in normal infants. *Human Development, 28,* 40-49.

Acredolo, L. & Goodwyn, S. (1990). Sign language in babies: The significance of symbolic gesturing for understandable language development. In R. Vasta (Ed), *Annals of Child Development* (pp. 1-42). London: Jessica Kingsley Publishers Ltd.

Adamson, L. B., & Chance, S. E. (1998). Coordinating attention to people, objects, and language. In A. M. Wetherby, S. F. Warren, and J. Reichle (Eds.), *Transitions in prelinguistic communication* (pp. 15-37). Baltimore, MD: Paul H. Brookes.

Aicardi, J., & Bax, M., (1992). Cerebral palsy. In J. Aicardi (Ed.), *Diseases of the nervous system in childhood* (London: MacKeith), 330-367.

Akhtar, N., Dunham, F., & Dunham, P. (1991). Directive interactions and early vocabulary development: The role of joint attentional focus. *Journal of Child Language, 18,* 41-49.

American Speech-Language-Hearing Association. (2005). Roles and responsibilities of speech-language pathologists with respect to augmentative communication: Position statement. ASHA Supplement 25.

Andrews, M. A., & Andrews, J. A. (1993). Family centered techniques: Integrating enablement into the IFSP process. *Communication Disorders Quarterly 15*, 41-46.

Angelo, D., Jones, S., & Kokoska, S. (1995). Family perspective on augmentative and alternative communication: Families of young children. *Augmentative and Alternative Communication, 11,* 193–201.

Angelo, D., Kokoska, S., & Jones S. (1996). Family Perspective on Augmentative and Alternative Communication: Families of Adolescents and Young Adults. *Augmentative and Alternative Communication, 12,* 13-22.

Argyle, M. (1996). *Bodily communication.* London: Routledge

Ashwal, S., Russman, B., Blasco, P. A., Miller, G., Sandler, A., Shevell, M., & Stevenson, R. (2004). Practice Parameter: Diagnostic assessment of the child with cerebral palsy: Report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. *Neurology, 62*, 851-863.

Assanand, S., Dias, M., Richardson, E. & Waxler-Morrison, N. (2005). The South Asians. In N. Morrison, J. Anderson and E. Richardson (Eds.), *Cross-Cultural Caring: A Handbook for Health Professionals in Western Canada* (Vancouver, BC: University of British Columbia Press), pp. 141-180.

Austin, J. (1962). *How to do things with words*. Cambridge: Harvard University Press.

Basil, C. (1992). Social interaction and learned helplessness in severely disabled children. *Augmentative and Alternative Communication, 8,* 188-199.

Bates, E., Beningni, L., Bretherton, I., Camaioni, L., & Volterra, V. (1979). *The emergence of symbols: Cognition and Communication in Infancy*. NewYork: Academic Press.

Bates, E., Bretherton, I., & Snyder, L. (1988). *From first words to grammar: Individual differences and dissociable mechanisms*. Cambridge, MA: Cambridge University Press.

Bates, E., Camaioni, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill-Palmer Quarterly, 21*, 205–226.

Beck, A., Bock, S., Thompson, J., & Kosuwan, K. (2002). Influence of communicative competence and augmentative and alternative communication technique on children's attitudes toward a peer who uses AAC. *Augmentative and Alternative Communication, 18,* 217 – 227.

Beck, A. R., & Dennis, M. (1996). Attitudes of children toward a similar-aged child who uses augmentative communication. *Augmentative and Alternative Communication, 12*, 78 – 87.

Beck, A., Fritz, H., Keller, A., & Dennis, M. (2000). Attitudes of school-aged children toward their peers who use AAC. *Augmentative and Alternative Communication, 16,* 13–26.

Beck, A. R., Kingsbury, K., Neff, A. & Dennis, M. (2000). Influence of length of augmented message on children's attitudes toward peers who use augmentative and alternative communication. *Augmentative and Alternative Communication, 16,* 239 – 249.

Beukelman, D. (1987). When you have a hammer, everything looks like a nail. *Augmentative and Alternative Communication*, *3,* 94–95.

Beukelman, D., & Yorkston, K. (1980). Nonvocal communication: Performance evaluation. *Archives of Physical Medicine and Rehabilitation, 61,* 272-275.

Bharathraj, J. (1983). *Manual on Developmental Screening test*. Mysore. Padmashree Publishers.

Blackstone, S. (1999). Communication partners. *Augmentative Communication News, 12,* 1-16.

Blackstone, S., & Cassatt, E. (1984). *Communication competence in communication aid users and their partners.* Paper presented at the Third International Conference on Augmentative and Alternative Communication, Boston.

Blake, J., & Dolgoy, S. J. (1993). Gestural development and its relation to cognition during the transition to language. *Journal of Nonverbal Behavior, 17*, 87–102.

Blockberger, S., Armstrong, R. W., O'Connor, A., & Freeman, R. (1993). Children's attitudes toward a nonspeaking child using various augmentative and alternative communication techniques. *Augmentative and Alternative Communication, 9*, 243 – 250.

Blockberger S. & Sutton A., (2003). Towards linguistic competence: the language experiences and knowledge of children with extremely limited speech, In: J. Light, D. Beukelman, J. Reichle (Eds.). *Communicative competence for individuals who use AAC.* Baltimore: Brookes, 63-106.

Bochner S., Price P., & Jones J. (1997). *Child Language Development: Learning to Talk.* Whurr Publishers. London.

Bode, T. (1997). *Overt Co-Construction: Speaking adult communication partners in interaction with young children who use AAC systems.* Unpublished Master's Thesis, University of Melbourne, Australia.

Bornstein, M., Tal, J., Rahn, C., Galperin, C., Pecheux, M., & Lamour, M. (1992). Functional analysis of the contents of maternal speech to infants of 5 and 13 months in four cultures: Argentina, France, Japan, and United States. *Developmental Psychology, 28,* 593-603.

Brady, N. C., McLean, J. E., McLean, L. K., & Johnston, S. (1995). Initiation and repair of intentional communication acts by adults with severe to profound cognitive disabilities. *Journal of Speech and Hearing Research, 38*, 1334-1348.

Bruner, J. (1975). From communication to language: A psychological perspective. *Cognition, 3,* 255-287.

Bruner, J. (1983). *Child's talk: Learning to use language.* New York: Norton.

Bruner, J. (1985). "Models of the learner". *Educational Researcher*, 14. 5-8.

Buzolich, M. (1983). *Interaction analysis of augmented and normal adult communicators.* Unpublished doctoral dissertation, University of California, San Francisco.

Calendrella, A., & Wilcox, M. (2000). Predicting Language Outcomes for Young Prelinguistic Children with Developmental Delay. *Journal of Speech, Language, and Hearing Research*, *43,* 1061-1071.

Calculator, S., & Dollaghan, C. (1982). The use of communication boards in a residential setting: An evaluation. *Journal of Speech and Hearing Disorders, 47*, 281-287.

Calculator, S., & Luchko, C. (1983). Evaluating the effectiveness of a communication board training program. *Journal of Speech and Hearing Disorders, 48,* 185-191.

Capirci, O., Iverson, J., Pizzuto, E., & Volterra, V. (1996). Communicative gestures and the transition to two word speech. *Journal of Child language, 23*, 645-673.

Capone, N. C., & McGregor, K. K. (2004). Gesture Development: A Review of Clinical and Research Practices. *Journal of Speech, Language, and Hearing Research 47,* 173–186.

Carpenter, R., Mastergeorge, A., & Coggins, T. (1983). The acquisition of communicative intentions in infants eight to fifteen months of age. *Language and Speech, 26*, 101-116.

Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, join attention and communicative competence from 9-15 months of age. *Monographs of the society for Research in Child Development, 63* (4, Serial No. 255).

Carter, M. (2003). Communicative spontaneity of children with high support needs who use augmentative and alternative communication systems II: Antecedents and effectiveness of communication. *Augmentative and Alternative Communication, 19,* 155 – 169.

Carter, M., & Hook, J. (1998). Communication programming for students with high support needs: A model for deciding what to teach. *Special Education Perspectives, 7,* 42–55.

Caselli, M. (1990). Communicative gestures and first words: In V. Volterra & C. Erting (Eds.), *From gesture to language in hearing and deaf children* (pp. 56-67). New York: Springer- Verlag.

Chan, J., & Iacono, T. (2001). Gesture and Word Production in Children with Down syndrome. *Augmentative and Alternative Communication, 17*, 73-87.

Chaudhary, N. (1999): Language socialization: Patterns of caregiver speech to young children. In T. S. Saraswathi (Ed.), *Culture, Socialization and Human Development: Theory, Research and Application in India* (New Delhi: Sage), 145-166.

Clarke–Stewart, K. A. & Hevey, C. (1981): Longitudinal relations in repeated observations of mother-child interaction from 1 to 2-1/2 years. *Developmental Psychology*, *17*, 127-145.

Coggins, T., & Carpenter, R. (1981). The communicative intention inventory: A system for observing and coding children's early intentional communication. *Applied Psycholinguistics, 2,* 235-251.

Coggins, T., Olswang, L., & Guthrie, J. (1987). Assessing communicative intents in young children: Low structured observation or elicitation tasks? *Journal of Speech and Hearing Disorders, 52,* 44-49.

Cole, K.N., Dale, P.S., & Mills, P.E. (1992). Stability of the intelligence quotient-language quotient relation: Is discrepancy modeling based on a myth? *American Journal on Mental Retardation, 97*, 131-143.

Colquhoun, A. (1982). *Augmentative communication systems: The interaction process.* Paper presented at the American Speech-Language-Hearing Association Convention, Toronto.

Conti-Ramsden, G. (1994). Interaction with atypical learners. In C. Gallaway & B. J. Richards (Eds.), *Input and interaction in language acquisition* (pp. 183–196). New York: Cambridge University Press.

Conti-Ramsden, G., & Friel-Patti, S. (1984). Mother-child dialogues: a comparison of normal and language impaired children. *Journal of Communication Disorders. 17*, 19-35.

Crais, E., Douglas, D., & Campbell, C. (2004). The intersection of the development of gestures and intentionality. *Journal of Speech and Hearing Research, 47*, 678-694.

Cress, C., Linke, M., Moskal, L., Benal, A., Anderson, V., & La Montagne, J. (2000). *Play and parent interaction in young children with physical impairments.* Paper presented at the conference of the American Speech- Language- Hearing Association, Washington, DC.

Culp, P. (1982). *Communication interactions-nonspeaking children using augmentative systems and their mothers.* Paper presented at the American Speech-Language-Hearing Association Convention, Toronto.

Dale, P. S. (1980). Is early pragmatic development measurable? *Journal of Child Language 7*, 1-12.

Della Corte, M., Benedict, H., & Klein, D. (1983). The relationship of pragmatic dimensions of mothers' speech to the referential-expressive distinction. *Journal of Child Language. 10,* 35-43.

Derene, S. (2000): Culture, family and psyche in Hindu India: the 'fit' and the 'Inconsistencies'. *International Journal of Group Tensions*, *29,* 323-348.

Dore, J. (1974). A pragmatic description of early language development. *Journal of Psycholinguistic Research, 4,* 343–350.

Dowden, P., & Marriner, N. (1995). Augmentative and alternative communication: Treatment principles and strategies. *Seminars in Speech and Language, 16,* 140–156.

Dunst, C., & Wortman Lowe, L. (1986). From reflex to symbol: Describing explaining and fostering communicative competence. *Augmentative and Alternative Communication, 2,* 11-18.

Falkman, K., Sandberg, A., & Hjelmquist, E. (2002). Preferred communication modes: prelinguistic and linguistic communication in non-speaking preschool children with cerebral palsy. *International Journal of language & Communication Disorders, 37*, 59-68.

Farrier, L., Yorkstone, K., Marriner, N., & Beukelman, D. (1985). Conversational control in nonimpaired speakers using an augmentative communication system. *Augmentative and Alternative communication, 1,* 65-73.

Fogel, A. (1993). Two principles of communication: co regulation and framing. In Nadel and L. Camaioni (Eds.). *New perspectives in early communication development.* London: Routledge.

Folven, R., & Bonvillian, J. D. (1991). The transition from nonreferential to referential language in children acquiring American Sign Language. *Developmental Psychology, 27,* 806–816.

Franco, F., & Butterworth, G. (1996). Pointing and social awareness: Declaring and requesting in the second year of life. *Journal of Child Language, 23,* 307-336.

Franco, F., & Wishart, J., (1995). The use of pointing and other gestures by children with Down syndrome. *American Journal of Mental Retardation, 100,* 160-182.

Gambhir, S. K., Walia B. N., Singhi P. D., & Prashad D. (1993). Maternal attitudes towards spastic cerebral palsy. *Indian Pediatrics. 30,* 1073-77.

Gardano. A. C. (1996). *Individualism/Collectivism, family structure and communication: Practical knowledge and skills for working with culturally diverse families.* Paper presented at the annual meeting of the American Psychological Association, Toronto.

Geetha, Y. V. (2007). *Assessment Checklist for speech and language skills*. Unpublished ARF Project Report. AIISH, Mysore.

Gerber, S., & Kraat, A. (1992). Use of a Developmental Model of Language Acquisition: Applications to Children Using AAC Systems. *Augmentative and Alternative Communication, 8,* 19-32.

Girolametto, L., Weitzman, E., Wiigs, M. & Pearce, P. (1999). The relationship between maternal language measures and language development in toddlers with expressive vocabulary delays. *American Journal of Speech-Language Pathology, 8,* 364–74.

Glogowska, M. (1998). Parents' beliefs and ideas about children's early speech and language difficulties. *International Journal of Language and Communication Disorders, 33, Supplement.*

Golinkoff, R. M. (1986). 'I beg your pardon?' The preverbal negotiation of failed messages. *Journal of Child Language, 13*, 455-476.

Gopnik, A., & Meltzoff, A. (1986). Relations between semantic and cognitive development in the one word stage: The specificity hypothesis. *Child Development, 57*, 1040-1053.

Gorenflo, C. W., Gorenflo, D. W., & Santer, S. A. (1994). Effects of synthetic voice output on attitudes toward the augmented communicator. *Journal of Speech and Hearing Research, 37,* 64 – 68.

Grove, N., Bunning, K., Porter, J., & Olsson, C. (1999). See what I mean: Interpreting the meaning of communication by people with severe and profound learning disabilities: Theoretical and methodological issues. *Journal of Applied Research in Intellectual Disabilities, 12,* 190-203.

Halliday, M. (1975). *Learning how to mean: Explorations in the development of language.* New York: Elsevier North-Holland, Inc.

Hansson, K., Nettelbladt, U., & Nilholm, C. (2000). Contextual influence on the language production of children with speech/language impairment. *International Journal of Language and Communication Disorders*, 35, 31-47.

Hanzlik, J. R. (1990). Nonverbal interactions patterns of mothers and their infants with cerebral palsy. *Education and Training in Mental Retardation, 25,* 333-343.

Harding, C. (1984). Acting with intention: A framework for examining the development of the intention to communicate. In L. Feagans, C. Garvey, & R. Golonkoff (Eds.), *The origins and growth of communication* Norwood, NJ: Ablex publishing, 123-135.

Harding, C., & Golinkoff, R. (1979). The origins of intentional vocalizations in prelinguistic infants. *Child Development*. Seattle: University of Washington Press.

Hardy, J. C. (1983). *Cerebral palsy.* Englewood Cliffs, NJ: Prentice-Hall.

Harris, M. (1992). *Language Experience and Early Language Development.* Hove, UK: Erlbaum.

Harris, S., Kasari, C., & Sigman, M. D. (1996). Joint attention and language gains in children with Down syndrome. *American Journal on Mental Retardation, 100,* 608-619.

Heim, M., & Baker-Mills, A. (1996). Early development of symbolic communication and linguistic complexity through augmentative and alternative communication. In S. von Tetzchner and M. Hygum, Jensen (Eds.), *Augmentative and Alternative Communication, European perspectives* (London: Whurr), pp 232-248.

Huer, M. B. (1988). *The Nonspeech Test for Receptive and Expressive Language*. Wauconda, IL: Don Johnston Developmental Equipment, Inc.

Iacona, T., Carter, M., & Hook, J. (1998). Identification of intentional communication in students with severe and multiple disabilities. *Augmentative and Alternative Communication, 14,* 102-114.

Iacona, T., & Carter, M. (2002). Professional judgments of the intentionality of communicative acts. *Augmentative and Alternative Communication, 18,* 177-191.

Iverson, J., Capirci, O., & Caselli, M. C. (1994). From communication to language in two modalities. *Cognitive Development, 9*, 23–43.

Iverson, J. M., Longobardi, E., Caselli, M. C., (2003). Relationship between Gestures and words in children with Down syndrome and typically developing children in the early stages of communicative development. *International Journal of Language and Communication Disorders, 2*, 179-197.

Iverson, J., & Thal, D. (1998). Communicative transitions: There's more to the hand than meets the eye. In A. Wetherby, S. Warren, & J. Reichle (Eds.), *Transitions in prelinguistic communication* (pp. 59–86) Baltimore: Paul H. Brookes.

Johnston, S., Reichle, J., & Evans, J. (2004): Supporting Augmentative and Alternative Communication Use by Beginning Communicators with Severe Disabilities. *American Journal of Speech-Language Pathology*, *13,* 20-30.

Kloth, S., Janssen, P., Kraaimaat, F., Brutten, G. J. (1998). Communicative styles of mothers interacting with their preschool-age children: a factor analytic study. *Journal of child language, 25*, 149-168.

Kraat, A. (1985). *Communication interaction between aided and natural speakers: A state of the art report*. *An IPCAS study report* (pp. 223-225). Toronto: Canadian Rehabilitation Council for the Disabled.

Kraat, A. (1991): Methodological issues in the study of language development for children using AAC systems. In J. Brodin, & E. Bjorck-Akesson (Eds.), *Methodological issues in research in augmentative and alternative communication*: Proceedings from the First ISAAC Research Symposium in Augmentative and Alternative Communication (pp. 118–123). Stockholm: Swedish Handicap Institute.

Landry, S., Smith, K., Swank, P., Assel, M., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's Development or is consistency across early childhood necessary*? Developmental Psychology, 37,* 387-403.

Lasky, E & Klopp, K. (1982). Parent-Child Interactions in Normal and Language-Disordered Children. *Journal of Speech and Hearing Disorders*, *47,* 7-18.

Leonard, L. (1998). Children with specific language impairment. Cambridge, MA: MIT Press.

Letto, M., Bedrosian, J. L., & Skarakis-Doyle, E. (1994). Application of Vygotskian developmental theory to language acquisition in a young child with cerebral palsy. *Augmentative and Alternative Communication, 10,* 151–160.

Light, J. (1988). Interaction involving individuals using augmentative and alternative communication: State of the art and future research directions. *Augmentative and Alternative Communication, 4,* 66–82.

Light, J. (1989). Toward a definition of communicative competence for individuals using augmentative and alternative communication systems. *Augmentative and Alternative Communication, 5,* 137 – 144.

Light, J. (1997). “Let’s go star fishing”: Reflections on the contexts of language learning for children who use aided AAC. *Augmentative and Alternative Communication, 13,* 157–171.

Light, J., Binger, C., Agate, T., & Ramsay, K. (1999). Teaching partner-focused questions to individuals who use augmentative and alternative communication to enhance their communicative competence. *Journal of Speech and Hearing Research, 42,* 241–255.

Light, J. Collier, B., Parnes, P. (1985a). Communicative interaction between young nonspeaking physically disabled children and primary caregivers: Part 1-Discourse patterns. *Augmentative and Alternative communication, 1,* 74-83.

Light, J., Collier, B., Parnes, P. (1985b). Communicative interaction between young nonspeaking physically disabled children and primary caregivers: Part II-Communicative functions. *Augmentative and Alternative communication, 1,* 98-107.

Light, J., Collier, B., Parnes, P. (1985c). Communicative interaction between young nonspeaking physically disabled children and primary caregivers: Part III-Modes of communication. *Augmentative and Alternative communication, 1,* 125-133.

Light, J., & Kelford Smith, A. (1993). The home literacy experiences of preschoolers w,ho use augmentative communication systems and of their nondisabled peers. *Augmentative and Alternative Communication, 9,* 10–25.

Lilienfeld, M. & Alant, E. (2002). Attitudes of children toward an unfamiliar peer using an AAC device with and without voice output. *Augmentative and Alternative Communication, 18,* 91 – 101.

Ling, D., & Ling, A. H. (1974) Communication development of the first three years of life. *Journal of Speech and Hearing Research, 17,* 146-159.

Locke, J. (1993). *The child's path to spoken language. Cambridge*: Harvard University Press.

Marcos, H. (1991). Reformulating a request at 18 months: gestures, vocalizations and words. *First Language***,** *11*, 361-375.

Marcos, H., & Kornhaber-le Chanu, M. (1992). Learning how to insist and clarify in the second year: reformulation of requests in different contexts. *International Journal of Behaviour Development, 15,* 359-376.

McCollum, J., & Hemmeter, M. L. (1997). Parent-child intervention when children have disabilities: In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 549-576). Baltimore: Paul H. Brookes Publishing Co.

McConachie, H., & Ciccognani, A. (1995): 'What's in the box?' assessing physically disabled children's communication skills. *Child Language Teaching and Therapy, 11,* 253-263.

McCune-Nicolich, L. (1981). Toward symbolic functioning: Structure of early pretend games and potential parallels with language. *Child Development, 52,* 785–797.

McDonald, E. (1987). Cerebral palsy: Its nature, pathogenesis, and management. In E. T. McDonald (Ed.), *Treating cerebral palsy: For clinicians by clinicians* (pp. 1-20). Austin, TX: Pro-Ed.

McNeill, D. (1992): *Hand and mind; What gestures reveal about thought*. Chicago: The University of Chicago Press.

Millar C., Light, C. & Schlosser, R. (2006). The Impact of Augmentative and Alternative Communication Intervention on the Speech Production of Individuals with Developmental Disabilities: A Research Review. *Journal of Speech, Language, and Hearing Research 49,* 248-264.

Miller, M., & Kraat, A. (1984). Hey you, I've got something to say: A study of the attention-getting ability of a nonspeaking, physically disabled pre-schooler. In A. W. Kraat (Ed.), (1985) *Communication interaction between aided and natural speakers: An IPCAS study report* (pp. 223-225). Toronto: Canadian Rehabilitation Council for the Disabled.

Mohanty, S.P. (2000). 'The epistemic status of cultural identity', in P.M.L. Moya and M. R. Hames-Garcia (Eds.), *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism.* Berkeley: University Of California Press, 2-26.

Mundy, P. & Gnomes, A. (1998). Individual differences in joint attention skill development in the second year. *Infant Behavior and Development, 21*, 469-482.

NIMH, (1994): *National Sample Survey Organization on Disabled persons.* Report No. 393. Govt of India, (July-December 1991).

NSSO (1991). Report no. 393 of the National Sample survey organization. Govt of India, (July-December 1991) on Disabled persons.

Nicoladis, E., Mayberry, R., & Genesee, F. (1999). Gesture and early bilingual development. *Developmental Psychology, 35*, 514–526.

Paavola, L., Kunnari, S. & Moilanen I. (2005) Maternal responsiveness and infant intentional communication: Implications for the early communicative and linguistic development .*Child: Care, Health and Development, 31,* 727–735.

Pellegrino L & Dormans J. P. (1998). Cerebral palsy: definitions, etiology and epidemiology. In J.P. Dormans, L. Pellegrino (Eds.) *Caring for Children with Cerebral Palsy: A Team Approach.* Paul H. Brooks Publishing Co. 3-30.

Pennington, L., Goldbart, J., & Marshall, J. (2004). Interaction training for conversational partners of children with cerebral palsy: A sytematic review. *International Journal of Language and Communication Disorders*, *39,* 151-170.

Pennington, L., & McConachie, H. (1999). Mother-child interaction revisited: communication with non-speaking physically disabled children. *International Journal of Language and Communication Disorders, 34,* 391-416.

Pennington, L., & McConachie, H. (2001). Predicting patterns of interaction between children with cerebral palsy and their mothers. *Developmental Medicine and Child Neurology, 43,* 83–90.

Pino, O. (2000): The effect of context on mother's interaction style with Down's syndrome and typically developing children. *Research in Developmental Disabilities, 21,* 329-346.

Rao N., McHale J & Pearson E. (2003). Links between socialization goals and child-rearing practices in Chinese and Indian mothers. *Infant and Child Development, 12*, 475-492.

Reichle, J., Halle, J. W., & Drasgow, E. (1998). Implementing augmentative communication systems. In A. M. Wetherby, S. F. Warren, & J. Reichle (Eds.), *Transitions in prelinguistic communication* (pp. 417-436) Baltimore: Paul H. Brookes.

Reilly, S., Skuse, D., & Poblete, X. (1996). Prevalence of feeding problems and oral motor dysfunction in children with cerebral palsy. *Journal of Pediatrics, 129,* 877-882.

Rocissano, L., & Yatchmink, Y. (1983). Language Skill and Interactive Patterns in Prematurely Born Toddlers. *Child Development*, *54*, 1229-1241.

Romski, M. A., & Sevcik, R. A. (1996). *Breaking the speech barrier: Language development through augmented means.* Baltimore: Brookes.

Rosenbaum, P., Paneth, N., Leviton, A., Goldstein, M., Bax, M., Damiano, D., Dan, B., & Jacobsson, B. (2007). A report: The definition and classification of cerebral palsy. *Developmental Medicine & Child Neurology Supplement. 109*, 8-14.

Ross, B., & Cress, C. (2006): Comparison of Standardized Assessments for Cognitive and Receptive Communication Skills in Young Children with Complex Communication Needs. *Augmentative and Alternative Communication, 22,* 100 – 111.

Roth, F. P., & Cassatt-James, E. L. (1989). The language assessment process: Clinical implications for augmentative communication. *Augmentative and Alternative Communication*, *5,* 165-172.

Roth, F. P., & Speakman, N. J. (1984). Assessing the pragmatic abilities of children. Part 1. Organizational framework and assessment parameters. *Journal of Speech and Hearing Disorders, 49,* 2-11.

Rowland, C. (1990). Communication in the classroom for children with dual sensory impairments: Studies of teacher and child behavior. *Augmentative and Alternative Communication, 6,* 262-274.

Sachs, J. (1997). Communication development in infancy. In J.B. Gleason (Ed.), *The development of language* (4th ed., pp. 40-68). Needham Heights, MA: Allyn & Bacon.

Sameroff, A. J. (1983). Developmental systems: Contexts and evolution. In W. Kessen (Ed.), *Handbook of child psychology: Vol. 1, History, theory, and methods* (pp. 237-294). New York: Wiley

Sanagavarapu, P., Elliott, A., & Relich, J. (1994). *Cultural specificity in the guidance of children's metacognitive learning.* Paper presented at the Conference of the Association for Active Educational Research. Newcastle.

Sandberg, A., & Liliedahl, M (2008)**:** Patterns in early interaction between young preschool children with severe speech and physical impairments and their parents. *Child Language Teaching and Therapy, 24,* 9–30.

Sankar, C. & Mundkar, N. (2005). Cerebral Palsy–Definition, Classification, Etiology and Early Diagnosis. *Indian Journal of Pediatrics, 72,* 865-868.

Schweigert, P. (1989). Use of microswitch technology to facilitate social contingency qawareness as a basis for early communication skills. *Augmentative and Alternative Communication, 5,* 192-198.

Sen, A. (1988). *Psychosocial Integration of the Handicapped***.** New Delhi: Mittal Publications.

Sigafoos, J., Woodyatt, G., Keen, D., Tait, K., Tucker, M., Roberts-Penell, D., & Pittendreigh, N. (2000). Identifying potential communicative acts in children with developmental and physical disabilities. *Communication Disorders Quarterly, 21*, 77-86.

Simmons, N. & Johnston, J. (2007). Cross-cultural differences in beliefs and practices that affect the language spoken to children: mothers with Indian and Western

heritage. *International Journal of Language and Communication Disorders, 42,* 445-465.

Singhi P., Ray, M. & Suri, G. *(*2002). Clinical Spectrum of Cerebral Palsy in North India-an analysis of 1000 Cases. *Journal of Tropical Pediatrics, 48,* 162-166.

Smith, M. (1994). Speech by any other name: the role of communication aids in interaction. *European Journal of Disorders of Communication, 29*. 225-240.

Smith, L. (1998). Predicting communicative competence at 2 and 3 years from pragmatic skills at 10 months. *International Journal of Language and Communication Disorders, 33,* 127-148.

Snyder, L. (1978). Communicative and cognitive abilities in the sensorimotor period. *Merrill-Palmer Quarterly,* 161-180.

Srinivasan, B. (2000). *Culture, disability, and mother-child interaction: An Indian example.* Doctoral dissertation, Purdue University.

Srinivasan, B. & Karlan, G. (1997). Culturally responsive early intervention programs: Issues in India. *International Journal of Disability, Development, and Education, 44,* 367-385.

Tamis-LeMonda, C. S., Bornstein, M. H. & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development*, *72*, 748–767.

Tannock, R., & Girolametto, L. (1992). Reassessing parent-focused language intervention programs. In S. Warren & J. Reichle (Eds.), *Causes and effects in communication and language intervention* (pp. 49-80). Baltimore: Paul H. Brookes.

Tannock, R., Girolametto, L., & Siegel, L., (1992). Language intervention with children who have developmental delays. Effects of an interactive approach. *American Journal of Mental Retardation, 97,* 145-160.

Thal, D., & Tobias, S. (1992). Communicative gestures in children with delayed onset of oral expressive vocabulary. *Journal of Speech and Hearing Research*, *35*, 1281-1289.

Thal, D., Tobias, S., & Morrison, D. (1991). Language and gesture in late talkers: A one year follow up. *Journal of speech and Hearing Disorders, 34,* 604-612.

Tomasello, M. & Farrar, M. J. (1986). Joint attention and early language development. *Child Development, 57,* 1454-1463.

Trad, P. (1994). Previewing as a remedy for interpersonal failure in the parent-infant dyad. *Infants and Young Children, 7,* 1–13.

Vanderheiden, G., & Lloyd, L.L. (1986). Communication systems and their components. In S. Blackstone (Ed.), *Augmentative communication* (49-161). Rockville, MD: American Speech-Language-Hearing Association.

Venkatesan, S. (2003). *Toy kit for kids with developmental disabilities*. Mysore: AIISH.

Vijesh, P. & Sukumaran, P. (2007). Stress among mothers of children with cerebral palsy attending special schools. *Asia Pacific Disability Rehabilitation Journal, 18,* 76-92.

Vigil, D., & Hwa-Froelich, D. (2004). Interaction Styles in Minority Caregivers: Implications for Intervention. *Communication Disorders Quarterly, 25,* 119-126.

Wallace F. Roberts, J., & Lodder, D. (1998). Interactions of African American Infants and their mothers relations with development at 1 year of age. *Journal of Speech, Language, and Hearing Research*, *41*, 900-912.

Warren, S. F., & Yoder, P. J. (1998). Facilitating the transition from preintentional to intentional communication. In A. M. Wetherby, S. F. Warren, & J. Reichle (Eds.), *Transitions in prelinguistic communication* (pp 365-416) Baltimore: Paul H. Brookes.

Weinberg, M. K., Gianino, A. F. & Tronick, E. Z. (1989). *Facial expressions of emotion and social and object oriented behavior are specifically related in 6- month old infants.* Paper presented at the Society for Research in Child Development (SRCD). Biannual Convention, Kansas City, Missouri.

Westby, C & Ford, V. (1993). The Role of Team Culture in Assessment and Intervention. *Journal of Educational and Psychological Consultation, 4,* 319-341.

Wetherby, A. M., Alexander, D. G., & Prizant, B. M. (1998). The ontogeny and role of repair strategies. In A. M. Wetherby, S. F. Warren, and J. Reichle (Eds.), *Transitions in prelinguistic communication.* (pp. 135–159). Baltimore: Paul H. Brookes.

Wetherby, A., Cain, D., Yonclas, D., & Walker, V. (1988). Analysis of intentional communication of normal children from prelinguistic to the multiword stage. *Journal of Speech and Hearing Research, 32,* 240-252.

Wetherby, A. M., & Prizant, B. M. (1989). The expression of communicative intent: Assessment guidelines. Seminars in Speech and Language, 10, 77-89.

Wetherby, A., & Prizant, B. (1991). *Communication and symbolic behavior scales.* Chicago: Riverside.

Wetherby, A. M., & Rodriguez, G. P. (1992). Measurement of communicative intentions in normal developing children during structures and unstructured contexts. *Journal of Speech and Hearing Research, 35,* 130-138.

Wilcox, M., Kouri, T. A., & Caswell, S. (1990). Partner sensitivity to communication behavior of young children with developmental disabilities. *Journal of Speech and Hearing Disorders, 55*, 679-693.

Wilder, J., & Granlund, M. (2003). Behavior style and interaction between seven children with multiple disabilities and their caregivers. *Child: Care Health and Development, 29,* 559-567.

Yoder, D., & Kraat, A. (1983). Intervention issues in non-speech communication. In J. Miller, D. Yoder, & R. Schiefelbusch (Eds.), *Contemporary issues in language intervention* (pp.27–51). Rockville, MD: ASHA Reports.

Yoder, P. J., & Warren, S. F. (1999). Maternal responsivity mediates the relationship between prelinguistic intentional communication and later language. *Journal of Early Intervention, 22,* 126-136.

Yoder, P., & Warren, F. (2001a): Intentional communication elicits language–facilitating maternal responses in dyads with children who have developmental disabilities. *American Journal of Mental Retardation, 106,* 327-335.

Yoder, P., Warren, F., Kim, K., Gazdag, G. (1994). Facilitating Prelinguistic Communication Skills in Young Children with Developmental Delay II Systematic Replication and Extension *Journal of Speech and Hearing Research*, *37*, 841-851.

Yont, K., Hewitt, L., & Miccio, A. (2002). "What did you say"? Understanding conversational breakdowns in children with speech and language impairments. *Clinical Linguistics and Phonetics, 6,* 265-285.

APPENDIX A

CHECKLIST FOR SELECTION OF CHILDREN FOR THE STUDY

Nonverbal receptive language skills

1. Can identify 3-5 body parts
2. Can identify 10-20 pictures
3. Can identify the functions of at least 5-7 objects
4. Can identify 3-5 personal pronouns
5. Demonstrates understanding of concept of 'one'
6. Demonstrates understanding of the concept of 'size'
7. Demonstrates understanding of 5-6 adjectives
8. Can identify 3 prepositions
9. Can identify 5-7 actions in pictures
10. Follows 3 or more verbal directions

Nonverbal expressive language skills

1. Signals 3 body parts
2. Vocalizes directly at mother/object
3. Responds appropriately using sounds and gestures in his/her own modality
4. Participates in gesture games prompted by the examiner
5. Imitates sounds /gestures in his/her own repertoire
6. Signals 10 picture names
7. Imitates at least one communicative interaction with strangers
8. Answers 1 -3 simple questions using nonverbal gestures
9. Answers 'WH' questions of physical needs
10. Signals one preposition correctly

APPENDIX B

OPERATIONAL DEFINITION OF COMMUNICATION FUNCTIONS

Communicative functions	**Definition**
Request for information	*Turns that serves to request for information* • *about the speaker,* • *about the object,* • *about the action.*
Request for attention	*Turns that serves to gain attention* • *towards oneself,* • *towards the object* • *towards the action*
Request for objects	*Turns that serve to demand a desired tangible object.*
Information	*Turns that serves to comment/provide information* • *on objects,* • *actions,* • *response to partners (mother/children) communication act.*
Instruction for action	*Turns that serves to command the partner to carry out an action.*
Instruction for speech	*Turns that serves to command the partner to speak.*
Confirmation	*Turn that serves as affirmation, liking or acceptance to partner's comment.*
Denial	*Turn that serves as* • *dislike, or an indication of 'do not want'* • *negative responses to partner's comment.*

APPENDIX C

OPERATIONAL DEFINITIONS OF COMMUNICATION MODALITY

	Modality	Definition
Vocal gestures	Vocalization	Communication attempt involving use of voice. Does not include chuckle, gurgle or any other vegetative sounds.
	Verbalization	Communication attempt involving spoken utterances that are not intelligible words
Eye gestures	Looking at object	Communication attempt involving asking for an object/person/about a location, either need based or for some kind of manipulation in that context.
	Looking at person	
	Looking at location	
	Combination of looking at object/person, location	Communication attempt in terms of asking for an object/person/about a location, either need based or for some kind of manipulation in that context. Involves the combined usage of two or more modalities. For e.g., looking at object', person and location.
	Eye blink	Communication attempt using blinking of eyes
Facial Gestures	Facial gestures	Communication attempt involving the use of facial expressions
Body gestures	Whole body(Upper trunk)	Communication attempt involving the use of complete upper trunk
	Part body	Communication attempt involving the use of any part of the body excluding the face.
Part body (Limb gestures)	Showing	Communication attempt involving holding up an object
	Pointing	Communication attempt involving extending any part of the body in the direction of referent
	Ritualized	Communication attempt involving gestures that do not stand for any specific referent directly. However, it could stand for rules /rituals in the communication context. E.g. Reaching out or opening and closing of palm
Combination	Sequential (specify)	Communication attempt involving sequential combination of any the above mentioned modalities.
	Simultaneous (specify)	Communication attempt involving simultaneous combination of any the above mentioned modalities.

APPENDIX D

QUESTIONNAIRE FOR THE ASSESSMENT OF ATTITUDES OF MOTHERS TOWARDS THEIR CHILDREN WITH DISABILITY AND ASPECTS OF COMMUNICATION

Instructions: Answer each of the following questions as 'Yes' or 'No'.
You may seek clarification if the questions are not understood by you.

Sl. No.	Items			Yes	No
1.	Does your child indicate his/her needs? If your answer to question 1 is 'No', please skip questions 1a-1e and proceed to question No.2 directly				
	If your answer to question 1 is 'Yes'	1a.	Does he/she indicate needs through eye gestures (looks at objects or person; blinks eyes etc)?		
		1b.	Does he/she indicate needs through facial gestures (various facial expressions such as smiling, frowning etc)?		
		1c	Does he/she indicate needs through body gestures (pointing with hands or any other body parts)?		
		1d	Does he/she indicate needs through vocal gestures (vocalizing, making various vocal sounds)?		
		1e	Does he/she indicate needs through combination of eye, facial, body and vocal gestures? (Specify the combination if your answer is yes). …….. ……..		
2.	Does your child request for information? (Does he/she ask in any ways 'What is in this'? or 'what is in the bag'?)				
3.	Does your child request for object? (Does he/she ask in any ways 'Can you give me the toy'?)				
4.	Does your child request for attention? (Does he/she ask you to attend to him/her; or attend to an activity /toy /object of his/her choice?)				
5.	Does your child request for action? (Does he/she ask in any ways 'Can you wind this toy for me'?)				
6.	Does your child deny? (Does he/she indicate to you in any ways 'do not want/ do not like'?)				
7.	Does your child give confirmatory responses? (When you ask if this is the particular item he/she wants or if this is the activity he/she wants to do, does he/she agree to it)				
8.	Does your child respond to your request for information?				

9.	Does your child respond to your request for object?				
10.	Does your child respond to your request for attention?				
11.	Does your child respond to your request for action?				
12.	Does your child respond to your denial?				
13.	Do you feel that if your child communicated through some other means (excluding speech), you would be able to understand him/her better? If your answer to question 13 is 'No', please skip questions 13a-13e and proceed to question 14 directly				
	If your answer to question 13 is 'Yes' then	13a.	Do you agree that use of eye gestures along with the way he/she is communicating at present would improve your understanding of his/her needs?		
		13b.	Do you agree that use of facial gestures along with the way he/she is communicating at present would improve your understanding of his/her needs?		
		13c.	Do you agree that use of body gestures along with the way he/she is communicating at present would improve your understanding of his/her needs?		
		13d.	Do you agree that use of vocal gestures along with the way he/she is communicating at present would improve your understanding of his/her needs?		
		13e.	Do you agree that use of combination gestures (eye, facial, body and vocal) along with the way he/she is communicating at present would improve your understanding of his/her needs? If your answer is 'Yes', please specify which among the combination do you think would improve his/her present communication ability. …….. ……..		
14.	Do you agree that physical disability affects your child in various other ways other than developing head control, sitting etc.? If your answer to question 14 is 'No', please skip questions 14a-14h and proceed to question 15 directly.				
	If your answer to question No. 14 is 'Yes', then	14a.	Do you agree that physical disability affects sucking, swallowing and feeding?		
		14b.	Do you agree that physical disability affects speech development?		
		14c.	Do you agree that physical disability affects his/her use of eye gestures?		
		14d.	Do you agree that physical disability affects his/her use of facial gestures?		
		14e.	Do you agree that physical disability affects his/her use of body movements (body gestures)?		

		14f.	Do you agree that physical disability affects his/her use of vocal gestures?		
		14g.	Do you agree that physical disability affects his/her use of combination gestures?		
		14h.	Do you agree that physical disability affects his/her ability to interact with others?		
15	Do you think that your child will ever speak?				
16.	Do you think that your child will speak, as he/she grows older, without any help from a Speech-Language pathologist?				
17.	Do you think that your child will speak only with the help from specialists?				
18.	Do you think you can do something to make your child learn to speak? If your answer to question 18 is 'No', then please proceed to question 19.				
	If your answer to question 18 is 'Yes' then	18a.	Do you think that speaking to your child more will help him/her learn to speak?		
		18b.	Do you think that by playing with your child with toys and thus letting him/her feel the toys along with letting him/her explore the surrounding will help him/her learn to speak?		
		18c	Do you think that by encouraging him/her to use eye, facial, body or vocal gestures or combination of any of the above will help him/her learn to speak? If your answer is 'Yes', please specify which among the combination do you think would help him/her? ……..… …….		
19.	Are you presently worried about your child's difficulty in eating and drinking?				
20.	Are you presently worried about your child's difficulty in developing head control, sitting etc.?				
21.	Are you presently worried about your child's inability to speak?				
22.	Are you presently worried about your child's schooling?				
23.	Do you think that your child would benefit from physiotherapy?				
24.	Do you think that your child will benefit from occupational therapy?				
25.	Do you think that your child will benefit from speech and language therapy?				
26.	Do you think that use of sign language would help your child to indicate his needs?				
27.	Do you think that use of communication boards would help your child to indicate his needs?				
28.	Do you think that your child would benefit from various computer programs to indicate his/her needs?				

29.	Do you agree that use of eye, facial, body, vocal or combination gestures can help him/her learn to speak?		
30.	Do you agree that encouraging use of eye, facial, body, vocal or combination gestures will hinder his/her ability to learn to speak?		
31.	Do you agree that encouraging use of eye, facial, body, vocal or combination gestures do not affect his/her learning to speak?		
32.	Do you agree that encouraging use of eye, facial, body, vocal or combination gestures can help him/her learn to interact (mingle) with others?		