

Mother-Child Communication Interaction in Children with Cerebral Palsy

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Abstract

Verbal and nonverbal communication fulfills various communicative functions. Intention to communicate is an important communicative function, which further includes functions such as; (i) request for information; (ii) request for attention; (iii) request for object; (iv) information; (v) instruction (action); (vi) instruction (speech); (vii) confirmation (viii) denial. Typically developing children use intentional communication to have a preplanned effect on the mother, who is the most available communication partner for communication. It is clinically observed that in children with cerebral palsy (CP), the intentional communication between the child and the mother is often impaired. However, very few studies have addressed this issue in greater detail. The aim of this study is to describe the factors in intentional communication between the mother and nonspeaking child with cerebral palsy. Amongst the factors analyzed, instruction (action) and information were the most predominant functions observed in mother and child respectively. The other functions showed a hierarchical trend which is discussed in detail. The results revealed a communication asymmetry in the use of various communicative functions between mothers and their non speaking children with CP. Mothers were dominant communication partners while children were passive communicative partner as revealed from the frequency of occurrence of various communicative function.

Key words: Communication function, Nonspeaking children, Cerebral palsy

Communication is a highly complex and dynamic phenomenon whereby the sender and receiver of the message are continuously coordinating and modifying their present and anticipated actions according to others signals (Fogel, 1993). As Shames, Wiig, & Secord, (1998) puts it, communication is a process wherein we exchange information, feelings, opinions and news. Communication is also multimodal. Though most of the communication is attained through speech, the process is enhanced by the use of facial expressions, gestures, eye gaze, etc.

Children with developmental disability such as cerebral palsy unlike typically developing children have issues in different spheres of life such as feeding, motor control and communication. The term cerebral palsy, as defined by Hagberg, (1989) includes different syndromes, all depending on a non-progressive damage of the immature brain resulting in motor impairment. Depending on the damage, individuals present either anarthria, (inability to produce speech) or dysarthria (unable to produce intelligible speech). Children with anarthria are the non-speaking children who depend on typically available nonverbal strategies such as eye-gaze, facial expressions, gestures, and vocalization to communicate. Often such children are recommended Augmentative and Alternative communication (AAC) strategies for enhancing communicative skills. AAC is "an area of clinical practice that attempts to compensate for the impairment and disability patterns of individuals with severe expressive communication disorders" (ASHA, 1989). Individuals, who use AAC, like their verbal counterparts, have a variety of interaction goals within their social roles. Light (1988) proposed four main goals in such communicative interactions namely:

1. Express needs and wants,
2. Develop social closeness with others
3. Exchange information with others and
4. Fulfill social etiquette expectations.

The communication demands differ across these interactions in order to fulfill the intended purposes. In the first year of life, typically developing children move from the preintentional stage of communication to the intentional stage of communication (Bates, Beningni,

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Camaioni & Volterra (1975). Intentional communication elicits more contingent responses from mothers as they are easier to interpret or mothers attribute meaning to subtle cues elicited by the child (Yoder & Warren, 1999). Communication development is shaped by the cumulative experience of the interactive process between a parent and child. Children have the ability to use vocalizations, eye-gaze, and motor control of arms and hands, and the caregiver has the intuitive ability to read these potential communicative signals.

Physical limitation as imposed by the physical impairment seen in children with cerebral palsy reduces the opportunities for exploration and object-based play (Cress, Linke, Moskal, Benal, Anderson & LaMontagne, 2000) that are most essential for communication development. Since most of the early learning experiences involve physical acts performed in a given environment, learning language through exploration is rendered equally difficult. The early cognitive and communicative skills are reported to be learnt through social play interactions as compared to object play in typically developing children (Cress et al. 2000). Children with severe physical impairments on the other hand, rely on vocalizations, eye-gaze, and gestures during interactions with their communication partners (Light, Collier and Parnes 1985c). Children with severe or multiple disabilities, have limited ability to use the same repertoire available to typically developing children, and the ability of the caregiver to read these signals will thus be inevitably affected (Carter and Hook 1998). Depending on the characteristics of the behavior, that convey the intent, either singly or in a combined form, there is obvious confusion on the part of the communication partner about interpretation of the child's behaviors and for associating meanings to their communication intentions (Iacona, Carter & Hook 1998). The caregivers make inferences on the basis of other available source of information such as the context, basic understanding of the nature of the child, previous interaction experiences and kinds of verbal and nonverbal expressions (Iacono et al, 1998).

Infants with severe communication disability also fail in exerting communication control, because of caregiver's problems in reading the early signals from the infant or the infant's ability to act on objects. This in turn results in failure to develop contingency awareness, in children i.e. the understanding that a behavior has an effect on the environment. This further leads to reduced 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 a failure to develop intentional communication to develop (Basil, 1992).

Most of the studies have focused on factors related mother-child interaction in typically developing children and patterns of language development through this interaction process. There are limited studies evaluating the mother-child interaction in children with severe physical impairment and specifically in children with cerebral palsy. This study is an attempt to analyze mother-child interaction in nonverbal children with cerebral palsy during the development period. To develop communication competency in such children a basic understanding of the communicative repertoire used by mother and child during communicative interaction needs to be looked at. Thus the main focus of this present study is to analyze the communication patterns in mother-child communication interactions specific to children with cerebral palsy and who are non-speaking.

Method

The aim of the study was -

- To analyze the communicative functions of mothers while interacting with non-speaking children with cerebral palsy between the ages ranging from 2 to 3 years.

The communication functions studied were as follows (refer appendix 1 for details):

1. Request: (a) Request for information (b) Request for attention (c) Request for object
2. Information
3. Instruction (for action)
4. Instruction (for speech)

5. Confirmation

6. Denial

Subjects

The subjects were selected from centers catering to services to children with special needs. Children within the age ranges of 2 to 3 years with the primary diagnosis of cerebral palsy confirmed by the medical professionals and physiotherapist/occupational therapist were selected. The demographic details of the subjects are presented in Table no 1. None of them had undergone any formal speech and language intervention. All the subjects were quadriplegic (four limbs involvement) and were not independently mobile. Their peripheral hearing and vision were normal (as per the reports available) and had age appropriate receptive language age based on REELS (Receptive Expressive Emergent Language Scale, Bzoch and League, 1971). They were exposed at home to Kannada language. Expression was primarily through non-verbal modalities and none of them had meaningful speech in their expressive vocabulary. Since there are no standardized tools available for measuring nonverbal expressions, expressive language were mainly profiled based on clinical observation and parental interview. Expression was mainly through use of unaided communication strategies such as gestures, pointing, facial expression and/or voicing.

Subject	Age/Sex	Diagnosis
A	3.0 yrs/F	Spastic Quadraplegic
B	2.10 yrs/M	Spastic Quadraplegic
C	2.6 yrs/M	Spastic Quadraplegic
D	2.11yrs/M	Dyskinetic Quadraplegic

Table 1: Demographic data of the subjects

Mothers were selected as communication partners as the mothers accompanied most of the subjects attending intervention. Though the contributions from fathers are well acknowledged, mothers play a significant role and are the available partner for communication in most cases. Mothers were in the age range of 21- 25 years and they were literate with a primary education of higher secondary grade. They had no speech, language or other sensory deficits.

Procedure

The four dyads were familiarized with the clinical settings. The principal investigator built rapport with the mother-child dyad. They were instructed to interact with the child using available set of materials/toys, as they would normally do at their homes. Few sessions of feeding, physiotherapy/infant stimulation and play were video recorded to familiarize the dyad with the recording procedure and to desensitize them for the physical presence of the investigator during video recording, and to help overcome shyness/fear if any. Informed consent was obtained from mothers for video recording, prior to their inclusion in the study. The actual procedure consisted of 3 audio-video taped sessions of 15 minutes of each dyad interacting with the selected toys and suggested activities.

Before the recording, mothers were instructed on how to use the material and the activity that was required to be carried out with the child. A semi-structured interaction mode was chosen primarily to increase the chances of occurrence of communicative function, which were intended to be studied. The toys were selected such that it suited the age, physical condition of the child and that, which provided better communication interaction in the dyad. The same toys were provided to all the dyads. The material included ball, building blocks, car, noisemakers, marker pens, kitchen set, doll and accessories of doll, cars, papers, flash cards and picture books. Three sessions were chosen to provide maximum opportunity for a communicative function to occur, and to rule out the contextual limitation (as in selection of a particular toy). Three audio-video recordings were carried out on separate days, within a period of one month, with a gap of a week between consecutive recordings.

Phase 1: Mothers used both verbal and nonverbal strategies to communicate. Due to the inherent difficulty in transcribing the verbal and nonverbal behaviors of the mothers separately and since the aim of the study was to analyze mothers' overall communication strategies; only the verbal behaviors of mothers were transcribed. Child's communication strategies were not noted down in this transcription. Taxonomy of the communicative functions was based on review of literature on mother child communicative interaction (Dore, 1978, Wetherby, Cain, Yonclas, Walker, 1988). Two judges, who were postgraduates in speech-language pathology with a minimum of 2 years of experience in intervention of childhood language impairment, were selected. A list of communicative functions, (see Appendix 1), along with the definition and examples were coded for training the judges. A sample video recorded clip of a 6-year-old child meeting all the criteria as specified for subject selection in this experiment 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. The judges were given enough opportunity and practice along with ample discussion to familiarize them with the actual rating procedure.

Phase 2: After the training the actual experiment involved the judges, viewing the transcribed version of each session along with the recording of each dyadic session completely for 2-3 times. Once the judges were comfortable and were familiarized with the dyadic sessions. Each transcribed utterance elicited by the mother was coded based on the taxonomy of communicative functions provided to the judges. Similarly the recording was viewed again for coding communicative function elicited by the child. Finally the recording was viewed in total to reconfirm and check the coding offered for the mother and the child's communicative functions. Both the judges carried out this procedure separately, with the principal investigator helping them with the technical aspects of the recorded samples like switching off the sample at particular point so that they could code the utterance. No discussion regarding the coding, with the principal investigator was entertained during this process. Both the judges rated the sample separately.

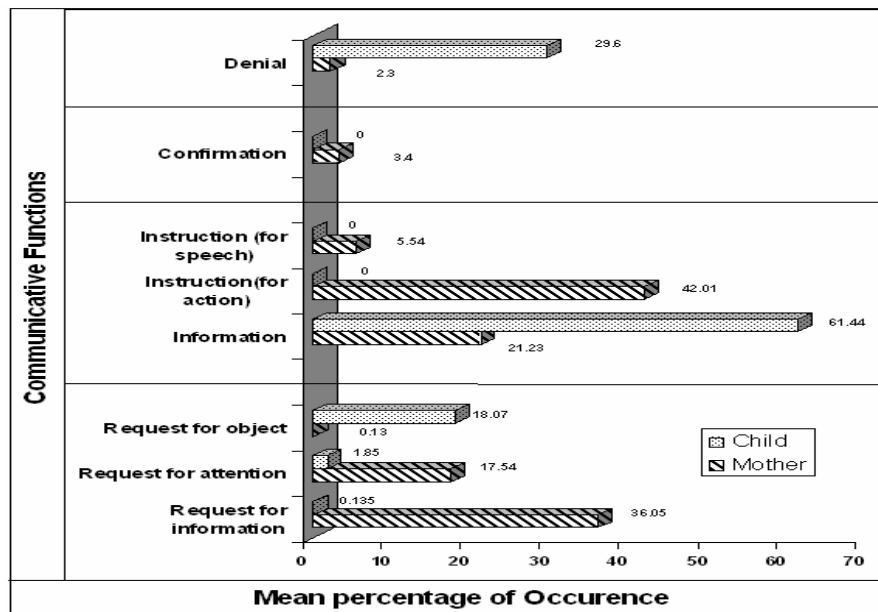
Scoring and reliability

The frequency of occurrence of each mother-child communicative function was calculated. The percentage ratio was calculated for each a) mother elicited function to total functions, b) child elicited function to total child function. Inter-judge reliability using alpha coefficient, for the communicative functions of the dyad were carried out. Inter judge reliability ratings for the communicative function of the child ranged from 80% to 99% whereas for mothers, the inter-judge reliability was 99%. The mean percentage of each function for mother and child was calculated. Mean percentages for the three recordings were calculated for each judge. Since the inter-judge reliability of the total of the frequency functions was high, (99%), the mean percentages of each judge were further tabulated to provide a composite mean rating for each communicative function for all the 4 subjects.

Results and Discussion

The aim of the study was to analyze the type and frequency of communicative function in mothers and nonspeaking children with cerebral palsy during semi structured communication interaction. Since verbal and nonverbal responses in mothers were difficult to differentiate, the judges coded the combined communicative strategies of mothers and compared them with nonverbal strategies of the children. The type and frequency of the coded communicative function data, by all the four dyad subjects by both the judges for each recording were calculated. Mean response for all the subjects by both the judges for the type of communicative functions used by the mother and child were calculated. Most of the communicative utterances were mainly by the mothers and they often consisted of multiple utterances with same functions repeated or comprising of multiple functions. On the other hand, nonspeaking children's communicative function were limited and comprised of single function. The children being nonverbal, mothers seemed to provide a linguistically stimulating environment for them to facilitate language

development. Children exhibited limited repertoire of communicative skills as reflected in their limited communicative functions.



Graph 1: Mean percentage of occurrence of communicative functions (mother and child)

The mean percentage occurrences of various communicative functions are presented in graph 1. Result in graph 1 reveals that there is significant difference observed in various communicative functions in children and mothers. Mothers showed a higher frequency and varied communicative functions as compared to children, which is also supported by other studies (Light et al, 1985 a, b; Pennington and McConachie, 1999). Mothers of nonspeaking children take a larger proportion of communicative turn evident by the higher frequency of communicative functions, thus depicting unequal partnership, dominating the communication interaction (Light et al, 1985b, Pennington & McConachie, 1999). Motor impairment in itself could be the prime reason for the same. The physical dependence of these children could be compelling mothers to be over protective and to assume charge of their life in all spheres including communication.

Request for information had a mean of 36.05%, while request for object and request for attention had a mean percentage of 18.07% and 17.54%. Majority of communicative functions in mothers during dyadic communication interaction were instruction (action). The mean percentage of instruction (action) in mothers was found to be 42.01%. This is possibly because of the inherent mothering pattern often reported in most typically developing children (Wetherby et al. 1988). The initial interactive games of mother and typically developing child are dominated by motoric activities as children learn to speak. It is through these interactive games that rules of language are learnt. In the instances of children with motor impairment, and concurrent delay in attaining motor milestones, mothers seem to continue to provide instructions for actions and encouraging them to perform it. Mothers mostly ignore the limitations imposed by the physical condition. The children selected for the study continued to be on physiotherapy/occupational therapy program. This would have probably influenced the mothers' communication interactions, which were more inclined towards motoric activities. The significant fact that emerged is the unrealistic expectation of mothers from their children for example, picking up objects, reaching out for an object, etc. were predominant strategies seen in the mothers' communication.

Provision of information had a mean percentage occurrence of 21.23%. The reduced frequency of information by mothers could also be due to poor response on the part of the child.

.It was also observed that among these provisions of information, there were higher instances where mothers requested for information, which was followed by provision of information by her. The mean percentage for instruction for speech in mothers was found to be 5.54%. Though this is considerably less than instruction for action, it again reflects on the belief by mothers that speech would develop in their children over a period of time like other motor milestones, such as partial neck control, or sitting with support/aid. Confirmation attained a mean percentage of 3.4%. Confirmation usually followed child's response, and was observed to be linked with mothers' attempt to encourage the child to communicate. The mean percentage of denial was 2.3%. The strong dominance of mothers in the communication interaction can be inferred based on the high percentage of communication function such as instruction for action request for information, and provision of information and a poor regard to other functions such as requesting for attention towards the activity, confirmation, denial or request for object. Pennington et al. (1999) states that communicative functions such as request for information by the mothers actually tend to restrict the communication interaction. Most of this request for information in the dyadic interaction were either asking for label, or expecting a yes/no response, or '*test questions*' for which the mothers already knew the answers. Light et al (1985b) also observed similar findings in their study. Presence of these functions in mothers' interactions further restrain the children's' conversation. Provision of information is believed to be one of the language stimulation strategies, especially in the developmental period. In typically developing children this has been well correlated with children's expressive language development. A low proportion of this function is thus a concern in this population. However such interactive strategy in children with cerebral palsy could further reduce the active participation of the child in the communication process and makes the child assume a responsive role.

Contrary to the mothers' findings in the study, children exhibited restricted range of type of communicative function. They were found to be compliant in the communication interaction. The reason could be that mothers have least communicative expectation from these children especially during this period, when they are struggling to attain physical developmental milestones. Since different communicative functions are derived from the interactive process between children and their primary caregivers, namely the mothers, such lowered expectations actually hamper the communication development in these children. The motor impairment restricts the movement and ability of the children to perform tasks. Simple physical movements like pointing, reaching out or even touching are time consuming if not impossible. It was observed during interaction that, children were seldom provided with the time or opportunity to produce many of the functions resulting in restricted and low frequency of communicative function. It is possible that the communicative abilities of nonspeaking children were restricted due to limited social stimulation and opportunities to explore. The results of the analyses of the communication samples are presented in table 2.

Functions	A	B	C	D
Request for information	-	-	-	+
Request for attention	+	-	-	+
Information	+	+	+	+
Instruction (for action)	-	-	-	-
Instruction (for speech)	-	-	-	-
Confirmation	-	-	-	-
Denial	-	+	+	+
Request for object	-	+	+	+

Table 2: Communicative function elicited by nonspeaking children (A, B, C, D) within the dyadic interaction

None of the children requested for action or instructed the mother to perform an action or speak. Child D was the only one who requested for information, whereas, child A and D were the only children who requested for attention. Provision of information was observed in all the four children. Child B, C & D used only information, denial and request for object. Request for object indicated either the choice of activity, or a material required to produce the action in response to instruction for action. The presence of this function indicates that the children with cerebral palsy are actually not as passive as they are assumed to be. They do have an ability to indicate their preferences or need. This information could be further used as an activity to obtain goal directed behavior, and to control the environment to a certain extent. The communicative functions most commonly and most frequently used were provision of information, which was seen in all the four children's communication repertoire (Refer table 2). This is in agreement with studies of Light et al, 1985 b, Pennington et al, 1999). The high incidence of request for information by mothers could have obliged the children to provide information, or it could be that the high incidence of mothers' provision of information could have produced such an effect.

Mean percentage of information was 61.44 %, which was the highest of the communicative turns in children followed by denial (29.6 %). The requests for object occurred 18.07 % of times in children. Request for attention had a mean of 1.85 % whereas request for information had a mean percentage of 0.135%. None of the children confirmed, instructed for action or instructed for speech from mothers, Communication strategies such as eye gaze, facial expressions, gestures, and vocalizations are usually subtle, effortful, time consuming and unconventional. Conditional limitation in such children also limit their ability to use behaviors (such as eye gaze, motor control etc.) and as caregivers' ability to read these behaviors as communicative signals are inevitably affected (Dunst & Wortman Lowe, 1986). For mothers to attend and interpret their attempt to communicate, such occurrence needs to be brought to the mothers' attention. A failure to do so, evident in the lower mean percentage prevents the provision of contingent responses by the mothers which otherwise leads to development of learned helplessness (Schweigert, 1989) in the later period. The high frequency of occurrence of functions such as provision of information, denial or request for object probably could be functions that are possible for the child to perform within the limitation imposed by the severe physical and speech impairment whereas other functions such as request for information, instructing the mother for an action or for speaking require a higher potential which is lacking in these children. Probably these functions are interpreted strongly based on the context in which it occurs and the chances of this being missed out by the judges are high. The reduced type and frequency of communicative function could be also a result of limited ability or possibility to use the naturally available unaided strategy by the children. These limitations could be overcome with the provision of AAC system. Possibly a previous experience in interacting with these children to familiarize them with their communicative repertoire would have prevented the likelihood of omission of such function.

An overview of the interaction pattern between mothers and children with cerebral palsy using AAC show an asymmetrical pattern wherein mothers dominate the conversation while children usually tend to be a respondent in most instances. These findings are supported by Calculator and Dollaghan, 1982; Light, Collier and Parnes, 1985a. It is also observed that mothers provide fewer opportunities to their children to communicate. This is again supported by Calculator and Luchko (1983). Several factors could be contributing to this unequal participation by the non speaking individual. Lack of conversational experience and dependence of partner for message interpretation (Culp, 1982; Colquhoun, 1982), developmental constraints, which may limit physical and cognitive experiences and restriction imposed due to the inability of these children to speak, could be some of the reasons for this asymmetry in communication interaction.

Conclusion

Communication is a dynamic and transactional process, in which communication partners continually influence each other throughout the course of their interactions (Blackstone, 1991, 1999). The communicative interactions are dependent on the communication skills of each individual participating in the interaction. The study analyzed the communication interaction strategies in mothers and nonspeaking children with cerebral palsy. Mothers communication strategies were dominated by instructions (actions) followed by request for information, provision of information followed by request for attention. Instruction for speech, confirmation denial and request for object had fewer occurrences in the communication process. Results of the study revealed an apparent disparity between the types and frequency of communicative function used by the dyads. Mothers seemed to dominate the communication process. Contrary to this, children demonstrated more of provision of information, followed by self centered communication strategies which were need/preference based such as request for object and denial whereas instructing mothers to perform an action or for speaking never occurred in the interaction. Request for attention were evident in few instances.

This study is a preliminary attempt in analyzing the communication patterns in the dyad. It does not provide the complete picture of the interaction strategies such as which function/modality were mainly used for initiations or for responding, or which function or modality had more cause-effect relationship etc. However it still enlightens professionals on numerous aspects while working with such children. There is a dire need for rehabilitators engaging in dealing with communication to focus not only on the child but also on mothers and other caregivers and train them on facilitating communication skills. Further research is needed to evaluate how severity of the impairment contributes to the communication patterns. The subjects studied had no formal speech and language therapy. A similar study with subjects who are undergoing speech and language therapy would provide information on whether there is any difference in the communication interaction patterns in mothers and children.

Counseling mothers on the condition of the child and the process of rehabilitation is the prime necessity. Providing a true picture of the child's capabilities could help parents to have realistic expectation from their children, which could further promote better communication skills. Environmental exposure in various ways, in the absence of the normal process and modification of the typical language stimulation behaviors, exploratory play by mothers to particularly suit the needs of the child would facilitate the child in developing skills to communicate. Communication is the right of every individual and it hold true for every child and it holds true for such children too. Expression of thoughts, needs and wants in whatever modality should be encouraged by the mothers. Awareness to the different interaction styles by mothers and its effect could provide insight to mothers on how to handle children with such special needs. Guidelines specific to stimulating these children for communication readiness, and to become an active communicator could prevent communication difficulties in the later date.

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APPENDIX 1: DEFINITION OF COMMUNICATIVE FUNCTIONS

Communicative functions	Definition
Request for information	<i>Turn that serves as request for information about the speaker, about the object, about the action.</i>
Request for attention	<i>Turns that served as to gain attention towards himself, the object or action</i>
Request for objects	<i>An intentional communicative act verbal or nonverbal used to demand a desired tangible object.</i>
Information	<i>Turn that either commented on objects, actions or as to partners comment.</i>
Instruction for action	<i>An intentional communicative act (verbal or nonverbal) used to command another to carry out an action or instructing to speak.</i>
Instruction for speech	<i>An intentional communicative act (verbal or nonverbal) used to command another to speak.</i>
Confirmation	<i>Turn that indicated affirmation, liking or acceptance to partner's comment.</i>
Denial	<i>Turn that revealed dislike, or an indication of do not want, negative responses to partner's comment.</i>