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Communication Patterns in Non-Verbal
Physically Disabled Children -
Description and Intervention

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ABSTRACT

There has been little detailed follow up of children who use augmentative communication systems, although frequent reports from schools and parents indicate that the introduction of augmentative communication is not always successful.

This project describes the communication of physically handicapped children who were referred to The Wolfson Centre Communication Aids Centre, London, for assessment and recommendation of a communication aid. It aims to examine whether the provision of aids to this client group actually does improve communication patterns.

A method of describing communication patterns in these children was developed, using videotaped observation of adult/child dyads. Approximately five minutes of filmed interaction was transcribed for each contact. Coding focused on the structure (initiations and responses) and speed of interaction, the communicative functions and the modes the child used to communicate with (eg gesture, verbal, vocal, symbol etc).

Study 1 uses this method to profile nine children at assessment (contact 1) and again approximately one year later (contact 2). Subjects were observed and video-recorded with a parent and with a teacher at each contact.

A questionnaire about functional communication was also administered at contact 2.

Study 2 aims to evaluate the effect of a training workshop for parents and uses the method to profile 14 children in two groups of matched pairs. The parents of the children in the experimental group attended a one day workshop training communication skills. Both groups were profiled at assessment (contact 1), three months later (contact 2) and approximately one year later (contact 3).

Results were limited by long delays in provision of the recommended communication aids which made it impossible to look systematically at change related to the introduction of the aid. Children's communication patterns were found to be very restricted in both structure and function, although short term changes after parent training were demonstrated at contact 2.

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CHAPTER 1

INTRODUCTION

COMMUNICATION AIDS FOR PHYSICALLY DISABLED CHILDREN

Children who are physically disabled are universally recognised as having difficulties with mobility and fine motor movements. In addition to these motor difficulties they often experience major problems in developing and using communication skills. One possible method of helping these children develop optimal communication skills is by introducing the use of a communication aid. The aim of the present research was to describe the communication patterns these children use and evaluate intervention with a communication aid.

1.1 Setting

This research is set in The Wolfson Centre Communication Aids Centre (CAC) in London. The Communication Aid Centre network in the United Kingdom was established in 1983 as the result of a joint initiative by the DHSS (Department of Health and Social Security) and RADAR (Royal Association for Disability and Rehabilitation). The Wolfson Centre CAC is the only paediatric Communication Aids Centre in the UK, and accepts referrals from a wide area. Children referred are primarily non-verbal, physically disabled and seeking an augmentative form of communication. For a description of children seen during an 18 month period see Jolleff et al (1992) appended in the back pocket of this thesis.

The Wolfson Centre Communication Aids Centre provides:

1. a multidisciplinary assessment team to assess severely physically disabled non-verbal children for augmentative communication systems. These range from simple communication boards to sophisticated electronic systems.

2. an initial assessment culminating in recommendations for an augmentative communication system.

3. a regular review service to monitor the progress of the children using their communication system.

4. a loan library of equipment.

5. a resource and information centre.

6. a continuing commitment to inform and educate professionals involved in the field of childhood disability about new advances in technology and approaches to remediation.

1.2 Aided Communication

For many physically disabled children, effective communication through the traditional channel of speech is either not possible, or severely limited. Clement & Twitchell (1959) described the dysarthrias occurring in association with cerebral palsy and concluded that disturbance in the speech mechanism reflected the disturbance in the limbs. Later studies described the speech of these children and its effect on intelligibility for the listener (Darley, Aronson & Brown 1975; Andrews, Platt & Young 1977; Kent & Netsell 1978). Speech was

described as being characterised by major disturbances in phonation, articulation and respiration. This suggests that even the less severely affected physically disabled children are at risk for developing impaired communication, while the more severely affected, who may have normal intelligence, cannot write or speak and are reduced to communicating with illdefined vocalisations and gross gestures.

There are many different augmentative/alternative communication systems available to help these children and improve their communication potential.

Communication aids fall into a number of categories:

1. signing systems which are only useful if the child has the physical control to sign fairly accurately.

2. symbol systems which are particularly useful for more physically handicapped children.

3. electronic aids which are useful for any child who has difficulties with verbal expression. These range from very simple devices to complex text to speech aids which potentially offer infinite expressive ability.

Most communication aid users need more than one aid. eg a visual display or synthetic speech system for spontaneous communication and a written output for school work. A number of children combine gestures or simple signs, vocalisations, symbol systems and an electronic aid.

as they are able to address the content and structure of language. This enables the signer to convey the same degree of complex and abstract language that the conventional vocal speaker could transmit. The limitation for communication for signers lies with the environment and its understanding of the sign language being used.

1.2.1 Signing Systems

Alternative/augmentative communication in the form of signing systems eg BSL - British Sign Language (Brien, 1992) and the Paget-Gorman Sign System (Paget, Gorman & Paget, 1976) have been available for many years, particularly as systems for the deaf. They are systems that offer a potentially sophisticated communication method,✷ BSL is often criticised for its lack of syntax, but with hand signs and finger spelling, it can provide a rapid form of communication. The Paget Gorman Sign System is able to communicate both the syntax and semantics of language in a non-vocal, visual form. However, because in both these systems the hand movements are quick and complex, they do not generally offer a viable alternative for the physically disabled child.

The advent of the Makaton Vocabulary manual sign system in 1972, devised by Margaret Walker, offered a very simple signing system that is accessible to some physically disabled children. Children need some degree of motor control, but as the signs are very gestural and not too precise, many children are able to use some of them. The Makaton vocabulary is frequently criticised for being a "content" language lacking "structure" and therefore being very limited, but it is based on BSL and is therefore in theory expandable. However, in practice and certainly for the physically disabled population this does not usually happen.

1.2.2 Symbol Systems

Symbol systems are now familiar alternative/augmentative communication systems. They include Blissymbols which were developed in 1949 by Charles K. Bliss (2nd edition 1965) as an international language, Rebuses which were developed from the Peabody Reading Scheme, originally to help children learn to read and Makaton symbols which were developed in 1976 to accompany the signs from the Makaton Vocabulary project. They have now been combined with the British Rebus system. Makaton/Rebus symbols are simple pictographic line drawings and for this reason are often used for children with learning difficulties.

Figure 1.1 Makaton/Rebus Symbols
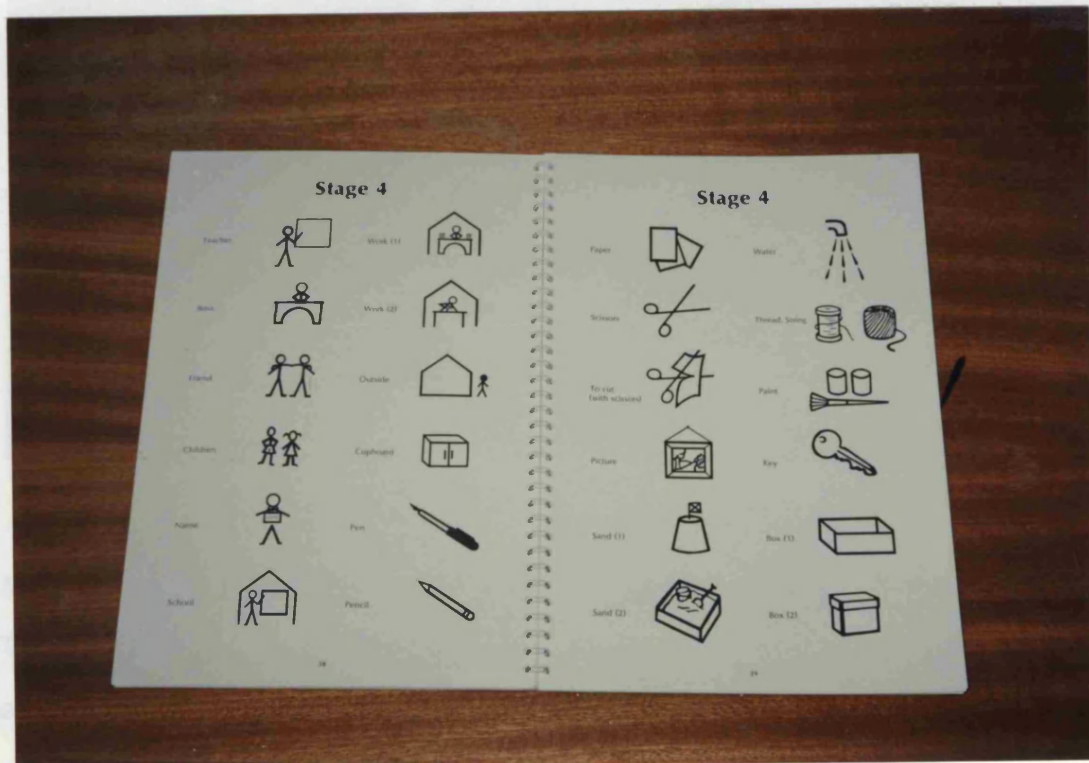
Blissymbolics is the other widely available symbol system used in the UK and is more symbolic, based on nine geometric shapes. There are approximately 2000 symbols available and in theory it is possible to "say" anything by using strategies such as "sounds like", "opposite meaning", "combine". Efficient Bliss users do this and also spell words that cannot be transmitted in other ways.

Figure 1.2   Bliss Symbol Chart
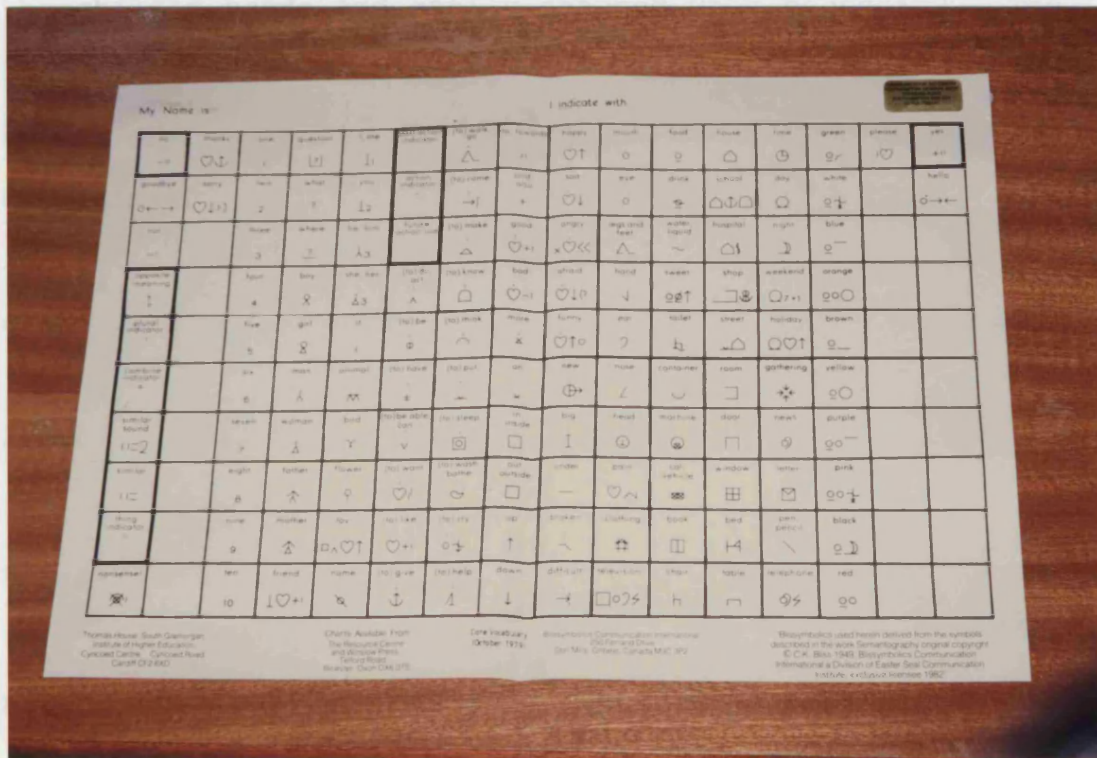
1.2.3   Electronic Devices
The availability and scope of electronic devices offering speech synthesis as the mode of communication are constantly changing as new developments in technology offer

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more and different possibilities. The two main types of electronic aid available are digitised speech and text-to-speech systems.

Digitised speech records the human voice. This means that the voice which comes out of the child's speech synthesizer can be a child's voice, and women no longer have to use speech synthesizers with male voices. Recordings are made of useful words and phrases. Most devices using this system allow the input to be individualised according to the child's needs and easily changed when necessary. The limitations of aids using digitised speech are a restricted number of recordings, although the number does vary according to the device, and no flexibility in spontaneous input, although some devices do allow phrases to be combined when required.

Text-to-speech systems convert words typed into the computer into speech. The quality of the speech output and variability in pronounciation vary according to the speech synthesizer selected and usually to the price paid. The more expensive synthesizers generally produce better quality speech. These systems theoretically offer the potential to communicate anything. They will store words and phrases which can be accessed by simple movements and also have the facility for the child to be spontaneous by typing in new words during a conversation. The limitations of these text-to-speech systems relate mainly to accessing

them, as the children who generally use them are severely physically disabled.

1.3 Accessing Communication Aids

Methods of accessing communication aids can be described in two main categories - Direct and Indirect.

1. Direct access is when the child selects the item for communicating himself, in one or sometimes more (if the child is using a coded system) movements. Examples of direct access would be fist, finger or eye pointing or using a head or light pointer for a symbol board. A traditional

keyboard could be operated with fingers or a head pointer, or a nontraditional keyboard like a Concept Keyboard could be operated with fists.

2. Indirect access is when the child has to use some sort of scanning method. This is usually necessary when the child has very poor physical control and coordination. Examples of scanning methods would be using another person to scan down a symbol chart, stopping him on the correct horizontal line and scanning across, stopping the person when they reach the appropriate picture, symbol, word or letter. Scanning can be done using a switch to stop the scanning process vertically and horizontally. There are a number of computer programmes that will do this from simple games and puzzles to sophisticated word processing programmes.

Any form of direct access is much quicker and gives the child a much greater degree of independence. Indirect access is slow and frequently relies on help from a carer. Selecting the best access system for the child is very important: if the aid is not easy to use, clinical experience and observation in various settings strongly suggest that it does not get used.

1.4 Communication Aids in Practice

There have been few follow-up studies on the outcome of the recommendation of communication aids but those that have been reported offer a gloomy picture of underuse of the aid and very restricted communication. This tends to support clinical observations from therapists involved in the recommendation process and reports from schools and parents, that aids frequently do not meet client expectation and needs, that is, effective communication.

Kraat (1985a) compiled data on communicative interaction between aid users and natural speakers. She identified consistent trends including limited use of aids and a reduced range of communicative functions in aid users. Culp et al (1986) carried out a retrospective study of clients of all ages who had attended an augmentative communication aid service. Data showed that there was a high percentage of rejection of aids and a low percentage of use of aids. In addition to this it was noted that children were much more likely to use an aid at school than at home. Positive correlations were reported between the number of communicative functions used and percentage of aid use and between the number of communicative functions and receptive language age. It was also noted that younger children used their aid for a greater percentage of the day. This suggests that young non-verbal children with good receptive language may have a better outcome of communication aid use with a wide range of functions.

However, Udwin & Yule (1990, 1991a, 1991b) studied two groups of children learning to communicate using either Bliss symbols or Makaton signing, and followed them for 18 months. They report a disappointing picture of limited communication skills with very little progress over time.

1.5 Assessment

A number of different models for assessing this client group for an appropriate communication aid have been developed. As early as 1976, Vanderheiden & Harris-Vanderheiden were suggesting that choosing the right aid for the child was a complex task and that the following issues should be taken into account: type and degree of physical handicap, cognitive ability, social and physical environment, other functional communication channels available to the child and the communication function to be fulfilled by the aid.

In response to the complexity of assessing the child for an augmentative communication system, attempts were made to develop decision making flow charts.

Shane & Bashir (1980) developed an election decision matrix with ten categories including motor, language, cognitive and environmental factors. The matrix gives an 'elect', 'reject', or 'delay implementation' of an augmentative communication system decision. Ferrier & Shane (1983) extended this model to select a system for the client. The

selection model takes account of environmental, user and technique factors.

The matrix suggested by Owens & House (1984) has three levels. The first looks at the appropriateness of augmentative communication for the client, the second provides information on modes of communication and the third on the kind of code (signs, symbols, words, pictures etc.) the client requires.

Although these flow charts were not completely successful in overcoming the difficulties clinicians were experiencing in assessment, they did highlight the importance of factors other than the aid user. As Culp (1987) states "the characteristics of the communication system, the behaviour of the communication partner and the nature of the communication situation, have a dramatic effect on the behaviour of the augmentative technique user", and suggests documenting these factors for evaluation.

Yorkston & Karlan (1986) define assessment as ongoing and as "a decision-making process that occurs at critical points throughout the clinical management of persons with severe expressive communication disorders" They stress, as do Lombardino & Langley (1989) the need for a multidisciplinary team and focus on defining the client's needs, assessing his capabilities and always planning ahead. This should have the effect of stretching the

client to reach his potential and move on.

1.5.1 The Wolfson CAC Assessment Model

The assessment model used by this author was developed by
the Wolfson Centre Communication Aids Centre team and is
described in detail by Jones et al (1990). A brief summary
is presented here.

Professionals making a referral to the CAC are requested to
complete a pre-assessment form before being offered an
assessment appointment. This is to determine which
children have the prerequisite skills thought to be
necessary to use a communication aid.

Pre-requisites are considered to be:

1.   Visual function:

     most augmentative communication systems rely on visual
     stimuli such as pictures, symbols, signs.

2.   Visual attention:

     it is necessary to be able to attend to visual
     stimuli, as most systems rely on decoding visual
     stimuli like pictures, symbols and signs.

3.   Verbal comprehension:

     children usually need a basic understanding of labels
     of familiar names and actions before they use them to
     express themselves.

4.   Cause and Effect:

     It is well known that understanding of cause and
     effect relations is correlated with early language

development (Bates, Benigni, Bretherton, Camaioni and Volterra 1977) and the child needs to demonstrate that he can consistently perform an action for a reward or operate a toy with a switch.

5. Communicative intent:

· the ability to communicate specific messages through pointing, vocalising, body movements or physically manipulating an adult to achieve the comprehension of the message.

If the child is seen to have the pre-requisites, an assessment appointment is offered. A first assessment typically takes a day. In the morning the child and his carers are seen by the multidisciplinary team. The team may consist of a speech therapist, an occupational therapist, rehabilitation engineer, paediatrician and psychologist. In the afternoon, the child's local therapists and teachers are invited to join the family. Before seeing the child, the family and the team meet to discuss the child and how the family perceive the problems and how they feel the child can best be helped.

Assessment by the multidisciplinary team addresses a number of areas:

1. Mobility:

if the child is wheelchair bound, the aid could be mounted on the wheelchair. If the child is mobile, the aid must be portable.

2. Posture:

    Sitting position is very important for accessing the communication aid.

3. Accessing:

    If the child has good hand function, it will be possible to access a keyboard directly to work the communication aid. If the child has limited hand function, the aid could be accessed indirectly by switches. If the child does not have reliable hand function, the team need to identify another reliable, consistent response to train for accessing.

4. Vision:

    It is important to know about the child's visual field because of positioning the aid's visual display. Many of the children referred have restricted visual fields.

5. Oculo-motor:

    The child's scanning ability needs assessment because of the size and type of visual display.

6. Hearing:

    If the child has a hearing impairment it may be important to reinforce the auditory input with a visual means of communication like signing or symbol use.

7. Symbolic and Verbal Comprehension:

    Comprehension level is assessed informally using developmental levels, and formally using tests that do not require a verbal reply like the TROG - Test for

Reception of Grammar (Bishop, 1983) and the BPVS - British Picture Vocabulary Test (Dunn, Dunn, Whetton, Pintilie, 1982).

8. Communicative Functions:

Range and type of communicative functions used. This is now assessed by the use of a scripted elicitation procedure. (Price, McConachie, Jolleff, 1992)

9. Communicative Modes:

The modes and combination of modes which the child uses for communicating. For example, verbal, vocal, gestures, signs, symbols etc.

At the end of the assessment day, the Team make recommendations for a communication system that will meet the needs of the child and his environment.

1.6 Conclusion

Although this kind of assessment model offers a multidisciplinary view of the child and includes many different factors, it primarily addresses the child and the aid. To identify and anticipate factors which might facilitate or prevent effective aid use, it is necessary as Culp (1987) suggests to assess other aspects like communication partners and different communication situations.

It was originally thought that introducing communication aids to non-verbal children would be like providing short sighted children with glasses or hearing impaired children

with hearing aids. At first, it seemed surprising that the children did not start to communicate easily now the means were available. However, when examined more closely it can be seen that successful use of a communication aid depends on a complex matrix of factors concerning the children and their communication skills, the aid/aids available to them, the methods they employ to access them and the expectations, attitudes and support their home and school environment offer.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The development of communication is vital to a child's
personal, social, cognitive and emotional growth. It is
the means by which the child controls the environment and
makes relationships. However as Wells (1981) states "it is
a collaborative enterprise" and each partner in the
communication takes turns in being the speaker or message
transmitter and being the hearer or receiver of the
message. Successful communication requires agreement on
the subject matter in the shared situation, follows an
orderly sequence of turns, appropriately relates the
meaning of the messages to the level of the communicators
and to the communication turns that have preceded and will
succeed the current turn. McLean and Snyder McLean (1978)
propose that "early social interactions provide the vehicle
through which the child acquires linguistic structures,
much of the semantic content and the social use of
language" and as early as 1962, Vygotsky stated that, "
What the child can do today in co-operation, tomorrow he
will be able to do on his own"

However, physically disabled non-verbal children are
limited in their opportunities for exploring the
environment and expressing their needs and emotions. Many
activities are done for them rather than with them,

therefore denying them the experience of collaboration and co-operative learning. They are consequently at risk of becoming isolated from normal social interaction and as this is seen as the medium through which the development of communication is facilitated (Bruner, 1975a; Bates, Camaioni & Volterra, 1975; McLean and Snyder McLean, 1978) they are therefore at risk for the development of abnormal communication patterns.

In view of this, this review will first briefly examine the development of communication skills in the context of social interaction in the normal child as a background to considering the development of communication patterns in the physically disabled child. It will then move on to examine the communication patterns of non-verbal children who use communication aids and finally will address issues of training aid users and their caregivers.

2.2 The Development of Communication Skills in the Normal Child

During the last twenty years there has been considerable interest and work directed to the area of pre-linguistic development and social interaction between the mother and child. Its importance for the later development of verbal language and communication is emphasised by Bruner in 1975b, when he states that "language acquisition occurs in the context of an 'action dialogue' in which joint action is being undertaken by infant and adult." The importance

of gestures and vocalisations within this interactive dialogue is discussed by Bruner (1975a) and Bates, Camaioni & Volterra (1975).

2.2.1   Social   Interaction   and   the   Beginnings   of Communication

Bruner suggests that linguistic concepts are first realised in joint action.   Joint action consists of three components; the child, the object and the mother or caretaker. Joint action occurs when both the caretaker and the child can focus on the object - when the child is about four months of age. Once joint focus has been achieved, a behaviour or a vocalisation will occur which will serve as a comment upon the object being focused on. The child's understanding of syntactical rules develops because they have been abstracted from the joint action routines of the mother and child.

More recent support for Bruner's view that mother's provide a "linguistic commentary" that interprets events that are taking place comes from a number of studies. For example, Messer (1978; 1980) studied mother/child dyads aged between 11 and 24 months. He found a very close relationship between the non-verbal context and the language input by the mother. He also noted that the mother made interpretation for the child easier by simplification and repetition. Harris, Jones & Grant (1984) found a similar pattern, noting also that when mothers initiated a new

topic, it was almost always accompanied by non-verbal communication to aid the child's understanding. Harris et al and Schaffer, Hepburn & Collis (1983) made the same observations about how mothers monitor their child's actions and attention so that they can make appropriate comments about what the child is doing.

These findings are given further refinement by a study in 1986 (Harris, Jones, Brookes & Grant) which suggests that while the relationship between the non-verbal context and the language input is important, it is the timing of the language input that is crucial. Language levels were assessed for ten children of twenty four months of age. Seven were found to be normal and three were exhibiting delay. Retrospective data analysis of conversations from these ten mother/child dyads at sixteen months found differences in the timing of the mother's commentary. All mothers talked about the activities their child was engaged in. However, mothers of the children with normal language talked about the objects or actions the child was attending to at that time, whereas the mothers of the children with delayed language often talked about an object or activity before or after the child had attended to it.

2.2.2 Communicative Function

"Language does not exist as an end in itself, but as a means to the achievement of some social/communicative function" (McLean & Snyder McLean 1978). This

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* Bishop & Mogford (1988) describe pragmatics as "The study of how utterances are used to convey meaning in different social and environmental contexts".

However, Martin (1992) suggests a wider definition for pragmatics which includes "communicative intentions and language functions, response to communication and understanding language, as well as interaction and conversation".

social/communicative function of language is referred to as "pragmatics". Bruner (1975a) defines pragmatics as the "direct function" of speech through which communicators affect the behaviour of others.[*] The term pragmatics is essentially linguistic, and strictly does not include the non-verbal behaviours and they will therefore be referred to as communicative functions hereafter.[#]

Bates et al (1975) divide prelinguistic development into three distinct stages based on Austin (1962) and attempt to link them to Piaget's six stages of sensorimotor development. Caregivers respond and interpret the earliest vocalisations by the baby, although it is doubtful that the baby is intending to send a message. The adult, however behaves as though the baby is trying to send a message and even if the interpretation is wrong, the baby will learn something about the effects of certain kinds of behaviour. Bates et al classify this as the first stage - perlocutionary. The child has "a systematic effect on his listener without having an aware control over that effect." Crying or cooing in the very young baby would be an example of this.

The second stage - illocutionary is when the child "intentionally uses non-verbal signals to direct adult attention to objects and events". Pointing in the young child would be an illustration of this stage.

The final stage - locutionary is when the child "constructs propositions and utters speech sounds within the same performative sequences that he previously expressed non-verbally". An illustration of this in the very young child would be asking for an object or action by name instead of pointing at it as in the illocutionary stage. Bates et al (1977) suggest that this stage does not occur until the child has reached Stage 5 in the Piagetian sensorimotor framework (Piaget, 1954). This requires that the child should have achieved an understanding of the means-end relationship and operational causality. Applied to intentional communication, this means that the child must recognise events as ordered in causal sequences, with one event occurring before and capable of influencing or causing later events. The child must also recognise that other people can operate independently and need to be contacted if the child wants them to be part of the interaction and act in accordance to the child's intentions.

There are a number of communicative function frameworks which have been suggested (Halliday, 1975; Dore, 1975; Bates,C., 1982; Greenfield & Smith, 1976; Coggins & Carpenter, 1981; Creaghead & Marguiles, 1982; Conti-Ramsden & Friel-Patti, 1983; Roth & Spekman, 1984a,b). Some of the frameworks have a rather restricted range of categories and some propose inadequate definitions of different functions. However it appears that it is possible to identify some

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core categories that are common to all systems: eg attention seeking; requesting objects, actions and information; protesting or rejecting; responding and acknowledging.

Therefore prelinguistically, it would seem that the child is constructing a communicative framework which is already facilitating communication and from which can develop verbal communication. It is estimated that only 35% of human communication is conveyed through speech, the remaining 65% is transmitted through non-verbal behaviour (Birdwhistell cited in Blackstone, 1986). However, as Bruner (1975a) comments the process is only made possible by the "presence of an interpreting adult who operates not so much as a corrector or reinforcer but rather as a provider, an expander and idealizer of utterances while interacting with the child".

2.2.3 Motherese

When a caregiver is interacting with a child, she instinctively employs a different language style to the one she would use with an adult. Her speech is characterised by short, simple utterances, which are free of grammatical errors and refer to objects or actions in the immediate environment. She speaks more slowly and in a slightly louder, higher pitched voice than usual using very clear pronounciation and emphasising important words (Garnica, 1977). This way of talking to the young child is termed

"motherese" and is considered by some researchers (Snow, 1972; Cross, 1977; Pinker, 1979) to have an effect in language acquisition.

2.2.4 Synchrony between Mother and Child

There is growing evidence that language learning strategies of the child and language teaching strategies of the caregiver change with the development of the child in both verbal and non-verbal ways (Bates, 1976; Garnica, 1977; Snow, 1977; McLean & Snyder McLean, 1978). These changes in strategies appear to be related. The child's communicative behaviour is modified by the mother or caregiver's input and the mother's communicative behaviour is modified by the child's communicative behaviour.

Evidence for this reciprocal model is offered by Clarke-Stewart and Hevey (1981) who studied social interaction in children aged between 12 and 30 months. They found that the child's communication increased during that time and the mother's attention and communication first increased and then as their child's communication increased, their own decreased. Holzman (1983) carried out a longitudinal study of four mother/child dyads and found that the mother's linguistic behaviour varied appropriately to the child's linguistic levels at different stages of development. Ling and Ling (1974) studied communicative behaviours in mother/child dyads in the first three years. They found that the mothers seemed to be aware of the modes

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of communication the child was using and to be attempting

a "match". eg when the child was one month, although the

mother used verbalisations, vocalisations, eye contact and

facial expressions, her predominant communicative mode was

body action and when the child was two to three years old

and was developing verbal communication as his main mode,

the mother adjusted and also predominantly used the verbal

channel.

2.2.5 Turntaking

This mutual responsiveness between the adult and the child

facilitates a successful pattern of interaction, which is

characterised by each partner taking turns and expressing

communication through a variety of different modes. Each

partner must be sensitive and responsive to the other's

communication, be expecting signals from different modes

and be aware of the relevant linguistic level of the

partner (McLean & Snyder-McLean, 1978).   Turntaking

involves the roles of each partner shifting from

communicator (active) to listener (passive) and back again.

Schaffer (1977) comments that "it is the manner whereby

this change is accomplished that constitutes the severest

test of the ongoing relationship".   Signals must be

produced that indicate to each partner intentions of

initiating or terminating his turn.

With very young children the responsibility for structuring

the turntaking lies mainly with the mothers and they have

been observed to use different strategies to establish and prolong the turntaking. For example, the child may be playing and the mother may comment on the play. In response to the comment the child looks up at the mother. Although the child did not intend to initiate an interaction, the mother, by responding to the child's action, gave him the experience of affecting another person's behaviour with his actions and in this way offered the child the experience of playing the role of initiator within the interaction. The mother has enclosed the child's behaviour in a communicative sequence without any apparent intention on the child's part (Jones, 1980). The use of "turnabouts", turns which respond to and require a response from the opposite partner, (Kaye & Charney, 1980), were often employed by mothers of young children to maintain an interaction.

Howe (1980) provides a refinement to the notion of "turnabouts". She studied mother/child dyads aged twenty to twenty two months who initially all had the same level of language development. When the videotapes of these dyads were analyzed there were three distinct patterns of conversation between the mother-child dyads. In one group, mothers frequently answered children by expanding the child's comments, but they did not initiate conversation by requesting information from the child. In the second group, mothers would often initiate a conversation with a request for information, but would rarely give an expanded

reply. The third group consisted of mothers who used both the expanded reply and the request for information. Three months later, the children in group 3 had made more linguistic progress suggesting that children need the experience of being an active communicator - providing information that they know - but that they also require the extra linguistic information that the expanded reply supplies. The importance of expanding on something the child has just said is also highlighted by Cross (1978).

2.3   The Development of Communication Skills in the Physically Disabled Child

From the very brief examination of the literature concerned with the normal development of interaction and communication, it seems that the child's developing motor activity plays a crucial role and that a number of subtle features of the social interaction and collaboration between mother and child could be very important. The non-verbal framework has assumed an important place in the development of normal communication and the physical disability of the child increases the risk of its disruption. This section will review work specifically related to the development of communication skills in the physically disabled child.

Compared with the wealth of literature about normally developing children and their communication, there are very few studies of physically disabled children's early

communication development.

2.3.1 Mothers and their Physically Disabled Children - an Early Study and Developing Methodology

Shere & Kastenbaum, (1966) examined thirteen pairs of mothers and their physically disabled children, particularly focusing on the relationship of mother-child interaction and cognitive development. The children were between the ages of two and four years. Each child was studied by interviewing the mother and observing their interaction at home. The study yielded much descriptive information and serves to paint a picture of the feelings and perceptions of mothers of physically disabled children and the context in which they find themselves.

The results of the interview highlighted some of the views that these mothers held about their handicapped children. There was a strong desire to see physical progress, particularly in walking. Every mother evaluated her child as "good". This judgement was based on the child's passivity - eg he did not express demands or require disciplining. Mothers overestimated their children's cognitive levels, expressed shame at having a physically disabled child and were desperate for people to say hopeful things about the child's potential. Mothers considered that their children should be happy and this related to looking after them and doing things for them. Mothers generally lacked insight into the way their children's

physical disability was limiting their learning potential
and consequently did not realise that there was an active
role for them to play in facilitating learning situations
for their children. Mothers expressed anger and negative
feelings towards professionals because they did not say
encouraging things, and it was also clear that
professionals did not offer helpful advice like how to
change children's environments to help them learn.

From the observational study they present two cases in
detail. One mother limits herself to providing basic needs
for the child, who was generally discontented, passive and
uninterested in things around her. The second mother was
more interactive and was observed to comfort, teach and
stimulate her child, who was active, alert, happy and
interested in things around him. Shere & Kastenbaum
comment that despite the differences between the mothers,
"both lacked insight into the relationship between a severe
physical handicap and cognitive development in a young
child".

The detailed study of the two cases by Shere & Kastenbaum
indicates how diverse and complex interaction patterns in
this client group can be. The study generally highlights
how views and self image of the mothers might be an
important factor in facilitating interaction; for example,
the need the mothers felt for helping, looking after and
doing things for their children is likely to reinforce

passivity while overestimating their cognitive ability, lacking insight into the children's cognitive and social development needs and focusing on their physical development may lead to the children experiencing non-stimulating environments. It is interesting to note how little useful information the mothers seemed to have and how professionals were seen as unhelpful.

The Shere & Kastenbaum study did indicate that the framework they used was capable of identifying differences in interactional patterns. Other researchers began to develop ways of documenting interaction and in 1969 Kogan, Wimberger & Bobbitt developed an approach to observe interaction between mothers and their disabled children which Kogan and different colleagues then utilised and refined in a number of studies (Kogan & Tyler, 1973; Kogan & Gordon, 1975; Kogan, Tyler & Turner, 1974; Tyler, Kogan & Turner, 1974; Kogan, 1980) The approach was based on the view that social interaction is a "multivariate dynamic process" and behaviours were analyzed according to their "relative status, affection and involvement components". They studied interactions between the disabled children, their mothers and therapists.

2.3.2 Mother and Disabled Child Interaction

Kogan & Tyler (1973) studied three groups of children who were physically disabled, were normal or had learning difficulties. While acknowledging that the parents of the

group were highly motivated and the children were not matched on variables like developmental levels or the parents on educational status their results did indicate interesting differences between the groups. They found that the mothers of the disabled children displayed more controlling behaviours than the mothers of the non-disabled children and that both groups of disabled children were more passive than the normal control group, although the physically disabled group displayed more assertive, controlling behaviour than the group with learning difficulties.

In 1987, Barrera & Vella studied two groups of mother/child dyads - disabled and non-disabled children. Groups were matched on much stricter criteria than the Kogan & Tyler (1973) study, including parental education, developmental levels, sex, birth order and socioeconomic status. Observations were made during free play sessions at home. Although they note that the groups were "remarkably similar" they did identify some potentially important differences when considering the development of communication. They found that the children within the disabled child dyads made less eye contact than the non-disabled children. They noted that while mothers with non-disabled children "responded to interactive play with interactive play", the mothers of the disabled children responded with "commands and verbalisations". They also noted, like previous studies by Kogan and colleagues (1973,

1974) that mothers of disabled children were more controlling in their interactions with their children than were the mothers of non-disabled children. They suggest that this is evidence of reciprocal influences within the dyad and that the mother's behaviour pattern within the disabled dyad may interfere with communication development.

2.3.3 Maternal Responsivity

Brookes-Gunn & Lewis (1984) studied maternal responsivity in mother/handicapped infant dyads. They found that cerebral palsied children exhibited less behaviour than groups of Down's syndrome or developmentally delayed children, and also that mothers of developmentally delayed children were more responsive to their children than mothers of children in other groups. They linked this difference to the higher mental age of the developmentally delayed group and suggest that maternal responsiveness may be most related to the mental age of the child and not to the disabling condition.

2.3.4 Interaction and Mothers as Therapists

The study reported in 1974 by Kogan, Tyler & Turner and Tyler, Kogan & Turner describes interaction between both mothers and therapists and children with cerebral palsy. Three different kinds of sessions were recorded and analyzed: the mother playing with the child; the mother offering therapy to the child and the therapist with the child. Results showed that over time, there was reduced

2.3.6   Psycholinguistic Processing in the Physically Disabled Child

Bishop (1988) states that "The available evidence shows that, provided hearing and intelligence are not impaired, inability to speak does not prevent development of language understanding and inner speech".   There are a number of case studies which support this.   As early as 1962, Lennenberg described a child who had a complete inability to make speech sounds and yet had good comprehension of spoken language and in 1975 Fourcin described the famous case of Richard Boydell who had severe cerebral palsy and who was unable to express himself until the age of 30 when he was given a Possum typewriter which he operated with his foot. Recently there have been a number of popularised cases, eg the film "My Left Foot".

Within the physically disabled population there are many whose neurological damage also affects their cognitive ability.   This will also affect their ability to learn and use language in the same way as it does in a child without physical disability but with low general intelligence.

It is important to realise as the above cases indicate and Bishop (1988) states that "Poor speech production ability is not an adequate explanation for poor speech perception in a child with an organically based speech disorder"

affection and warmth towards the child demonstrated by both parents and therapists. Mothers were more controlling and negative when offering therapy than they were when playing with the child. The study indicated that there may be a longitudinal relationship between the child's physical progress and the adult's responsiveness, possibly exacerbated by professional's emphasis on the child's physical disability. This supports some of the findings in the Shere & Kastenbaum (1966) study.

2.3.5 Intervention Programmes based on Mother/Child Interaction Analysis

Shere & Kastenbaum (1966) and Kogan (1980) carried their observations into intervention programmes. The findings from both these programmes suggest that family dynamics and mother/child interaction are often negatively toned and tend to inhibit rather than facilitate development. Shere & Kastenbaum suggest early intervention to help families have a realistic view of the child. Kogan suggests identifying behaviours that can be changed. The study indicates that poor parental interaction and behaviours may be avoided and can be helped by behaviour instruction to groups of parents. However, the change in parents' behaviour was not accompanied by any measurable change in the child's skill or independent function.

In summary, it would seem that there are differences in the development of the non-verbal framework between physically

disabled children and normal children and that this could be of significance to the development of communication in the disabled child.

2.4   Communication   Patterns   in   Children   who   use Communication Aids

It has already been mentioned in Chapter 1, that speech for severely physically disabled children is either not possible or severely limited, while the previous section of this chapter has reviewed work that indicates that the children's non-verbal framework is distorted.   It seems reasonable now, to consider what happens to physically disabled children's communication when they use a communication aid to augment their expressive speech.

Harris   (1982)   highlighted   the   difficulties   that communication aid users face when communicating using an aid.   She suggests there are three steps a non-aid user needs to take to express an idea, (see Figure 2.1) and contrasts this with a minimum of eight steps that the aid user has to take when he wishes to communicate (see Figure 2.2).

Figure 2.1   Intention to expression for non - aid users

1) ```THOUGHT,IDEA```

2)  ```
    COGNITIVE FORMULATION OF MESSAGE
    INTO FORM WHICH MATCHES
    INTENTION & WHICH WILL BE
    UNDERSTOOD BY THE RECEIVER
    ```

    CONSIDERATIONS
    PRAGMATICS
    SEMANTICS
    SYNTAX
    PHONOLOGY
    SOCIAL ENVIRONMENT
    LISTENER SKILL

3)  ```
    VOCAL EXPRESSION OF
    THOUGHT, IDEA
    ```
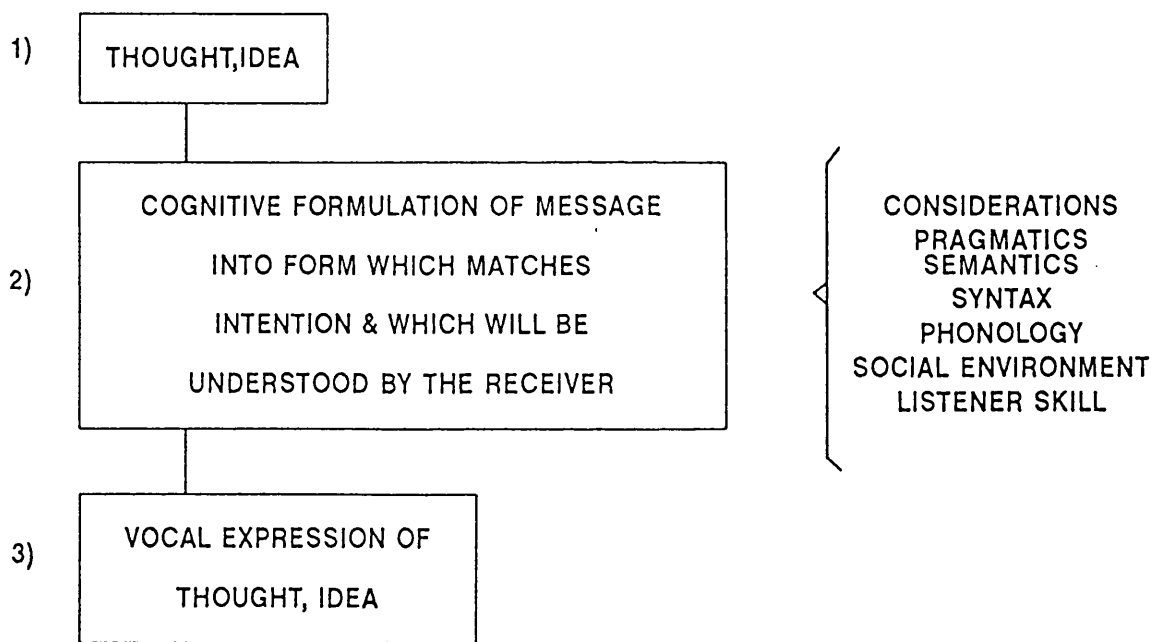
(Harris 1982)

Figure 2.2 Intention to expression for aid users

1) Thought, idea

Considerations:
  pragmatics
  semantics
  syntax
  phonology
  listener skill
  social environment

⟶

2) Cognitive formulation into appropriate form   (Reformulate)

3) Select expressive mode

4) Alert receiver to mode chosen

5) Visual/motor search of vocabulary available in order to select "best match" to intended message

6) Visual motor selection and sequencing of message elements

No direct match

7) Examine accuracy of output and ensure correctness of message

8) Message expression

Re-formulate message if incorrect or not comprehended

Message expression

(Harris 1982)

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2.4.1 Barriers to Effective Communication

"Augmentative communication devices are a poor substitute for natural speech" (Kraat,1985) and communication between aid users and normal speakers does not replicate or parallel speech to speech interaction. She suggests that communication using these systems will have many constraints and peculiarities.

Both Harris (1982) and Kraat (1985a) identified the speed of communication as a barrier - aid users are much slower than normal speakers. Foulds (1980) comments that a typical adult speaks at a rate of 126 - 172 words per minute, while a typical aid user has an output of 2 - 25 words per minute. If we consider the stages the child using a communication aid has to go through to express one idea (Harris, 1982) it is easy to see why there is such a difference in communicative rate. This slow rate of delivery from the aided speaker can make the interaction boring and tedious and tempt the normal speaking partner to speak for the aid user.

The listener/speaker roles become confused as, unless a speech synthesizer is being used, the communicative partner will need to speak the words and assemble the message that the aid user is indicating (Harris, 1982). This means that traditional turntaking is upset. The equality of interaction is interfered with and there is control by the normal speaker, who can anticipate, change the subject and

dominate the interaction using a high frequency of requests and instructions (Harris, 1982; Light, Collier & Parnes, 1985a; Buzolich & Wiemann, 1988). The aid user tends to play the respondent role in the interaction by using "yes/no" or providing specific answers to requests (Beukelman & Yorkston, 1980; Harris, 1982; Calculator & Luchko, 1983) and the normal speaker tends to initiate more frequently within the interaction (Calculator & Dollaghan, 1982; Harris 1982; Calculator & Luchko, 1983).

Vocabulary available to the aid user is restricted (Harris, 1982; Kraat, 1985a; Udwin & Yule, 1990) as most aids have limited vocabularies. Some aids have facilities for spelling vocabulary or combining parts of words but this method is obviously slow and communication is then affected by the constraint of speed.

The range of communicative functions used by the aid user is noted by Harris (1982) to be restricted. This is further supported by the detailed work of Light, Collier & Parnes (1985b) and Udwin & Yule (1991a) which will be discussed later in this section.

Harris (1982) also comments that aids themselves are considerable barriers to effective communication because they are so unnatural and that both the user and the communicative partner need a working knowledge of the aid and an adequate skill level to use it.

Kraat (1985a) suggests that both the aid user and his communication partners need to make adjustments to the communication situation and aim for the "optimal levels of interaction that can be achieved" within this framework. This may mean employing a variety of different techniques that normal speakers would not use, like for example, utilising a sort of shorthand. We have already discussed in Chapter 1 how efficient Bliss users overcome lack of vocabulary by using strategies like "sounds like" etc. Word processing packages with predictive lexicons reduce the number of keystrokes users have to make and therefore reduce time. PAL - Predictive Adaptive Lexicon (Swiffin, Pickering, Arnott & Newell, 1985) would be an example of this.

2.4.2 Communication Patterns of Communication Aid Users

There has been very little detailed work in this area but there are two major studies that have examined this client group's communication patterns. The work of Light, Collier & Parnes (1985a, 1985b, 1985c) was concerned with cerebral palsied Bliss board users, and the work of Udwin & Yule (1990, 1991a, 1991b) looked at two groups of physically disabled children - Makaton signers and Bliss board users.

Light, Collier & Parnes studied eight non-speaking physically disabled children aged between four and six years and analyzed their interaction patterns across three variables - discourse, communicative functions and

communication modes. The interaction in two settings - a free play session with their caregiver and a structured context with a clinician - was recorded by videotape and analyzed according to the three frameworks. All the children in the study had Bliss communication boards with a vocabulary of a minimum of one hundred symbols that they had been using for at least six months prior to the study.

Discourse was analyzed on three levels:

Level 1: Is a communicative act present or absent where it would be reasonable to expect one to occur?

Level 2: Does the communicative turn have backward links ie is it related contextually, or does it establish a new context?

Level 3: Does the communicative turn have forward links, demand a response or just invite a comment? This is important for keeping the interaction going

Functions were analyzed according to a list of twelve functions: social conventions; requests for objects or actions; requests for information; requests for clarification; requests for attention; confirmations & denials; provision of information; provision of clarification; expressions of self; elicited imitations; conversational fillers; unintelligible.

Modes were analyzed according to a list of six modes: communication board; vocalisation; gesture; eye gaze;

gesture and vocalisation; eye gaze and vocalisation.

Results showed that the discourse pattern was unequal: while the children and adults influenced each other, the caregivers produced more than twice the communicative turns of the child, and controlled the interaction. They did this by initiating new topics and demanding specific responses from the child. The children only used about half their turn opportunities and then usually when they were obliged to respond. The child's range of communicative functions was limited - Yes/no responses yielded a 39% mean score, and answering questions with specific information ie information demanded by the caregiver and known to both child and adult, yielded a mean score of 18.4%. The children rarely asked for information or clarification, although there were a wider range of functions used with the clinician in the structured context than in the free play session. Communication modes produced some interesting results. Only 18.2% of the child's turns were taken using their communication board. The authors also noted that the mode used was influenced by the communication partner's demands on the child and by the function. Confirmations and denials were transmitted primarily by gestures or vocalisations, while more symbolic communication was transmitted by the communication board.

Udwin & Yule (1990, 1991a, 1991b) undertook a longitudinal study of twenty Makaton signers and twenty Bliss board

users, aged between 3;6 and 9;8 years to evaluate the "impact of augmentative communication training on the communicative abilities of language impaired cerebral palsied children". They were followed up every six months for eighteen months. Measures of physical handicap, IQ, and language comprehension were taken. Results indicated that there were very few differences between the groups at assessment, and over time, in acquisition and use of the system and in the use of communicative functions. The differences that there were disappeared when measures of IQ and language comprehension were taken into account.

The overall picture these papers present is very similar to the Light et al (1985) study of limited use of systems for a small number of communicative functions. For example, Udwin & Yule report over 80% of all utterances recorded were for just four functions. The children did demonstrate some progress over the eighteen month period, but it was very slow and restricted. The sign/symbol vocabulary they used was small and the length and complexity of their utterances was limited. An interesting finding was that neither system appeared to facilitate greater communication, although it is widely believed that brighter children should be introduced to Blissymbolics as it provides more communicative potential.

If we consider the small percentage of communication that was transmitted by the children in the Light et al (1985)

study and the limited use of the system made by children in the Udwin & Yule (1990, 1991) study it would be reasonable to question the use of the system for communication. Light, Remington & Porter (1982) when discussing substitutes for speech suggest that the system cannot be considered to be a substitute for speech until it is used "referentially to pursue the child's own ends in a variety of settings". They suggest that the systems should be taught and practised in structured settings, used in structured settings and then used spontaneously in unstructured settings. Udwin & Yule suggest that possible contributory factors to the underuse of the systems they report on is the very limited exposure to the system the child received both at home and at school, eg one to one and threequarter hours formal training time per week at school and few structured strategies to encourage the use of the system in everyday communication.

This suggests the importance of considering the training issues associated with augmentative communication.

2.5 Training Issues

There is little work in this area and Udwin's (1987) survey of training studies carried out up to 1984 found that most of them were methodologically flawed. She identified defects in their description of subjects, their lack of control group and their employment of unreliable objective assessments and measurements of behavioural change. She

particularly noted the paucity of studies on Makaton signing and Blissymbolics which Kiernan, Reid & Jones (1982) report as being the most widely used systems in the UK for the communicatively disabled. The data available are largely descriptive and often from a small sample or a single case study.

However, there are some studies available that have increased knowledge of training issues. It has already been mentioned that the interaction patterns of physically disabled children can be distorted (Kogan & Tyler, 1973; Kogan, Tyler & Turner, 1984; Barrera & Vella, 1987) and the studies discussed in the previous section show that the patterns of child passivity and adult control continue into aid use (Harris, 1982, Light, Collier & Parnes, 1985a; Kraat, 1985). This interaction pattern does not facilitate the development of a wide range of communicative functions and communication for the aid user remains limited. The importance of the communicating partner has been emphasised in the discussion of normal interaction and aided interaction (Harris, 1982; Kraat, 1985a) and evidence from Kogan (1980) suggests that it is possible to change interaction patterns by intervention with the child's partner.

The idea that either the child or the communication partner might require more than just being taught how the aid works is a relatively new one. For example, in 1973 McDonald and

Schultz emphasised early introduction of individualised language boards for cerebral-palsied children and stated that "the language board facilitates social interactions, language development and organisation of thought and ideas". They suggested that the child would become "self-actualising and responsive". There was no suggestion that the child or his carers might need help in communicating with a language board or that different environments like the child's school might not accept it. Until very recently, the assumption was that now the child had a mode of expressive communication available he would be able to communicate effectively.

Later research (Kraat, 1985a; Blackstone, 1986; Mathy-Laikko & Yoder, 1986) strongly suggests that the interaction pattern between the aid user and his communication partner and the supporting context contribute significantly to the quality and effectiveness of the aid user's communication.

An early single case study by Calculator & Luchko (1983) attempted to intervene along three parameters which had already been identified (Calculator & Dollaghan, 1982) as interfering with successful communication. These parameters were the aid itself - in this case the design of the communication board, the aid user's use of the board and the interaction strategies employed by communication partners. Results indicated that all three parameters

responded to intervention strategies and produced a cumulative increase in communicative effectiveness. This provides support for the suggestion that effective communication with an aid depends on a number of different factors interacting together.

2.5.1 Training Partner Interaction Skills

A number of training programmes are now available which are aimed at improving the effectiveness of communication aid users communication primarily by training the interaction skills of their communication partners. Larsen & Woodfin (1986) developed a training programme for communication partners based on the Hanen Early Language Programme (Girolametto, Greenberg & Manolson, 1986). This programme is based on a child-centred conversational approach and emphasises the adult being responsive to the child's cues. Larsen & Woodfin (1986) developed a progressive teaching programme for communication partners aimed at adjusting their behaviours in order to facilitate effective communication with aid users. The initial evaluation of this programme demonstrated that there was a reduction in partner turns and in the number of questions and directives addressed to the aided speaker. Parents were instructed to communicate as they normally would with the child and it was noted that parents preferred not using the aid. Clinical experience certainly supports this point, although rigid insistence on always using the aid is also seen. Smith-Lewis and Ford (1987) reported on a client whose

teachers insisted that she communicate via her aid, even when it was much faster and easier to indicate replies by using eye-pointing and gesture.

2.5.2 Multimodal Approaches

Calculator (1988) suggests that aid users would often benefit from a multimodal approach and make use of aids like electronic devices and symbol boards while still using eye pointing and gestures when appropriate. It was observed by Kraat (1985b) that the expectations of electronic devices are high and there is a tendency to remove items like symbol boards and ignore gestures and eye-pointing when the child finally has access to a sophisticated electronic device. She suggests that knowledge and skill in using the new aid are required by both the communicator and their partner before successful communication even at the child's current level can be achieved. Culp & Carlisle (1988) have published a programme that is able to identify communication behaviours between the aid user and the communication partner and has a facility for defining long and short term goals, plan intervention and evaluate change.

2.5.3 Environmental Support

Some researchers have identified the lack of transferring acquired augmentative communication skills to different situations as a problem and Calculator (1988) suggests there is a need to include environmental variables in the

teaching process. There is a tendency for augmentative communication to be seen as something the child does with his teacher or therapist in structured situations: a teaching strategy and not a communication strategy. Udwin & Yule (199b1) in their study of Makaton signers and Bliss board users found that there was a very low priority ascribed to using the system at school (see previous section) and even less by parents at home. Parents were asked what they disliked about augmentative communication systems. The two commonest objections were that the use of the system would discourage efforts to speak and that other people did not understand the systems. This suggests that parents lack information and understanding of augmentative communication (Berry 1987).

2.5.4 Parents as Teachers

It is suggested by Berry (1987) that well-informed and trained parents are very effective teachers for their children. One of the reasons for their effectiveness is suggested by the literature on the normal development of interaction skills; the importance of language learning in context.

A parent-based sign training programme for severely language disordered children was implemented and evaluated by Willems, Lombardino, MacDonald & Owens (1982). The ten week programme consisted of weekly one and a half hour structured sessions with a speech therapist and at least 5

additional parental training sessions at home. Before the
parents began the home training programme, group parent
training sessions were held to familiarise parents with
language development, signing and intervention issues. The
results were very encouraging. All children learned to use
single sign utterances spontaneously; all parents learned
to use the signs taught and to handle the sign manual. In
addition a very positive and encouraging report was that
all parents felt confident and competent to train their
children to use the signs.

2.5.5 Summary

Calculator (1988) suggests there are a number of training
issues that should be seen as priorities. These are:
increasing the number of different environments and
opportunities the child has available for communication;
augmentative communication should be valued by the user and
the people he communicates with; the communication aid
should be available all the time to enable spontaneous
communication; and finally the communication aid and the
training programme should be integrated into daily
activities.

2.6 Conclusions

When the present study was conceived in 1985, much of the
specific literature on aids and training reviewed here was
not available. Many clinicians, teachers and parents were
concerned about the apparent ineffectiveness of

communication aids and the CAC staff were seeking accurate methods of describing the children's communication in order to evaluate communication aid intervention.

The broad aim of the study was therefore to measure the effectiveness of intervention with a communication aid for the children who were referred to the Communication Aids Centre. The majority of these children have cerebral palsy and over half of these have a severe physical disability (Jolleff et al 1992).

Although work was beginning to be published about the communication behaviour of this client group, there was no study that examined in detail the everyday communication patterns of children before and after intervention with a communication aid. In view of the observations made by the Communication Aids Centre's team that communication aids were used at school for "teaching" not at home for "communicating", it was decided to include an observation of parents and teachers. It was also decided in response to clinical observations and reports from parents and teachers that communication aids "did not work", to offer and evaluate a training workshop for parents.

To carry out this study it was first necessary to develop a method of measuring the communication skills of this client group. This descriptive profile was then used to test a number of hypotheses:

1. Non-verbal, physically handicapped children's communication skills will improve after the introduction of a communication aid.

2 Children will use more mature communication patterns and make more use of communication aids when interacting with their teachers than when interacting with their parents.

3. Parents will become more responsive to the child's communication and the child will use more sophisticated communication shortly (3 months) after a workshop training day.

4. Twelve months after the workshop training the old parent/child patterns of communication will have returned.

CHAPTER 3

THE DEVELOPMENT OF PROCEDURES

The studies to be reported here sought to measure communication in nonverbal physically disabled children using both standardised assessments and observational procedures.

This client group is very difficult to assess and they respond to assessment questions in nonconventional ways. It was therefore necessary to establish reliability of the assessor's recognition and recording of responses within standard baseline measures, eg Test for Reception of Grammar (TROG), British Picture Vocabulary Scale (BPVS) and the Columbia Mental Maturity Scale (CMMS).

The studies involved using repeated measures. The major dependent measure was a descriptive profile of the child's communication patterns, transcribed from videotape and analyzed. It was therefore important to assess firstly, the validity and secondly, the reliability of the system of categorisation.

3.1 Standard Assessments Used for Baseline Assessment

It seemed important to establish a measure of the child's understanding of verbal language as it would be fundamental information for the recommendation of an appropriate communication aid. The recommended communication aid

should provide potential for the child to develop and enhance his expression. The child's potential for language use is difficult to estimate from observation of current communication as it is often very restricted due to physical disabilities and limited alternative methods of communication. A reliable measure of verbal understanding should offer a guide to the child's potential for developing expression given a suitable mode of communication. It was also considered necessary to obtain a measure of cognitive ability as this would be an important factor for describing the subjects in the follow up study and for recommending a communication aid that would maximise the child's potential.

The physical disabilities of the client group made selection of suitable assessments for language comprehension and cognitive ability difficult. As the children were non-verbal, tests that did not require verbal responses were needed. Stimulus material also needed to be quite large and in a format in which it would be easy to indicate the answer using a gross movement like fist pointing.

The assessments that were chosen for language comprehension were Test for Reception of Grammar (TROG) and British Picture Vocabulary Test (BPVS). TROG assesses the child's understanding of syntax, while BPVS yields an understanding of vocabulary age equivalent. Cognitive ability was

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measured using the Columbia Mental Maturity Scales (CMMS).
None of the assessments require verbal responses and all
offer easy physical indication of answers.

3.1.1 TROG - Test for Reception of Grammar (Bishop, 1983)

This is an individually administered test of language
comprehension suitable for testing children in the age
range 4-12 years. It can be used for diagnostic purposes
in older subjects. It was standardised on an English
population. TROG specifically taps the understanding of
grammatical contrasts in English. The test consists of
eighty forced choice items arranged in blocks of four. In
each case the child is required to match a phrase or
sentence to one of a choice of four pictures. The number
of blocks passed can be translated into an age equivalent
score.

3.1.2 BPVS - British Picture Vocabulary Test (Dunn, Dunn, Whetton, Pintilie, 1982)

This is an individually administered test designed to test
receptive vocabulary. It is suitable for use with children
aged from 2.5 years to young adults. The test was
standardised on a British population and has a long and
short form. The short form was chosen for the purposes of
this study as the client group are difficult to test and
tire easily. Like the TROG the test consists of forced
choice items. The child is required to match a picture,
from a choice of four, to a word. There are thirty two

possible questions in the short form. A child reaches a
ceiling when he has made four errors in six consecutive
responses. The test is then discontinued. The number of
items passed can be translated into an age equivalent
score.

3.1.3 CMMS – Columbia Mental Maturity Scale (Burgemeister, Hollander Blum & Lorge, 1959)

This test is designed to measure "general understanding" in
subjects aged approximately 3-14 years.   It gives an
estimate of the child's reasoning ability compared with
that of other children of the same chronological age. The
test consists of one hundred long cards with drawings on
them. The cards, some of which are pictorial while others
are completely abstract, are arranged in order of
difficulty. Card 1 is simple and has three items on it.
The cards increase in complexity and number of drawings.
The maximum is six drawings. The child is presented with
the cards, one at a time, and required to indicate the one
that does not belong there. The child is deemed to reach
a ceiling when he fails twelve items out of sixteen
consecutive items. The test is then discontinued.
There is now an updated third edition of this assessment
available (Burgemeister, Hollander Blum, Lorge; 1972) which
expresses norms within a series of age bands. The version
used for this study was the 1959 revision, as the simpler
age-equivalent format for the norms allowed the subjects to
be rank-ordered.

3.2 Establishing Reliability of Nonconventional Responses to Standard Test Material

The present author was concerned that the recording of responses to test items made by eye pointing and imprecise fist pointing was very subjective. She therefore sought methods of testing the reliability of the subject's response.

The first method attempted was to videotape the child being tested and ask student speech therapists to score the assessments from the videotape. This proved impossible as the camera often could not record both the child's face (for eye pointing) and the set of pictures he was choosing from. This was because the table was often angled towards the child for ease of access.

The second method attempted proved more successful. This involved using a 'blind' second scorer who could not hear the question being asked at the time of testing, but could see the child's response. A pilot conducted on one client ran without problems and the method was used to establish reliability of recording nonconventional responses to standard test material.

Method

At the time of testing the child with two of the baseline assessments - TROG and BPVS, a second scorer was required to score the test as the child responded.

Subjects

Five subjects who had been referred to the communication Aids Centre for assessment; three boys and two girls, aged from five to twelve years of age.

Procedures

The tester was the first scorer and scored the test as usual. Each test has a score sheet with the question number marked on it and space to write the number of the picture the child indicates as his choice for the answer. The second scorer sat where she could observe the child and the set of pictures he would be using to indicate his answer.

Both these tests use an A4 size stimulus page divided into four equal parts by a central vertical line and a central horizontal line. Each of the four parts of the page has a different picture. The child is asked a question and answers by indicating one of the four pictures on the page. Each question has a different page of four possible picture responses.

The second scorer was given a sheet with the question numbers and asked to write down the number of the picture the child indicated for each question. To prevent the second scorer from hearing the question and therefore having knowledge of the correct answer, she wore earphones. The earphones were attached to an audiometer which had been

adapted to feed white noise through both ears. This effectively rendered her 'deaf' to outside communication. She would know when the child was being asked a question because the tester would turn the page of the test book.

Results

The score sheets for Scorers 1 and 2 were examined for agreements and disagreements on each question. Percentage agreements were high (See Table 3.1). Disagreements displayed no pattern and appeared completely random, probably reflecting a particularly ambiguous response from the subject. There was no relationship between the number of disagreements between scorers and the number of questions answered by the subject.

Table 3.1 Agreements between Scorers 1 and 2 - TROG

SUBJECT	QUESTIONS ANSWERED	% AGREEMENT
1	80	98.75
2	20	95
3	72	97.2
4	80	100
5	52	100

Reliability of scoring nonconventional responses to TROG

was therefore established at acceptable levels and as both BPVS and CMMS have similar formats to TROG it was assumed that reliability for all the assessments used in this study was established.

3.3   Development of a Descriptive Profile of Communication Patterns

To investigate whether communication patterns in this client group do change with the introduction of a communication aid it was necessary to develop a method of describing communication patterns in these children. This could then be used to compare patterns before and after aid provision and before and after some parents had taken part in a training workshop in interactive communication skills.

Van Kleek (1985) suggests that there are four major goals of empiricism to meet when analyzing interaction. These are:

1. "segment the flow of interaction into discrete, measurable units".

2. "provide operational definitions of categories of behaviour".

3. "create categories that are mutually exclusive".

4. "create an exhaustive list of categories so that the code is all-inclusive, that is all behaviours presented can be coded".

It is difficult to meet these criteria particularly as this

project is concerned with a client group who use very little if any conventional verbal communication to express themselves. They do however make themselves understood and communicate in a wide variety of ways which are unable to be measured by conventional linguistic tests. It therefore seemed reasonable to explore other methods of measuring these children's communication patterns.

Clinical experience and observation of the children that were referred to the Communication Aids Centre indicated that a functional approach might prove more useful. Light, Collier & Parnes (1985a,b,c) had demonstrated this approach on a group of similar clients. Light et al studied eight congenitally, nonspeaking physically disabled children aged between four and six years and their caregivers. To be included in the study these children were also required to have normal receptive language skills and cognitive potential, to have hearing and vision within normal limits and to have been using a communication system for a minimum of six months. The caregiver was required to be familiar with the child's augmentative communication system. Light et al's study had utilised a free unstructured play session with the caregiver using standard toys and a preset structured interaction with the clinician. The communication was observed and recorded by videotape.

It was felt that an approach of this kind could be adapted to record natural and everyday communication in this client group.

To investigate this further and to begin to formalise an analytic approach four researchers - SW the author a speech therapist, VH a student speech scientist, HM a clinical psychologist and JA a speech therapist spent approximately sixteen hours in eight two hour sessions viewing videorecordings of typical Communication Aid Centre clients interacting with one or more parents and experimenting with ways of analyzing the communication, based on the work of Light, Collier and Parnes.

3.3.1 Phase 1

After viewing a number of videofilms of children and one or more parents and attempting to transcribe the flow of communication between them, a number of ground rules were agreed:

1.   The videorecording and subsequent analysis should involve the client concerned and one adult only.
2.   The communication should be transcribed in two columns, one for the adult and one for the child.
3.   Spacing on the transcription should indicate the passage of time in the interaction.
4.   Acts of communication should be numbered in the order in which they occurred.

Using this method of transcribing it was possible to agree through group discussion, definitions and rules for Communication Acts, Structure, Functions and Modes. (see

Appendix 1 for full definition).

Communication Acts

1. A communicative act is defined as a verbal or non-verbal act capable of transferring one general idea to one person from another.

2. A new act starts when a new person takes a turn in the dialogue. Within a turn a new act starts when the communication shifts from response to initiation or, for the child only, when a new function is introduced.

Structure

1. Each communication act is coded as an Initiation, a Response or Other ie a communication that was something other than a response or initiation within the dyad being observed, such as a self-comment by the adult.

2. The communicative input of these dyads was often very unbalanced and in order to monitor the amount of communication within one act, it was agreed to count the number of units in each act. A unit is defined as a separate sentence or a sentence that could stand alone, although may be joined by a conjunction in the communication recorded.

Functions

The function codes of Light et al (1985b) were originally used (For final definitions adopted see Appendix 1).

However, during individual coding of the scripts and later in the group discussions, modifications were made, in particular to Function 7 - Provision of Information. This function was subdivided into three sections; a, b, c, as it was felt by the research group that there were significant differences in the sophistication of information that was given by the child and that this required marking.

The first section of Provision of Information - (a) was defined as providing information to a question when the answer is known or can only be one of a few possibilities. eg "Who gave you lunch today?" or "What colour is your dress?". Wood, Wood, Griffiths & Howarth (1986) comment on how much of conversation between teachers and children is made up of question and answer exchanges, where a high proportion of the questions are from the teacher and almost all the answers are from the child. This is also the type of pattern the Communication Aids Centre team observe in the parent/non-verbal physically disabled child dyad. While this provides a framework it does not provide the kind of conditions that facilitate the child's development of conversation skills. Wood et al (1986) suggest that conversation is about more than that and "serves to relate and share past experiences, plans for the future, life in other times and places or what might come to be".

The second and third sections of Provision of Information - (b) and (c) attempted to account for more of the Wood et

al "conversation" components. (b) was defined as providing information in answer to a question that is a new or unexpected idea or has many possible answers. eg "What do you want for your birthday?"; (c) was defined as providing information about the past.

The list of functions used for this phase were: social conventions; request for object or action; request for information; request for clarification; request for attention; confirmation and denials; provision of information: (a) answering questions which have one or few possible answers, (b) giving a new idea, (c) past; provision of clarification, repair; expression of self; elicited imitation; unintelligible; rejection; taking turns in a game.

Modes

The list of categories used for this phase were: verbal; vocal; eyepointing; fist or finger pointing; gesture; sign; symbol; other aid; physical.

3.3.2 Reliability Study 1

Method

Each of the four researchers in the group individually viewed, transcribed and analyzed approximately 4.5 minutes of filmed interaction using the Guidelines developed and described in the previous section (See Appendix 1).

Subject

A male client aged 15 years referred to the Communication Aids Centre for assessment. He was permanently resident at home and attended a day school.

Results

Reliability was established at acceptable levels for structure and function.

Structure

A total of 76 communication acts were transcribed. There were 41 Adult Communication Acts and 35 Child Communication Acts.

Table 3.2   Reliability of Coding of Adult Communication Acts for Structure

RESEARCHERS	INITIATIONS	RESPONSES
1	16	25
2	17	24
3	16	25
4	19	22

Researchers 1 and 3 = 100% agreement.

Researchers 1 and 3 compared with 2 = 97,6% agreement

Researchers 1 and 3 compared with 4 = 92.7% agreement

Table 3.3   Reliability of Coding of Child Communication Acts for Structure

RESEARCHERS	INITIATIONS	RESPONSES
1	1	34
2	2	33
3	0	35
4	0	35

Researchers 3 and 4 = 100% agreement

Researchers 3 and 4 compared with 1 = 97% agreement

Researchers 3 and 4 compared with 2 = 94% agreement

Function

A total of 35 Child communication Acts were coded for function.

Table 3.4   Reliability of Coding of Function - Researcher 1 with Researchers 2,3,4.

RESEARCHERS	% AGREEMENT	COHEN'S KAPPA
2	91	0.77
3	74	0.68
4	69	0.63

Mode

There was some disagreement between Vocal and Verbal, and

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between physical and gesture.

Discussion

The transcription of the interaction into Communication Acts and the coding of Structure was carried out without problems, and achieved a high level of interrater reliability.

There was some discussion of disagreements in the coding of Function and Mode. Communication Acts that were the subject of disagreement were reexamined by the group. The differences seemed to be resolvable by redefining some of the guidelines on coding. In particular Functions 7a and 7b, and Modes, vocal and verbal and physical and gesture.

When this had been achieved to the group's agreement, the coding procedure was felt to be ready to pilot. Researcher 2 - VH used the procedure to profile 5 subjects of school age who had been referred to the Communication Aids Centre. She was an undergraduate speech scientist at London University and submitted her work in part fulfilment of a BSc (Hons) in Speech Sciences, (Hall, 1988).

The procedure was also used by Researcher 4 - JA in a matched pairs study of 14 subjects. The subjects' parents underwent a workshop model of training in interaction skills. The first stage of this study was submitted as part fulfilment of an MSc in Human Communication at City

University (Allen 1988). The present author (Researcher 1 - SW) is presenting the second stage of the training evaluation as Study 2 here.

3.3.3 Phase 2

A further reliability study of the descriptive profile was carried out by Researchers 1 and 3 before the videotapes for Study 1 and Study 2 reported here were coded.

Reliability Study 2 (Preliminary Stage)

Method

Researcher 1 - SW transcribed approximately 4 minutes of videotape of each of two subjects and divided the transcription into Communication Acts.

Researcher 3 - HM received copies of the scripts and the videotape together with a short note about the modes through which the child generally communicated. Researchers 1 and 3 individually coded separate copies of the script using the videotapes for reference.

Subjects

Two subjects referred to the Communication Aids Centre for assessment who were permanently resident at home attending day schools; one boy aged 16 years and one girl aged 13 years.

Results

The coding of Function 7 still presented some agreement problems. In order to present a more clearcut definition it was agreed to retain Function 7a and combine Function 7b and 7c.

3.3.4 Reliability Study 2 (main stage)

Method

Researcher 1 transcribed approximately five minutes of videotape for each of ten subjects. (Total 50 minutes of interaction time). As before, Researcher 1 divided the transcriptions into communication acts and numbered them according to the sequence in which they occurred in the interaction.

Researcher 3 received copies of the transcripts and videofilms, together with notes about the modes each child used to communicate with. Researchers 1 and 3 individually coded separate copies of the scripts using the videotapes for reference.

Table 3.5 Final List of Communicative Functions used for Coding

1	Social Conventions
2	Request for object or action
3	Request for information
4	Request for clarification
5	Request for attention
6	Confirmations & denials
7	Provision of information: (a) answering questions which have one or a few possible answers. (b) giving a new idea or talking about the past.
8	Provision of clarification or repair
9	Expression of self
10	Elicited imitation
11	Taking turns in a game
12	Unintelligible

Table 3.6   Final List of Modes used for Coding

Verbal ++	words/recognisable word approximations
Verbal Y/N	yes & no only
Vocal	noises
Gesture	communicative nod, wave, shake; lift arms; confirming smile etc.
Sign	from a signing system
Symbol	from a symbol system
Electronic Aid	
Physical	

If the child is pointing vaguely around when using a symbol system, or looks up to the adult when asked, then the action is coded as physical. If the mode is physical, then no code for function is assigned.

Subjects

Ten subjects who had been referred to the Communication Aids Centre for assessment, who were permanently resident at home and attended day schools. They had a mean age of 13.1 years with a range from 9 years to 18 years.

Results

Interrater reliability was established at acceptable levels (see Table 3.7). Twelve separate functions could be coded; data are presented only for those with more than eight

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instances represented in the reliability samples.

Table 3.7   Interrater reliability in coding structure and function in communication.

	Adult		Child	
Structure	Initiation	Response	Initiation	Response
Total Acts	114	39	5	142
Agreement	98%	77%	100%	93%
Functions	Child Only			
	Function 6	Function 7	Function 12	
Total Acts	57	48	13	
Agreement	85%	80%	93%	

For a total of 143 Child Communication Acts (four acts were communicated by physical mode and were therefore not coded for Function) the overall agreement on Function was only 66%.   However, the major source of disagreement was where Researcher 3 - HM, coded an act as "unintelligible" whereas the present author, Researcher 1 - SW ascribed a specific Function.   As the present author knew the children and adults and aids it seemed acceptable to use her specific coding in data analysis.   When these unintelligible

instances are taken out of the calculation, overall agreement was 81% on coding communicative functions.

Within the functions coded, four seemed to represent 'higher level' communication. These were requesting information, requesting clarification, providing new information and providing clarification of misunderstandings (Dale, 1980; Light et al, 1985; Baumgart, Johnson & Helmstetter, 1990). In the coding used for this study these are Functions 3,4,7b,and 8. If these 'higher level' functions are grouped together, interrater reliability was 73%, but 100% if disagreements due to poor intelligibility were set aside.

Using the agreed final list of eight modes (see Table 3.6) there was a 100% agreement between SW and HM.

The reliability for the coding analysis of the descriptive profile of communicative patterns was now thought to be acceptable and could be used for data analysis.

CHAPTER 4

STUDY 1

HOW NON-VERBAL PHYSICALLY DISABLED CHILDREN COMMUNICATE

The aim of this study was to examine whether the provision of communication aids to non-speaking physically handicapped children actually does improve communication and to explore some limiting factors.

The study attempted to examine and describe the children's natural and everyday communication. Communication was measured in terms of structure - the balance of initiations and responses made by child and adult; communicative function - the range of communicative functions used by the child; and communicative mode - the use made of different modes of communication available to the child.

The study tested two hypotheses:

Hypothesis 1:

Non-verbal, physically disabled children's communication skills will improve after the introduction of a communication aid. Specifically improvement will be measured as:

- an increase in child initiations
- an increase in the use and range of communicative functions
- an increase in the use of communication aids

The children's communication was observed with a parent and with the teacher who spent most time with them at school.

It was expected that children's communication with teachers would be different from their communication with parents. Clinical observation suggested that teachers were more insistent about communication aids being used if they were available and that because they were less familiar with the child they were less able to interpret children's vocalisations, facial expressions and gestures. It was felt that this together with the more structured teaching situation and formal setting of the classroom would elicit more sophisticated communication. Thus the study tested a second hypothesis.

Hypothesis 2:

Children would use more mature communication patterns and make more use of communication aids when interacting with their teachers than when interacting with their parents. Specifically maturation would be measured by:

- an increase in child initiations
- an increase in the use and range of communicative functions
- an increase in the use of communication aids.

4.1 Design

This study took a single sample of patients who were referred to The Wolfson Centre Communication Aids Centre

Table 4.1a   Description of Subjects

S	SEX	CA ys:ms	MEDICAL DIAGNOSIS	SCHOOL
1	F	9:2	Cerebral Palsy, Intellectual Disability	PH
2	M	9:8	4 Limb Cerebral Palsy with Athetosis	PH
3	M	9:9	4 Limb Cerebral Palsy with Athetosis	PH
4	M	12:3	4 Limb Cerebral Palsy with Athetosis	PH
5	F	13:2	4 Limb Cerebral Palsy with Spasticity	PH
6	F	13:4	Severe Dyspraxia with Intellectual Disability	SLD
7	M	15:2	4 Limb Cerebral Palsy with Spasticity	PH
8	M	16:3	4 Limb Cerebral Palsy with Athetosis	PH
9	M	18:3	4 Limb Cerebral Palsy with Dystonia	PH

S   Subjects

CA   Chronological Age

PH   School for Children with a Physical Handicap

SLD   School for Children with Severe Learning Difficulties

and measured their communication at assessment and approximately one year afterwards when the recommendations of the assessment should have been implemented. The data were collected by videotape recording and structured interviews. The structured interview was included primarily to provide validation data for the videotape analysis.

Table 4.1 Design of Study 1

CONTACT 1	ASSESSMENT & RECOMMENDATION OF COMMUNICATION AID	
	PARENT	TEACHER
	VIDEO OBSERVATION & RECORDING	VIDEO OBSERVATION & RECORDING
CONTACT 2	VIDEO OBSERVATION & RECORDING. STRUCTURED INTERVIEW	VIDEO OBSERVATION & RECORDING. STRUCTURED INTERVIEW

4.2 Method

4.2.1 Subjects

Nine non-speaking physically disabled children who met the inclusion criteria were observed at assessment and then again approximately one year later. A tenth child was dropped from the study, as the second contact videotaped interaction could not be rated, because of indistinct

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difficult to rate because of the participants very quiet voices and very indistinct speech. On the second contact, both the child and mother were so muffled that it was not possible to rate the communication. (see Table 4.3)

4.2.2 Inclusion Criteria

Children who were referred to the Communication Aids Centre for assessment who:

- had a language comprehension age of 4 years or over. (measured on the TROG)

- were living at home with their parents, attending day schools.

- had no major sensory losses - ie hearing or vision. and whose parents had agreed to them being included in the study.

4.2.3 Assessment Procedures

On the day of assessment each child underwent:

1. The Wolfson Centre Communication Aid Centre Multidisciplinary Assessment (see Chapter 1 for details)

2. TROG Test for the Reception of Grammar

3. BPVS British Picture Vocabulary Scale

4. CMMS Columbia Mental Maturity Scale

5. 10 minutes of filmed interaction with a parent. This was set aside for later coding.

At the end of the assessment day recommendations for a

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communication aid system were made. These often included recommendations about seating and switches for accessing the aid. The Communication Aids Centre Team would write a report detailing these recommendations which was sent to the child's parents, school and local health authority for implementation.

Within six weeks of the day of assessment, a visit to school would be made and 10 minutes of interaction with the child and his teacher would be filmed. This was also set aside for later coding.

Procedure for Video Recording

At an appropriate time during the assessment day for parents and shortly afterwards for teachers, the child and adult were videotaped interacting together. The session incorporated a small amount of structure in order to compare a number of different sessions of filming.

Adults were asked to select two activities to carry out with their child. The first was to pursue some joint activity eg imaginative play with toys, and the second was to communicate together using a book or picture as stimulus material. They were asked to communicate in their usual manner. ie using any communication method like a symbol system, gestures, vocalisation that was usually available to them.

Approximately one year later, the child was videotaped at home with a parent and at school with his teacher, using the same procedure. At the follow-up parents and teachers were interviewed concerning the child's communication.

Procedure for Follow-Up Structured Interview

Parents and teachers were asked twelve questions about the child's everyday communication. (See Appendix 2) Each question related to one of the twelve communicative functions previously identified. Instructions for carrying out the interview using the suggested prompts if necessary are given on the interview schedule. (See Appendix 2)

The adult was asked about:

1. the frequency of use of each function
2. the mode the child usually used to express that function
3. the people he usually used the function with.

Each section, function, mode and people had three possible categories. (See Table 4.2)

4.2.4 Measures

Video Recorded Observation

Approximately five minutes of filmed interaction for each of the four contacts was transcribed and coded. Coding addressed Structure, Adult Response to Child Initiation, Rate of Interaction, Communicative Functions and Modes. This gave a sample of approximately twenty minutes per child: ten minutes at baseline and at follow-up contacts,

each comprising five minutes with a teacher and five minutes with a parent.

Structure

Each communication act in the discourse was coded as being an Initiation or a Response.

Adult Response to Child Initiation

Appropriate adult responses to child initiations were counted and expressed as a percentage of total child initiations.

Rate of Communication

This was measured by calculating the number of communication acts that took place per minute.

Function

Only the child was coded for Function.

A list of Functions used for coding can be found in Chapter 3, Table 3.5.

Mode

Only the child was coded for Mode.

A list of Modes used for coding can be found in Chapter 3, Table 3.6.

Structured Interview

The interview was a reported measure by the adult of the

child's communication. Communication was coded on three parameters, frequency of use of function, mode of use of function and category of people the child communicated with.

Table 4.2   Response Categories to Interview Schedule

FUNCTION	MODE	PEOPLE
E EASY/USUAL	V VERBAL	H HOME
D DIFFICULT	G GESTURE/EYEPOINT /NONVERBAL	F FAMILAR/ SCHOOL
N NEVER	A AID/SIGN/SYMBOL	S STRANGERS

Each section could only have one response recorded against it.   Therefore each question recorded one response in each of its three sections, giving each question one response about frequency of use of the function, mode of use of the function and the category of people it was most used with. The response recording sheet can be seen in Appendix 2.

Frequency of Use of Functions 1 - 12

The adult was asked to report whether the child found the function Easy or Difficult to use, or Never used it.

Mode of Use of Functions 1 - 12

The adult was asked to report which mode, Verbal, Gesture,

or Aid, the child was most likely to use to express each
of Functions 1 -12.

People To Whom the Child Usually Communicated Functions

1 - 12

The adult was asked to report which category of people, at
Home ie family, Familiar people eg friends the child does
not see often, or less familiar teachers than their normal
one, or Strangers, the child would be comfortable
communicating each of Functions 1 - 12 to.

4.2.5 Analysis

Data were analysed using non-parametric tests. Non-
parametric statistical tests have been chosen as they are
distribution free ie they do not assume that the subjects
being studied are drawn from a normally distributed
population and they are suitable for studies of small
numbers. The client group being studied are a particular
subset of disabled children and the study has small
numbers. Correlations between baseline assessments were
tested using Spearman rank correlation and differences
between the two conditions (parent and teacher) were
tested using the Wilcoxon matched pairs signed ranks test.
$p < 0.05$ was accepted as statistically significant.

4.3 Results

4.3.1 Contact 1

4.3.1.1 Ability and Language Comprehension Levels

There was no consistent relationship demonstrated between intellectual ability as measured by the Columbia Mental Maturity Scale (CMMS) and language comprehension as measured by Test for Reception of Grammar (TROG) and the British Picture Vocabulary Scale (BPVS), (see Table 4.3). CMMS and BPVS (Spearman Rank Correlation r_s = 0.26) and CMMS and TROG (Spearman Rank Correlation r_s = 0.54) show a non-significant correlation. However, a significant correlation was demonstrated between TROG scores and BPVS scores (Spearman Rank Correlation r_s = 0.948, $p <.005$).

However, caution should be exercised when interpreting these correlations as they are influenced by ceiling effects in the TROG and scores in the CMMS which the author considered to be underestimates of the subject's ability.

Table 4.3 Subjects' Characteristics at Contact 1

S	CA ys:ms	TROG BPVS CMMS age equivalent in ys:ms			SIGN	SYMBOL	COMPUTER/ TYPEWRITER SCHOOL
1	9:2	4:0	4:0	4:1	MAKATON	BLISS	-
2	9:8	9:0	9:6	9:1	-	BLISS	-
3	9:9	8:0	8:11	6:10	-	BLISS	-
4	12:3	9:0	9:6	8:9	-	BLISS	COMPUTER
5	13:2	11+ *	12:2	6:3#	-	BLISS	COMPUTER
6	13:4	6:0	7:9	7:11	MAKATON	-	TYPEWRITER
7	15:2	11+ *	10:2	8:9	-	-	-
8	16:3	11+ *	13:10	11:10	-	BLISS	COMPUTER
9	18:3	11+ *	14:9	6:4#	-	BLISS	COMPUTER

CA ys:ms   Chronological age in years and months

TROG   Test for Reception of Grammar

BPVS   British Picture Vocabulary Test

CMMS   Columbia Mental Maturity Scale

*   Performance at Test Ceiling

Recorded level considered an underestimate

4.3.1.2 Structure

Hypothesis 2 which expected more Child Initiations with teachers was not suppported as patterns of Initiation and Response were similar in both the parent/child and teacher/child dyads. The only exception to this was that parents elicited significantly more responses from the children than teachers did (See Table 4.4). Parents and teachers produced approximately the same number of Initiations as Responses. Children produced a small number of Initiations and a much larger number of Responses with both parents and teachers (See Figure 4.1). (See Appendix 3.1 for Subject data)

Table 4.4   Contact 1 - Structure: Adult and Child Initiations and Responses seen as a Percentage of Total Number of Communication Acts.

MEAN (SD)	ADULT INITIATION	ADULT RESPONSE	CHILD INITIATION	CHILD RESPONSE
PARENT	27.2 (4.1)	27.9 (3.2)	1.7 (1.8)	43.2 (2.2)
TEACHER	28.9 (6.2)	28.3 (4.8)	2 (3.4)	40.8 (2.3)
WILCOXON T	15.5	20	7#	7*

* P<.05

N = 5

SD Standard Deviation

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STRUCTURE
CONTACT 1

% Communication Acts
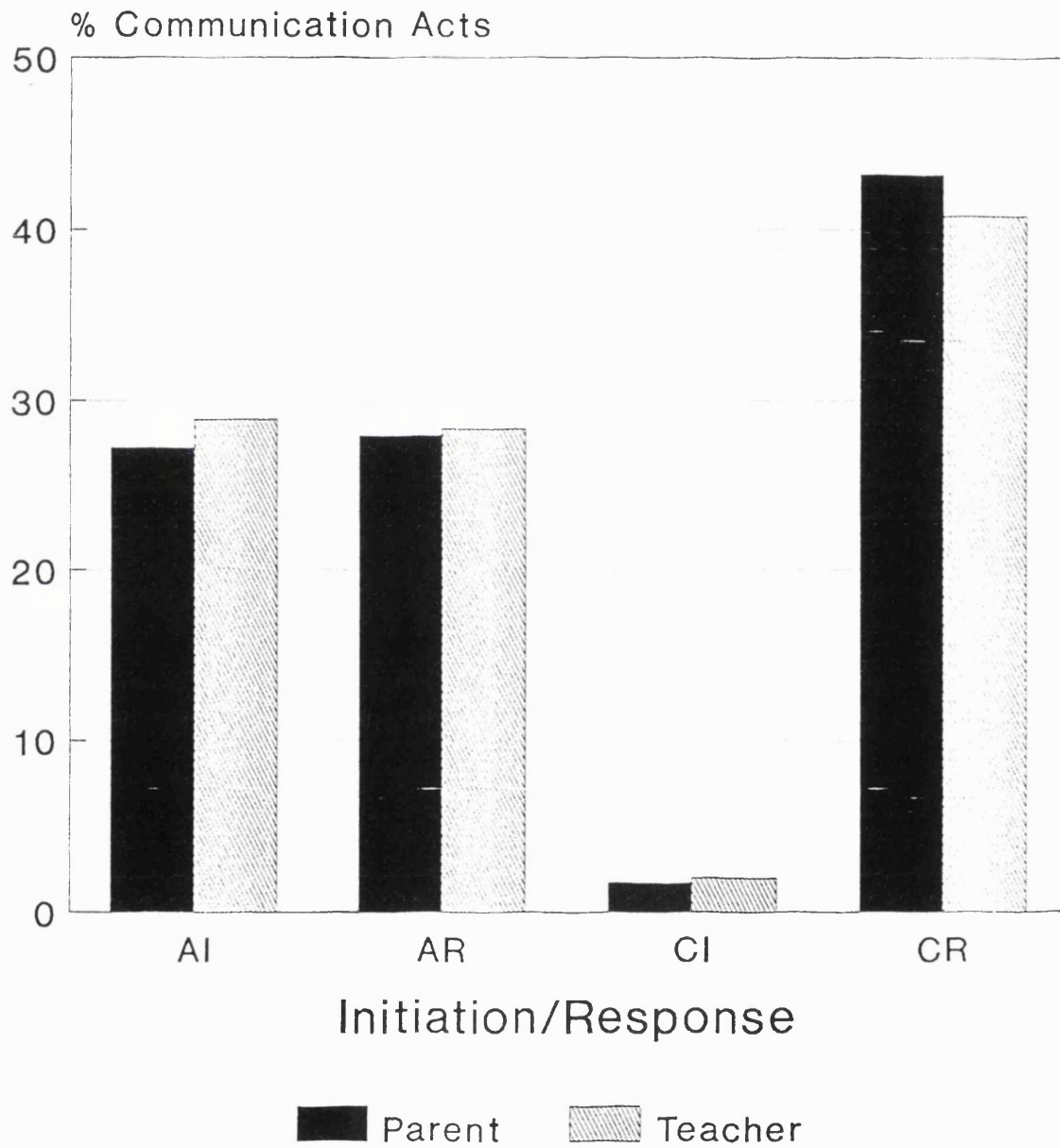
Figure 4.1

4.3.1.3 Adult Response to Child Initiation

There was no significant difference demonstrated between parents and teachers on this measure. (Wilcoxon T = 9.5, N = 4) Parents presented a mean score of 51.9 and Teachers presented a mean score of 44.4.

4.3.1.4 Rate of Communication

As a group there was very little difference in the Rate of Interaction between the parent/child and teacher/child dyads. (Wilcoxon: T = 20, p >0.05) However it is interesting to note that six subjects were slower with the teacher (See Table 4.5). The three subjects 3, 8 & 9 who were faster with the teacher were all children who were fast and efficient Bliss Board users where the teacher always communicated using the symbol chart. Parents of subjects 3 & 8 rarely used the Bliss chart except as a last resort. Subject 9's parent used the chart sometimes, but was not as efficient at reading the child's reply as the teacher. She therefore employed considerable guess work which often meant that the child had to repeat the communication, and it therefore took longer.

Table 4.5   Contact 1 - Rate of Communication: Number of

Communication Acts Per Minute for Each Dyad.

SUBJECTS	PARENT/CHILD	TEACHER/CHILD
1	27.9	23.6
2	20.1	10
3	20.4	28.5
4	23.2	16.5
5	19	12.6
6	28.5	26.9
7	15.5	12.2
8	29	35.1
9	16.3	29
MEAN SD	22.2 (5.2)	21.6 (9.0)

SD   Standard   Deviation

4.3.1.5 Functions

Again, Hypothesis 2 was not supported as there was no
difference in the subjects'use of functions when they were
communicating with a teacher or a parent (See Table 4.6).
Nearly 50% of the total functions demonstrated by the group
fell into Function 6 category - confirmations and denials.
Approximately one third of the total functions recorded

were coded under Function 7a - provision of information, answering a question which has one or a few possible answers. A very small proportion of total functions were coded as higher level functions 3, 4, 7b & 8. - 5% with parents and 6.6% with teachers. There were so few instances of other functions recorded for the group that the remaining functions were collapsed into one category - Other (See Figure 4.2). (See Appendix 3.2 for Subject data)

Table 4.6   Contact 1 - Observed Use of Function in Adult/Child Dyads

MEAN (SD)	FUNCTION 6	FUNCTION 7a	FUNCTION 3,4,7b,8	FUNCTION OTHER
PARENTS	46.2 (19.1)	34 (14.6)	5 (5)	14.8 (17.7)
TEACHERS	47 (19.8)	33 (16.3)	6.6 (7)	12.3 (10.6)
WILCOXON T	22	21	10	18

SD   Standard Deviation

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FUNCTIONS
CONTACT 1
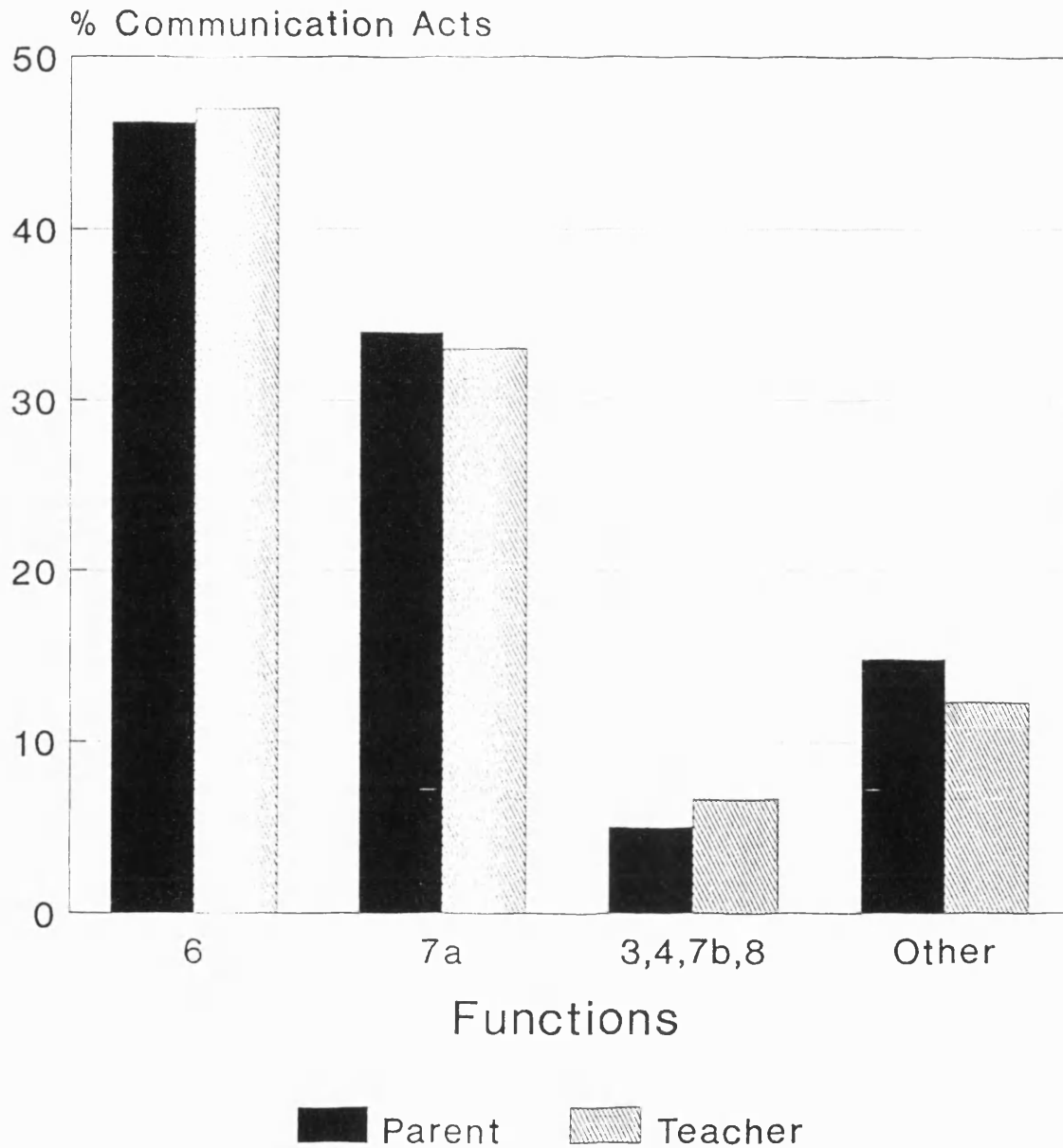
Figure 4.2

4.3.1.6 Mode

With the exception of Subject 1 who employed a multimodal system of communication and subjects 8 and 9 who relied very heavily on their symbol systems, subjects demonstrated little consistent use of communication aids (See Table 4.7). Subject 6 signed as a backup system if her very poor speech failed and subject 3 only used a symbol system when forced to do so by the teacher. The rest of the sample preferred to communicate with very poor and largely unintelligible speech, vocalisations and gestures.

Table 4.7 - Contact 1: Modes of Communication observed in Adult/Child Dyads

S	VERBAL				VOCAL		GEST.		SIGN		SYMB.		ELEC. AID		PHYS.	
	++		Y/N													
	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
1	x	x			x	x	x	x	x	x	x	x			x	x
2			x	x	x	x	x								x	x
3			x		x	x	x	x			x				x	x
4			x	x	x		x	x					C		x	x
5	x	x			x		x	x					C			x
6	x	x			x	x	x	x	x	x					x	
7	x	x			x	x	x	x								
8			x	x	x	x	x	x			x	x				
9					x	x	x	x			x	x				x

Verbal ++   - Verbal mode used for more than Yes/No

Verbal Y/N - Verbal mode used for Yes/No only

4.3.1.7 Summary

At Contact 1, the group presented as passive communicators with a high proportion of responses to initiations. The group used a restricted number of communicative functions

and made limited use of any communication aid available.

4.3.2 Contact 2

4.3.2.1 Provision of Communication Aids

This study was intended to measure change in the subject's communication patterns after intervention with the recommended communication aid. The major limiting factor in achieving this was delay in the provision of the recommended aid. (see Table 4.8)

After approximately one year, only two children subjects 4 and 5, had received the recommended aid from health authority funding. One child, Subject 2, had recently succeeded in raising funds and had taken delivery of the aid the week of the follow up appointment. Another child, Subject 7, had a Communication Aid Centre aid on loan. The families of four children, Subjects 3, 6, 8 and 9 had spent the year fundraising. The youngest child in the study, Subject 1 was progressing well, using a multimodal approach and did not during the course of the study require a high tech. aid.

It was therefore not possible to test the hypothesis concerning greater sophistication in communication patterns related to the introduction of a communication aid. However it might be expected that developmentally, children's communication skills will be changed after one year.

Table 4.8 Status of Provision of Aids at follow-up

SUBJECT	CAC RECOMMENDATION	FOLLOW-UP POSITION
1	Expand Bliss Chart	Continuing expansion
2	Speechpac (scanning)	Raising funds
3	Speechpac (scanning)	Raising funds had received aid on week of follow up appt.
4	Lightalker	DHA funded Lightalker 6 months
5	Lightalker Red Light Pointer	DHA funded Lightalker 6 months. Red Light Pointer not purchased
6	Speechpac	Raising funds
7	Lightwriter SL1	Loan of Lightwriter SL1 from CAC 7 months
8	Speechpac	Raising funds
9	Speechpac	Raising funds

4.3.2.2 Structure

The unequal patterns of Initiation and Response between the

child and adult remain largely unchanged at follow up. The

only difference is the nonsignificant result for Child
Response (See Table 4.9 and Figure 4.3). (See Appendix 3.3
for Subject data)

Table 4.9 Contact 2 - Structure: Initiations and
Responses seen as a Percentage of Total Number of
Communication Acts

MEAN (SD)	ADULT INITIATION	ADULT RESPONSE	CHILD INITIATION	CHILD RESPONSE
PARENTS	30.3 (7)	24.4 (7.2)	2.8 (6)	42.5 (5.9)
TEACHER	30.3 (4.3)	26.1 (5.2)	5.2 (5.1)	38.4 (5.9)
WILCOXON T	21	15	7#	13

N = 7

SD Standard Deviation.

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STRUCTURE
CONTACT 2
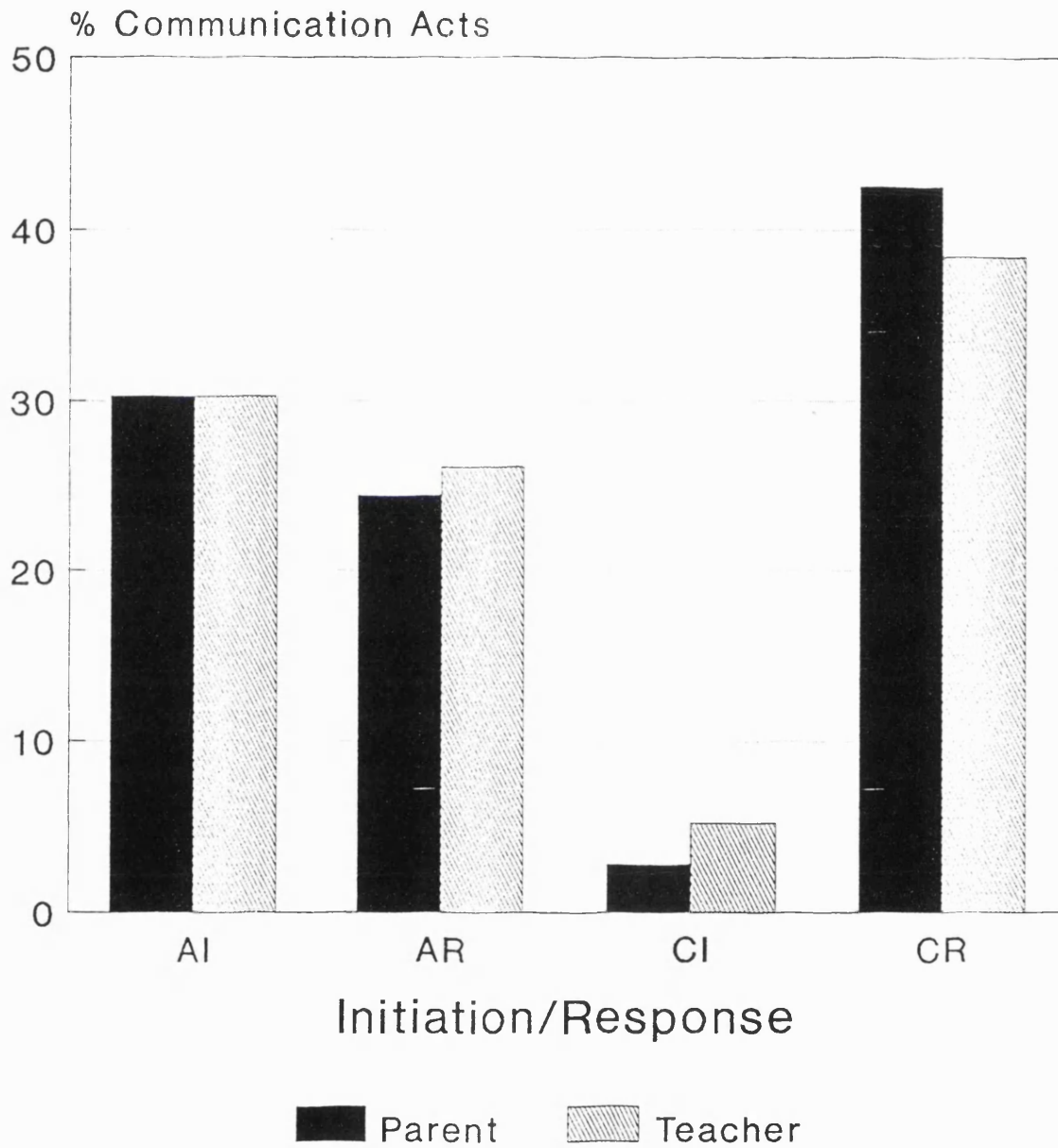
Figure 4.3

4.3.2.3 Adult Response to Child Initiations

As at Contact 1, there was no significant difference demonstrated between the two groups on this measure. (Wilcoxon T = 7, N = 5). Parents presented a mean score of 43.8 and teachers presented a mean score of 70.3.

4.3.2.4 Rate of Communication

As a group, the Rate of Communication at follow up was similar to the baseline measures. There was no significant difference between the child communicating with a parent or a teacher. (Wilcoxon: T = 18, p >0.05). At Contact 1. Subjects 3, 8 and 9 were all faster communicators with the teacher. At Contact 2, Subjects 3 and 8 were slower with the teacher. Both these subjects were now using a Bliss symbol book which is more convenient for carrying around, but slower for communicating with, as it involves finding the right page in addition to indicating the symbols needed for communication. Subject 4 was now much faster with the teacher as he was using an electronic aid at home with his mother which involved scanning with a light pointer which is slow and laborious and requires much practice to become proficient.

Table 4.10   Contact 2 - Rate of Communication: Number of Communication Acts Per Minute for Each Dyad

SUBJECTS	PARENT/CHILD	TEACHER/CHILD
1	29.6	20.4
2	15.7	16.5
3	24.7	18
4	9.2	13.8
5	20.2	32.6
6	25.9	21.9
7	11.1	9.1
8	37.6	25.8
9	14	16.1
MEAN (SD)	20.9 (9.4)	19.4 (6.9)

SD   Standard Deviation

4.3.2.5   Functions

The pattern of language function that the child used with the parent and with the teacher is very similar at contact 2 to the pattern recorded at Contact 1. There was no significant difference in the child's use of function with a teacher and a parent (See Figure 4.4 and Table 4.11). (See Appendix 3.4 for Subject data)

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FUNCTIONS
CONTACT 2

% Communication Acts
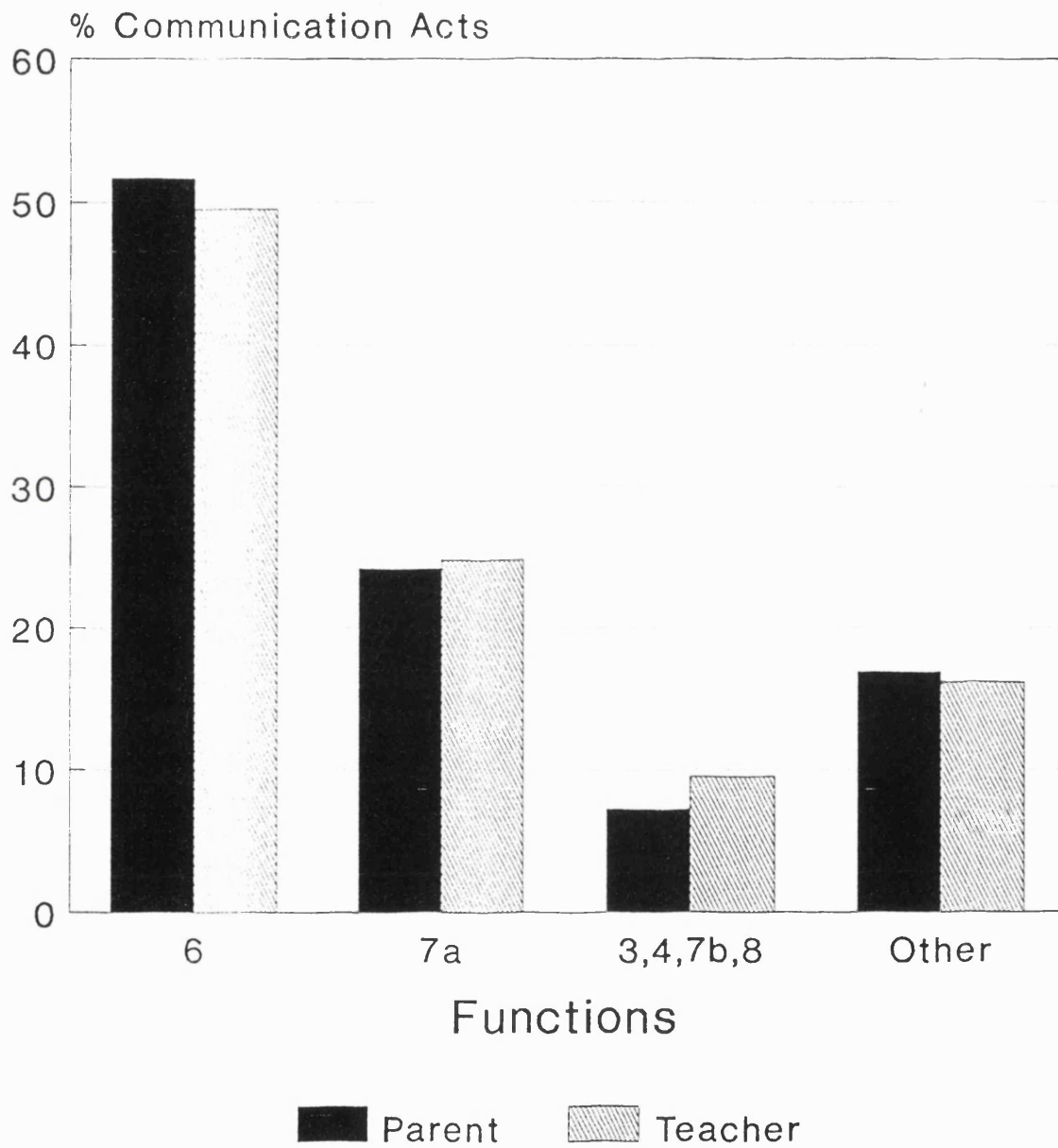
Figure 4.4

Table 4.11   Contact 2: Observed Use of Function in Adult/Child Dyads

MEAN (SD)	FUNCTION 6	FUNCTION 7a	FUNCTIONS 3,4,7b,8	FUNCTION OTHER
PARENTS	51.7 (22·5)	24.2 (12·1)	7.2 (13)	16.9 (11·9)
TEACHERS	49.5 (16·3)	24.8 (11·3)	9.5 (8·3)	16.2 (14·3)
WILCOXON T	20	21	7#	13

\# N = 8

SD Standard Deviation

4.3.2.6 Mode

Three subjects had received their recommended aid: Subject 4 was making using of the aid at home; Subject 5 refused to use it and Subject 2 had only had the aid for a week. Subject 7 had an aid on loan from the CAC and was making good use of it as a backup for his poor speech. (See Table 4.12).

Table 4.12   Contact 2 – Subjects' Modes of Communication

Observed with Parents and Teachers

S	VERBAL ++		VERBAL Y/N		VOCAL		GEST.		SIGN		SYMB.		ELEC. AID		PHYS.	
	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
1	X	X			X	X	X	X	X	X	X	X			X	X
2			X	X	X	X	X							X	X	X
3			X		X	X	X	X				X			X	
4			X	X	X	X	X						X	C		X
5	X	X			X	X	X								X	
6	X	X			X	X	X	X	X	X					X	
7	X	X			X	X								X		
8			X	X	X	X	X	X			X	X			X	
9					X	X	X	X			X	X			X	X

Verbal – ++ verbal mode used for more than Yes/No

Verbal – Y/N verbal mode used for Yes/No only

4.3.2.7 Summary

At Contact 2, as at Contact 1, there was very little difference in the communication patterns and use of communication aids that the children were producing when they were observed with a parent or a teacher.

4.3.3 Change Over Time - Parent/Child, Teacher/Child Dyads.

Using Contact 1 and Contact 2 measures, it was possible to compare the communication in both these dyads over a period of approximately one year.

4.3.3.1 Parent/Child Dyads

Comparison of the results from Contact 1 and Contact 2 for Structure, Adult Response to Child Initiations and Communication Rate, yielded no significant results.

Use of Communicative Functions did not change for Function 6, Functions 3,4,7b,8 and Other. However, by Contact 2 there was reduced use by children of Function 7a - Provision of information, answering questions when there is one or a few answers. (Wilcoxon T = 3, p <.01) (See Figure 4.5 and Table 4.13).

FUNCTIONS
Parent/Child Dyads

% Communication Acts

Functions
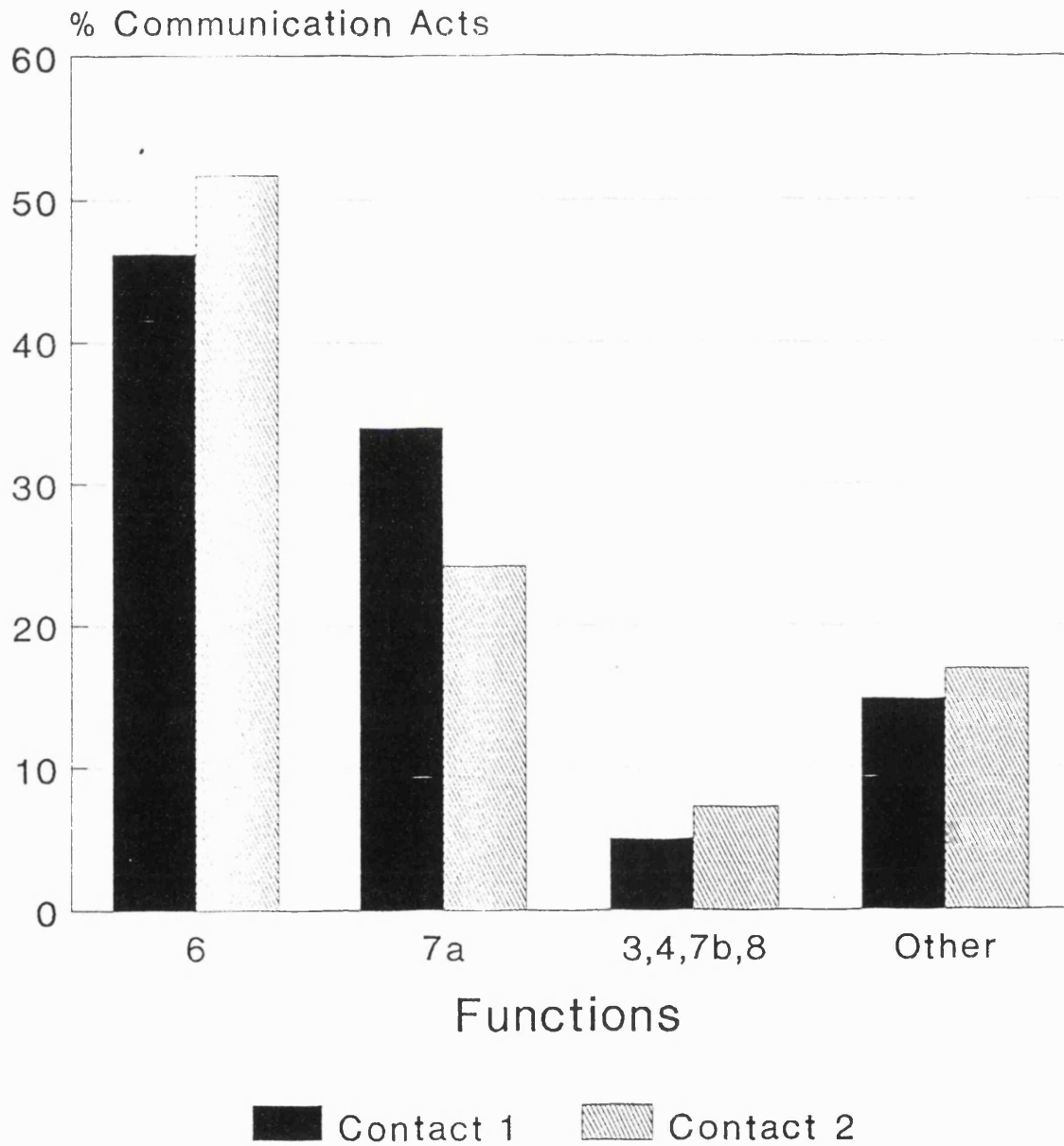
Contact 1 ▨ Contact 2

Figure 4.5

Table 4.13   Communicative Function: Comparison of Contact

1 and Contact 2

	FUNCTION 6		FUNCTION 7a		FUNCTIONS 3,4,7b,8		OTHER	
TIME	1	2	1	2	1	2	1	2
PC (SD)	46.2 (19.1)	51.7 (22.5)	34 (14.0)	24.2 * (12.1)	5 (5)	7.2 (13)	14.8 (17.7)	16.9 (11.9)
TC (SD)	47 (19.8)	49.5 (16.3)	33 (16.3)	24.8 (11.3)	6.6 (7)	9.5 (8.3)	12.3 (16.6)	16.2 (14.3)

PC Parent\Child Dyads

TC Teacher\Child Dyads

* p <.05

SD Standard Deviation

4.3.3.2   Teacher/Child Dyads

Comparison of the results from Contact 1 and Contact 2 for Structure demonstrated non-significant results for Adult Initiations, Adult Responses and Child Responses. A significant result for Child Initiations was achieved, demonstrating an increase at the second contact (Wilcoxon T = 6, N = 8, p <.05) (See Figure 4.6 and Table 4.14).

Comparison of the results from Contact 1 and Contact 2 for Communication Rate and Adult Response to Child Initiations were non-significant, as were all categories of communicative functions.

STRUCTURE
Teacher\Child Dyads
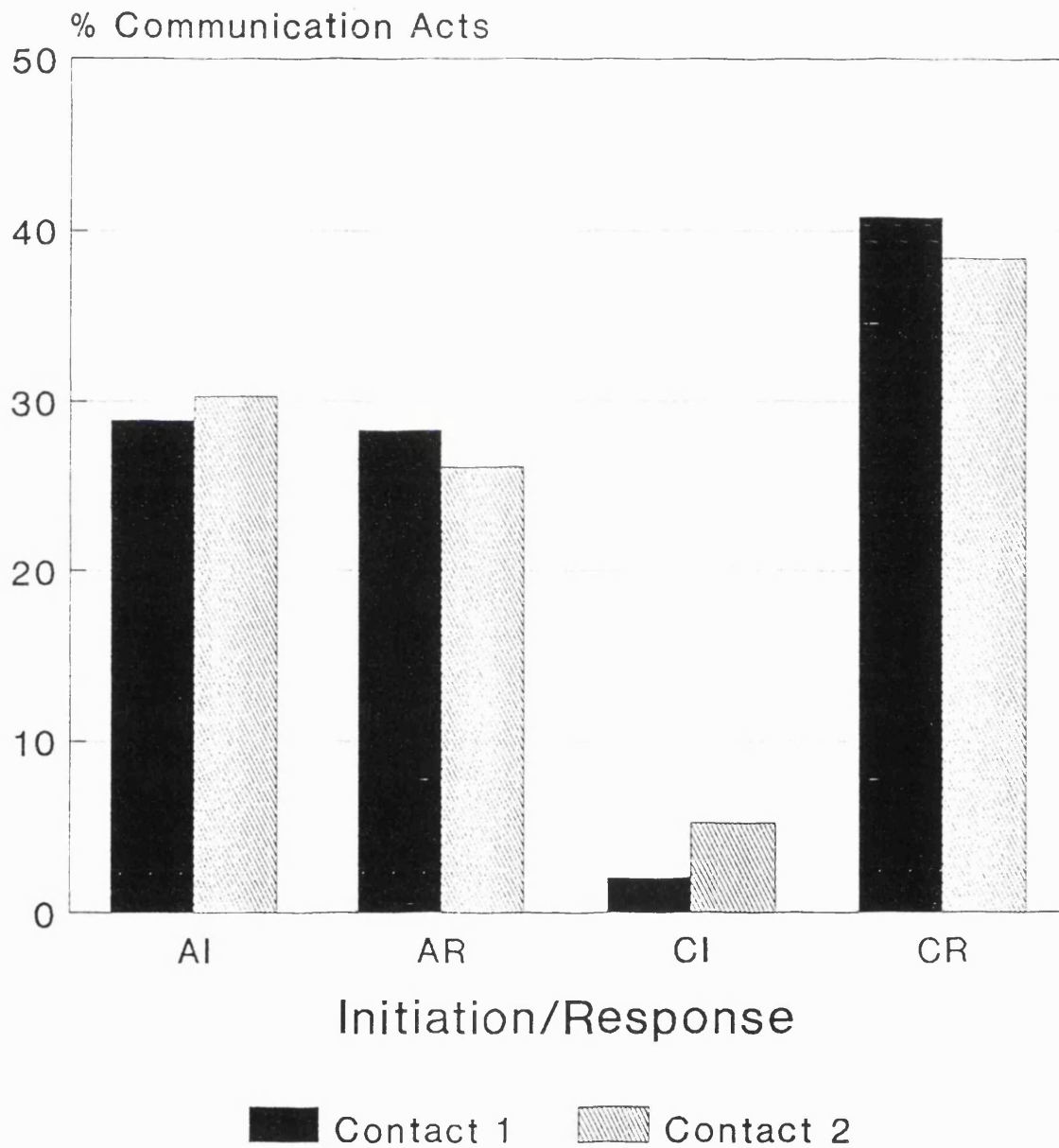
Figure 4.6

Table 4.14 Structure: Comparison of Contact 1 and Contact

2 Adult/Child Dyads

	ADULT INITIATION		ADULT RESPONSE		CHILD INITIATION		CHILD RESPONSE	
TIME	1	2	1	2	1	2	1	2
PC (SD)	27.2 (4.1)	30.3 (7)	27.9 (3.2)	29.4 (7.2)	1.7 (1.8)	2.8 (6)	43.2 (2.2)	42.5 (5.9)
TC (SD)	28.9 (6.2)	30.3 (4.3)	28.3 (4.8)	26.1 (5.2)	2.0 (3.4)	5.2 * (5.1)	40.8 (2.3)	38.4 (5.9)

PC Parent/Child Dyads

TC Teacher/Child Dyads

* p <.05

SD Standard Deviation

4.3.3.3 Summary

The two significant changes observed in the children's communication patterns, a decrease in the use of Function 7a with parents and an increase in Child Initiations with teachers was in the expected direction, demonstrating use of more sophisticated communication patterns at Contact 2.

4.3.4 The Structured Interview

Results are presented for the structured interview at Contact 2. With a few exceptions, noted below, the structured interview generally demonstrated a poor agreement between teachers and parents.

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Table 4.15 Structured Interview: Mean Number of Reported

Instances - Functions, Modes, People

(SD)	PARENTS	TEACHERS	WILCOXON T
FUNCTIONS			
EASY	9.1 (1.9)	9 (3)	22.5
DIFFICULT	4.8 (1.9)	4.2 (2.7)	17.5
NEVER	0.1 (0.3)	0.7 (1)	1 a **
MODES			
VERBAL	5.6 (5.7)	4.1 (5.1)	3.5 a
GESTURE	6 (5.1)	5.4 (3)	10.5 b
AIDS	2.3 (3.8)	3.9 (4.1)	1 c *
PEOPLE			
HOME ALONE	1.6 (4.3)	0 (0)	
FAMILIARS	9.8 (3.9)	9.6 (5.5)	14 d
STRANGERS	1.4 (1.2)	4.1 (5.7)	6.5 b

a   n = 6

b   n = 7

c   n = 5

d   n = 8

*   p <0.05

** p <0.025

SD   Standard Deviation.

4.3.4.1 Frequency of Use of Function

Both parents and teachers reported a high number of functions that were easy for the child to use. There were a possible fourteen functions (the interview retained the three categories in 7 - Provision of Information) and the Parents mean was 9.1, while the Teachers mean was 9. However there was a significant difference demonstrated on the Never category (Wilcoxon T = 1, p >0.025) showing that more teachers considered children never used functions than parents did (see Appendix 3.5 for Subject data).

Function 6 showed 100% agreement between parents and teachers as Easy, while Functions 3,4,7b,8 attracted 53% Difficult or Never from parents and 41.7% from teachers.

4.3.4.2 Preferred Modes

Parents reported a higher level of use of Verbal mode than teachers, while teachers reported a significantly greater use of aids (Wilcoxon T = 1, p <.05). (See Appendix 3.6 for Subject data)

It was expected that children would use communication aids more at school due to the more formal setting and greater expectations of intelligible communication. There is greater resistance to communication aids from parents and clinical experience suggests that parents feel their children use verbal communication more than they actually do.

4.3.4.3 People the child will communicate with

There was a high agreement of 78% between teachers and parents about children being able to communicate functions only at home (see Appendix 3.7 for Subject data).

4.3.4.4 Validation of Observed Functions and Modes

The structured interview had requested reporting of the child's most likely method of communicating particular functions. Congruency between observed and reported measures would not be expected as there are many variables like different situations and opportunities to allow for. Therefore, while it was not expected to observe all the functions, it seemed reasonable to expect that the mode reported would be observed as one of the modes used to communicate the function it was reported for. Results demonstrate that this was not always so (see Figures 4.7 - 4.12) and that there was often considerable discrepancy between the reported and observed measures.

Use of gestures - Parents
Contact 2
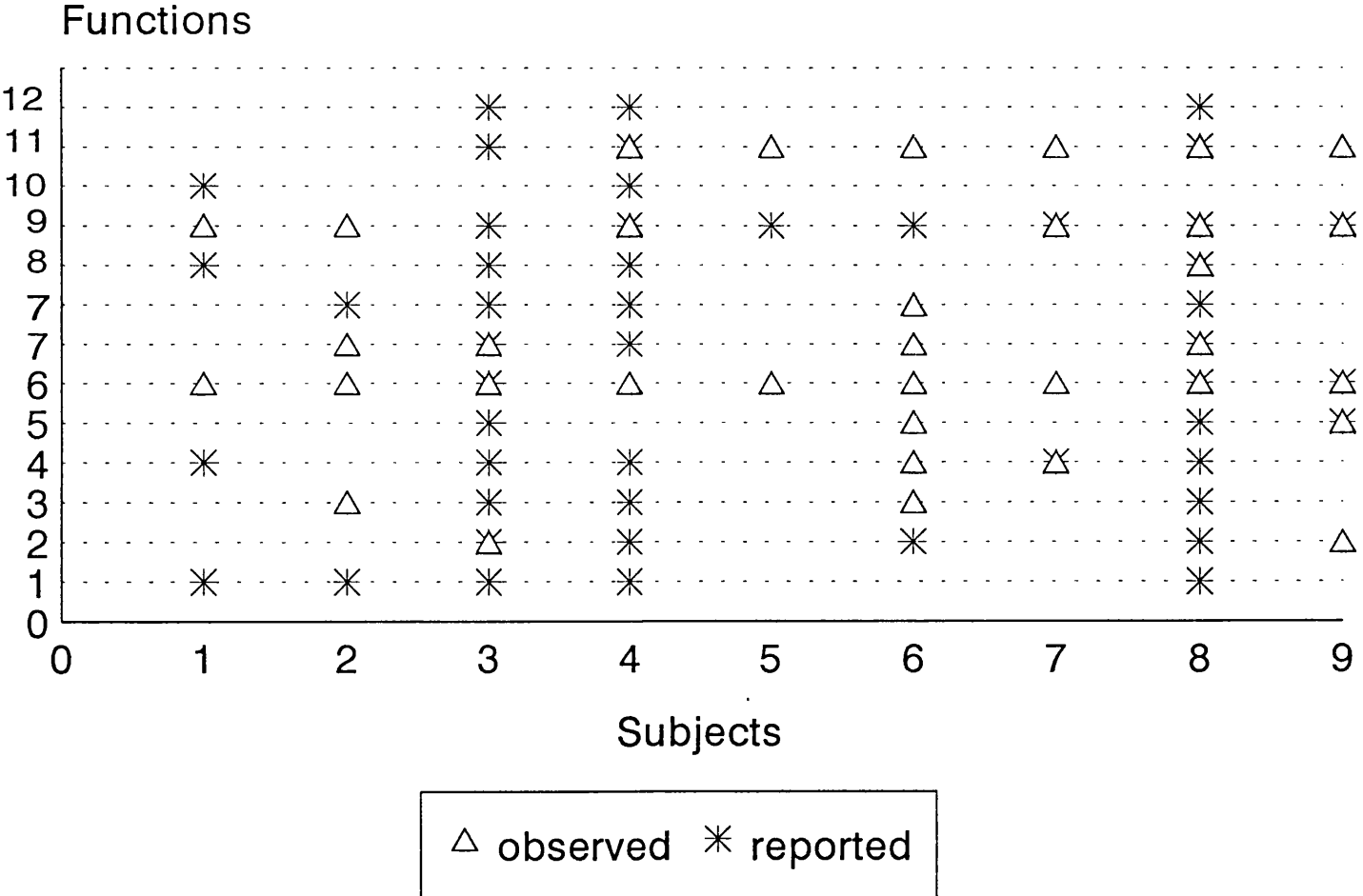
Use of gestures - Teachers
Contact 2
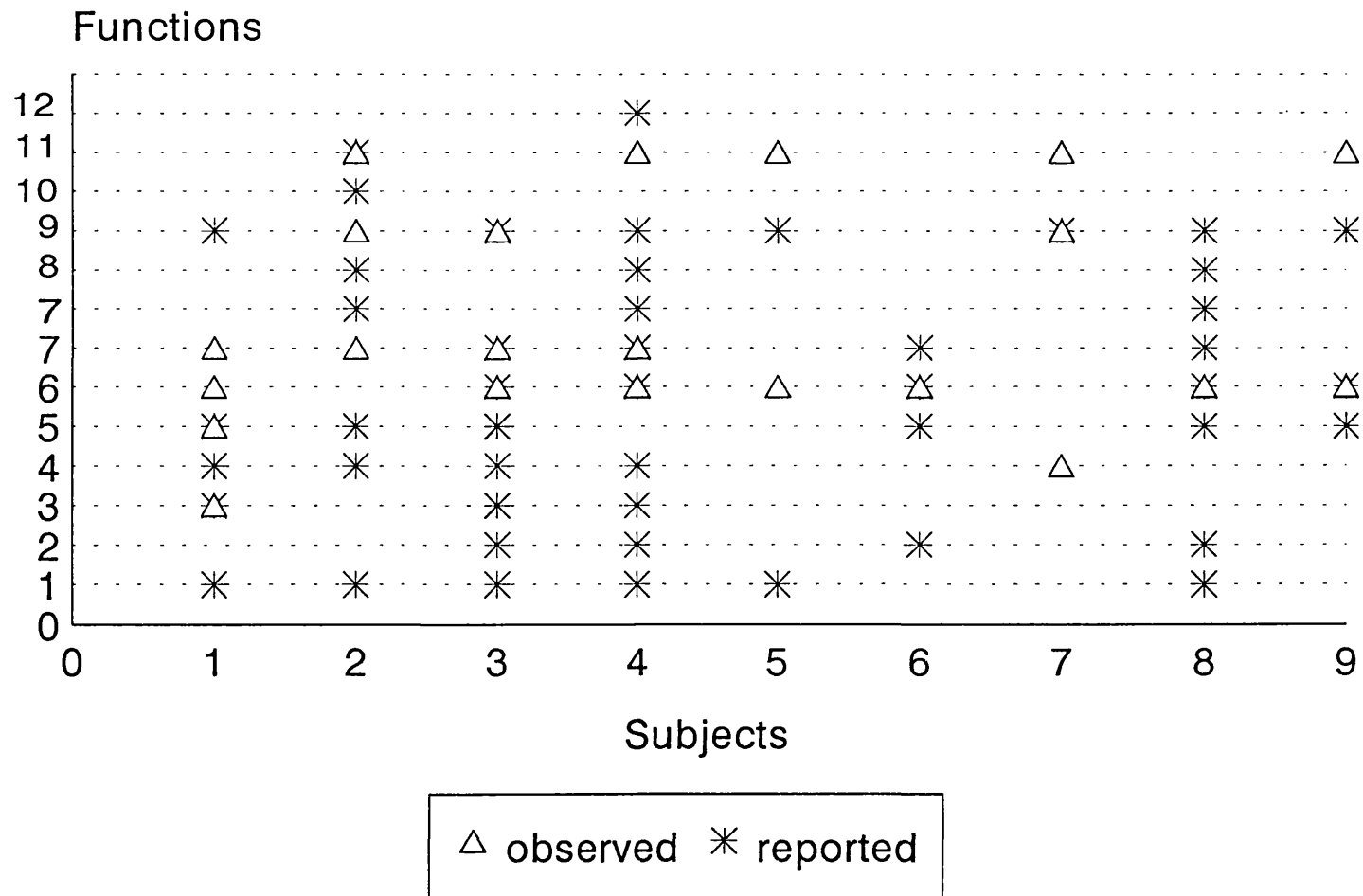
Figure 4.8

Use of verbal - parents
Contact 2
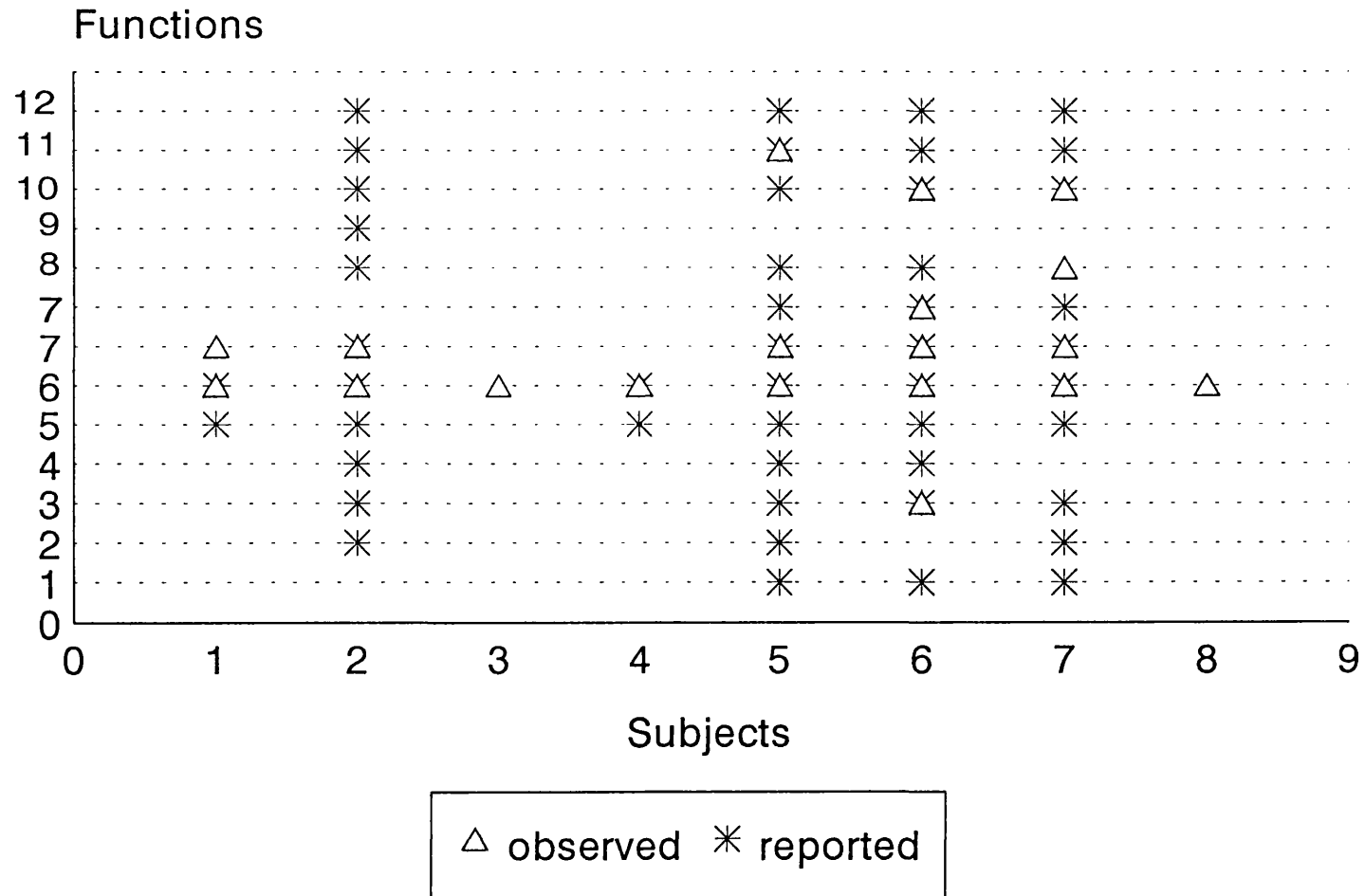
Figure 4.9

Use of verbal - Teachers
Contact 2
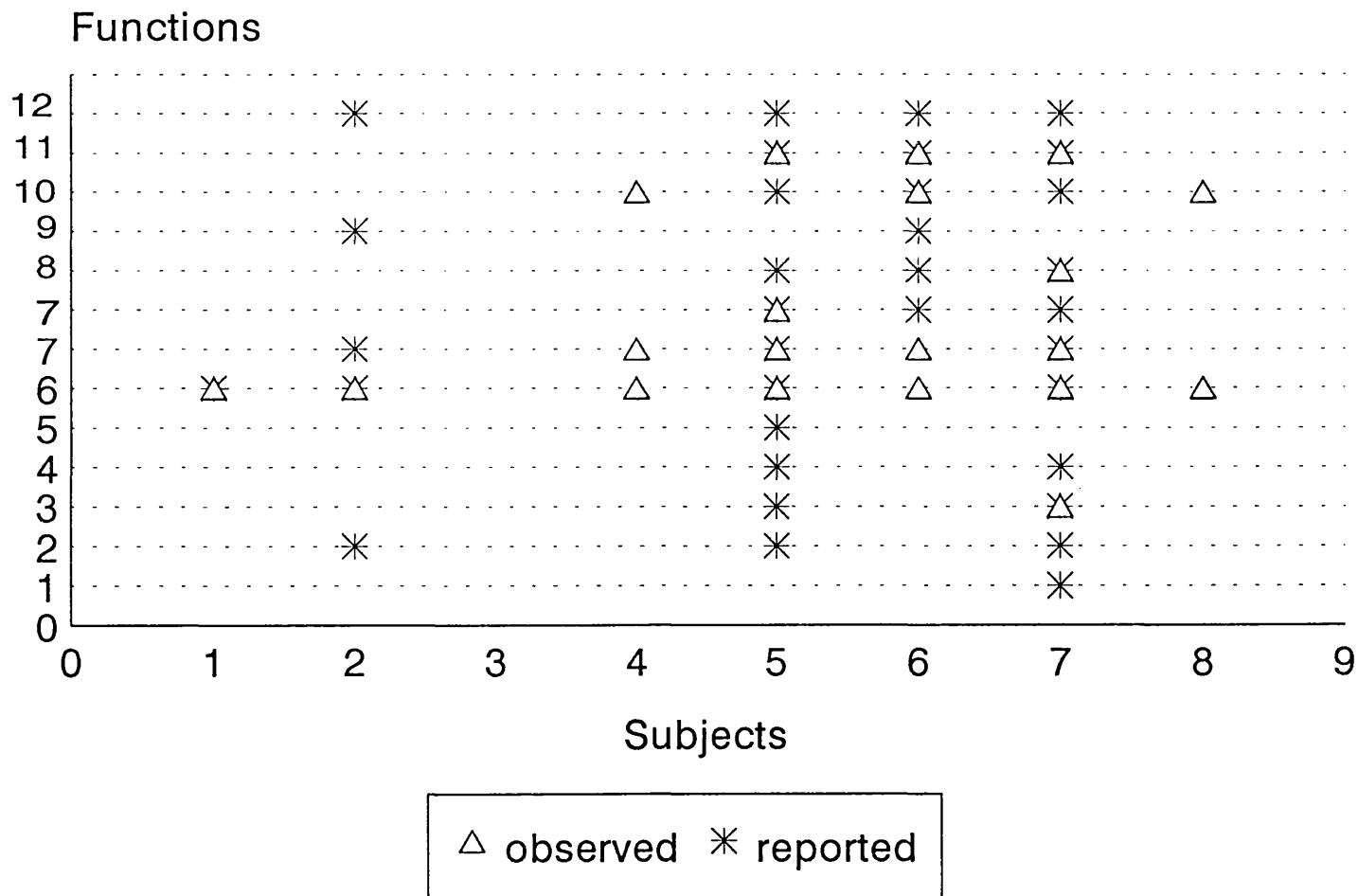
Figure 4.10

Use of Aids - Parents
Contact 2

Functions

Subjects
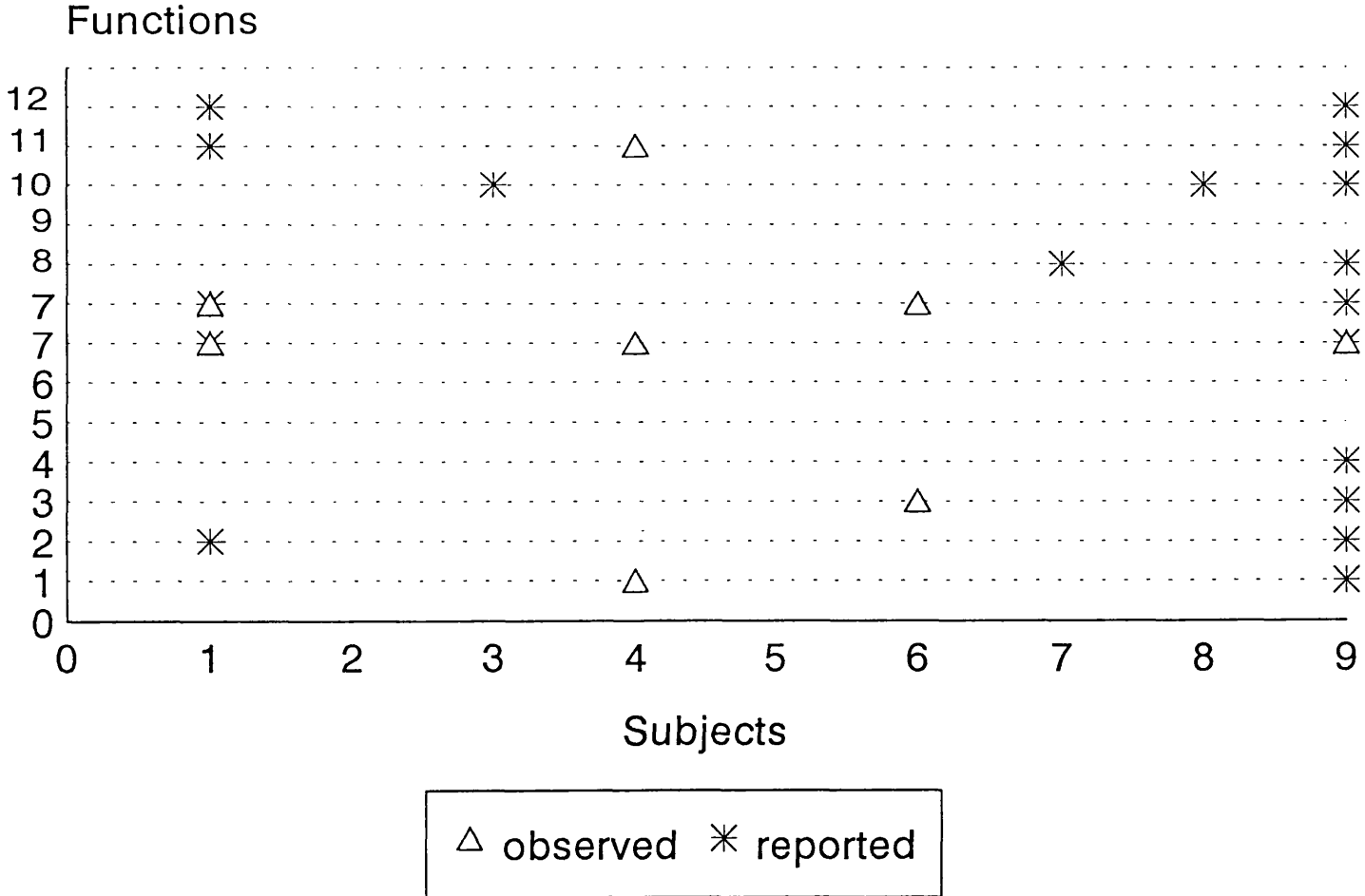
△ observed * reported

Figure 4.11

Use of Aids - Teachers
Contact 2

Functions

Subjects
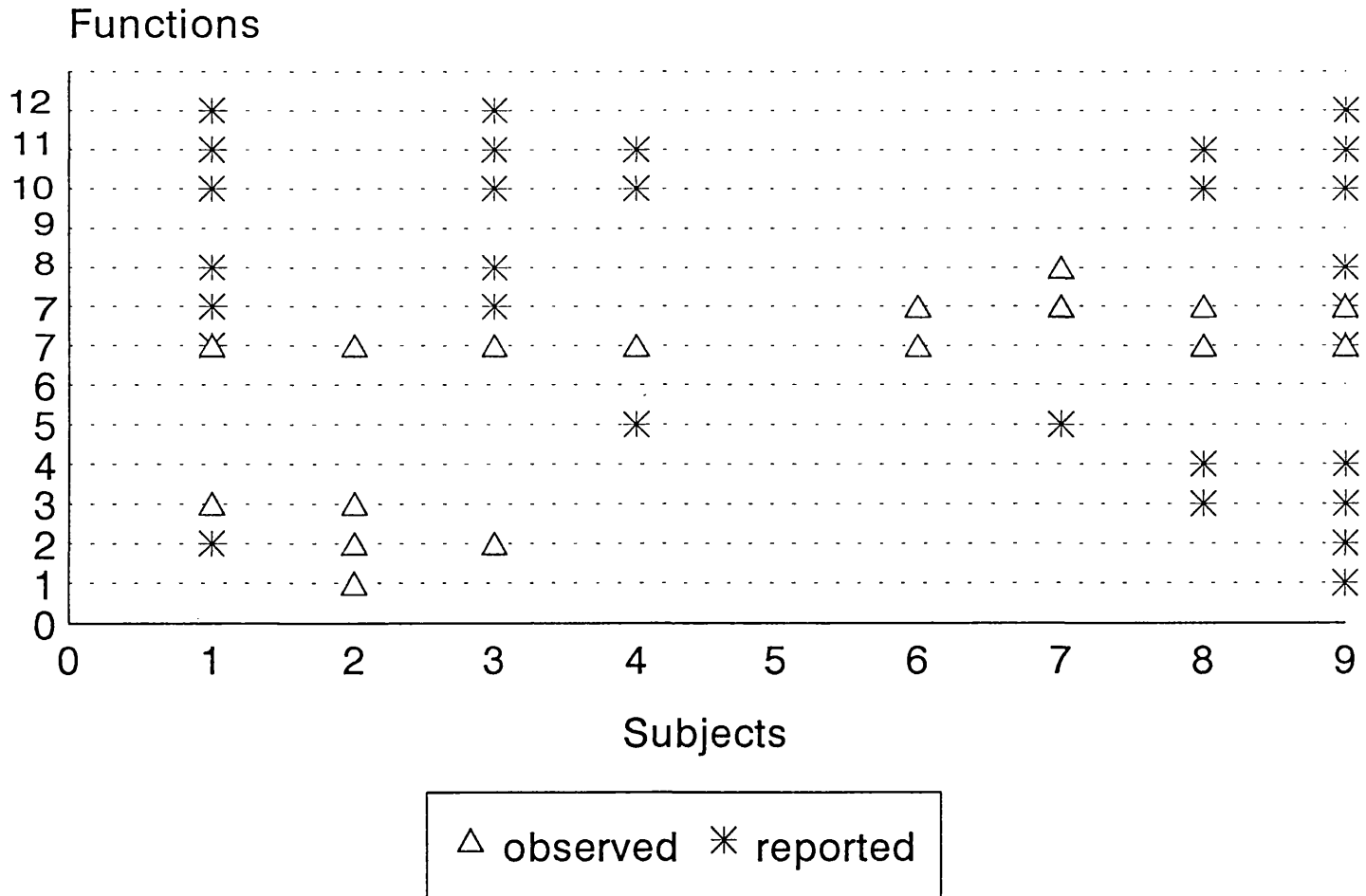
△ observed   ✳ reported

Figure 4.12

Using all the reported modes as a baseline, the observed modes were examined. For every instance of a reported mode for a particular function that also had an observed mode, it was noted as being the same as or different from the reported mode being used. In cases where more than one mode of communication had been observed for a function and there was both same and different modes observed, the comparison with reported was noted as same (See Appendix 3 for Subject data).

Table 4.16 - Total Reported Modes related to Observed Modes for the Same Communicative Functions

	PARENT			TEACHER		
MODE	REPORTED	OBSERVED		REPORTED	OBSERVED	
		S	D		S	D
GESTURE	50	16	2	48	12	5
VERBAL	48	15	7	34	12	7
AID	18	3	3	30	3	4

Taking the Total Reported Modes and the Same Observed Modes and using the Wilcoxon matched pairs signed ranks test, significant differences were demonstrated. Measures for Parents on all three modes and for Teachers on Gestures and Aids were found to be significant.

Table 4.17 - Total Reported Modes Related to the Same Observed Modes for the Same Communicative Functions

	PARENT			TEACHER		
MODE	TR	SR	P VALUE	TR	SR	P VALUE
GESTURE	50	16	0.0180	48	12	0.0117
VERBAL	48	15	0.0277	34	12	0.0679
AID	18	3	0.0431	30	3	0.0277

4.3.4.5 Summary

The structured interview confirmed some clinical observations and expectations; for example that aids are used more at school and that parents consider that their children use a verbal mode of communication more than they actually do. It also indicated that parents tended to consider that their children communicated with less strangers than teachers did, although this may have been a function of different environments.

The significant differences (p <0.05) between reported and observed modes and functions suggest that children are not offered sufficient opportunities for using a range of modes and functions and that both teachers and parents perceive the children as communicating in a more sophisticated way than they actually are.

CHAPTER 5

STUDY 2

TRAINING COMMUNICATION SKILLS

Study 1 successfully used the method of describing and categorising children's communication patterns that was developed by the author and colleagues at The Wolfson Centre, London. It demonstrates that the children's communication remained passive and largely reactive over a period of one year.

Clinical observations by CAC staff at both the assessment and later at review appointments suggested that a possible reason for children not improving their communication skills, even when a suitable aid was available, was because of the way they were being talked to by the adults they were with and the lack of support the environment gave the aid. Study 1 showed that parents and teachers were generally very directive in their communication with the child, frequently anticipating the answer and often only requiring a Yes/No.

These observations led staff to consider offering a dual approach to remediation. The child was offered an assessment and recommendation for an aid, but in addition, the parent was offered some training in communication skills. This study aims to evaluate the effect of intervention in the form of a training workshop in

communication skills for parents.

Hypothesis 3:

Parents will become more responsive to the child's communication and the child will use more sophisticated communication shortly (three months) after the workshop training. Change in communication patterns will be measured as:

- An increase in child initiations
- An increase in adult responses to child initiations
- An increase in the use and range of communicative functions.
- An increase in the use of communication aids

It was expected that one training workshop would not be sufficient to maintain change that was measured at three months over a longer period. Thus the study tested a second hypothesis.

Hypothesis 4:

Twelve months after the workshop training the old parent/child patterns of communication will have returned. In each case communication patterns will be measured by:

- The proportion of initiations to responses
- Adult responses to child initiations
- The use and range of communicative functions
- The use of communication aids

If this approach were seen to be successful, it was planned to extend the intervention to the child's teachers.

5.1 Design

A matched pairs design was used. Subjects were matched on level of language comprehension as measured by the TROG or other language comprehension assessment and on their physical abilities - whether they could directly select ie point or use a keyboard or whether they could only indirectly select ie use a switch to scan through possibilities, stopping when they reached the right item. The parents of Group A, the experimental group, were invited to attend a one day workshop about communication skills in addition to the usual assessment service offered at the CAC. Group B, the control group, received the usual assessment. Both groups were videorecorded to measure communication patterns at assessment, three months post training programme and approximately one year later.

It would have been possible to use a single case study design for this study and this will be discussed further in Chapter 6, opposite page 166.

Table 5.1   Design of Study 2

	GROUP A	GROUP B
CONTACT 1	ASSESSMENT VIDEORECORDING	ASSESSMENT VIDEORECORDING
INTERVENTION	WORKSHOP TRAINING	-
CONTACT 2	VIDEORECORDING	VIDEORECORDING
CONTACT 3	VIDEORECORDING	VIDEORECORDING

5.2   Method

5.2.1   Subjects

All subjects had been referred to the Communication Aids Centre for assessment and recommendation of a communication aid.   Over a six month period, fourteen non-speaking physically disabled children who met the inclusion criteria were matched as described in the Design in two groups of seven. If the child in Group A could not come to the workshop, their matched pair was offered the place and the original Group A child became a member of the control group (See Table 5.2).

5.2.2   Inclusion Criteria

Children who were referred to the Communication Aids Centre for assessment who:

- had a measurable language comprehension age which included labels, familiar names and actions.

- were living at home with their parents attending day
  schools.
- had no major sensory losses - ie hearing or vision
  and whose parents had agreed to them being in the
  study.

Table 5.2a Description of Subjects

S	SEX	CA ys:ms	MEDICAL DIAGNOSIS	SCHOOL
1A	M	3:10	4 Limb Cerebral Palsy with Athetosis	PH
1B	F	3:2	4 Limb Cerebral Palsy with Dystonia	PH
2A	M	3:7	4 Limb Cerebral Palsy with Athetosis	PH
2B	M	3:1	4 Limb Cerebral Palsy	PH
3A	F	13:2	4 Limb cerebral Palsy with Spasticity	PH
3B	M	12:3	4 Limb Cerebral Palsy with Athetosis	PH
4A	F	12:6	Cerebral Palsy, Intellectual Disability	SLD
4B	M	15:2	4 Limb Cerebral Palsy with Spasticity	PH
5A	F	15	Severe Dyspraxia with Intellectual Disability	SLD
5B	M	9:8	4 Limb Cerebral Palsy with Athetosis	PH
6A	F	9:2	Cerebral Palsy, Intellectual Disability	PH
6B	F	9:4	Cerebral Palsy Intellectual Disability	PH
7A	M	9:9	4 Limb Cerebral Palsy with Athetosis	PH
7B	M	15:5	4 Limb Cerebral Palsy with Athetosis	PH

S   Subjects

CA   Chronological Age

PH   School for Children with a Physical Handicap

SLD   School for Children with Severe Learning Difficulties

Table 5.2 Subjects

SUBJECT	C.A yrs/mths	SEX	DIRECT/ INDIRECT	TEST RESULTS
1A	3:10	M	D	md
1B	3:2	F	D	md
2A	3:7	M	D	BPVS 3:2 RDLS 3:6
2B	3:1	M	D	RDLS 2:6 SCT 3:0
3A	13:2	F	ID	TROG 11+
3B	12:3	M	ID	TROG 9:0
4A	12:6	F	D	TROG 4:5
4B	15:2	M	D	TROG 11+
5A	15	F	ID	RDLS 5:2
5B	9:8	M	ID	TROG 9.0
6A	9:2	F	D	TROG 4:0
6B	9:4	F	D	md
7A	9:9	M	ID	TROG 8:0
7B	15:5	M	ID	TROG 11+

5.2.3 Procedures

On the day of assessment all subjects underwent

1. The Wolfson Centre Communication Aid Centre Multidisciplinary Assessment.

2. TROG test for the Reception of Grammar or other language comprehension assessment.

3. 10 minutes of filmed interaction with a parent. This was set aside for later coding. The procedure for this was exactly the same as described in Study 1.

At the end of the assessment day recommendations for a communication aid system would be made.

This completes the baseline data.

Parents of the subjects in Group A,the experimental Group, were invited to attend The Wolfson Centre without their children for a workshop training day in communication skills.

All subjects were seen three months after the training day and one year after the training, for a repeat of the videotape recording. Data collection for Contacts 1 and 2 were shared between this author and Allen (1988). Contact 3 data collection was carried out by this author and all videotapes were coded or recoded by this author for this study.

5.2.3.1 Procedures for Parents' Workshop Training Day

The aim of the workshop was to inform parents about communication and make them more aware of their own communication, specifically when they were communicating with their child.

The day was timetabled from 10.00am - 4.00pm.

10.00 - 10.30   coffee

10.30 - 11.30   Introduction to communication using the Harris (1982) models of vocal and non-vocal communicators. (See Figures 2.1 & 2.2).

11.30 - 12.30   Small group work using videotapes of parents talking to their children.

a. Parents to identify two good points and three problem areas about communicating with their children.

b. To think about practical ways of improving communication in those problem areas.

c. Discussion with one of the speech therapists running the workshop, about their observations and ideas - begin to develop individual aims for each child.

12.30 - 1.30   Lunch

 1.30 - 2.45   Role play situations - practising games and activities that facilitate good communication patterns.

 2.45 - 3.00   Tea

3.00 - 4.00 Final session identifying individual aims

for each parent and child.

Diary sheets

Handouts

It was thought that increased awareness of their own communication and the practice in observing communication interaction between themselves and their child from the videotape should promote more facilitative and responsive adult communication. This should lead to increased and more sophisticated communication from the child. The workshop is described further in Allen (1988)

5.2.4 Measures

Video Recorded Observation:

Approximately five minutes of filmed interaction for each of the three contacts was transcribed and coded. This gave approximately 15 minutes per child. Coding addressed Structure, Rate of Interaction, Functions and Modes as for Study 1 and details can be found in Chapters 3 and 4.

5.2.5 Analysis

Data were analysed using non-parametric statistics which have been selected as they are distribution free and are suitable for studies of small numbers. Differences between the two groups and short term effects at Contact 2 were tested using the Wilcoxon matched-pairs signed-ranks test, while long term effects across contacts 1, 2 and 3 were

tested using the Friedman two-way analysis of variance.
$p < 0.05$ was accepted as statistically significant.

5.3 Results

5.3.1 Contact 1

5.3.1.1 Structure

At baseline there was no significant difference between the
two groups on the measure of Structure. Data looked very
similar to the data presented in Study 1 with the adults
demonstrating an approximately equal proportion of
initiations to responses and the children demonstrating a
very small number of initiations and a much greater number
of responses (see Appendix 4.1 for Subject data).

Table 5.3 Contact 1 - Structure: Adult and Child
Initiations and Responses seen as a percentage of Total
Number of Communication Acts

MEAN (SD)	ADULT INITIATION	ADULT RESPONSES	CHILD INITIATION	CHILD RESPONSES
GROUP A	26 (5)	30.2 (4.2)	2.4 (2.9)	41.4 (4)
GROUP B	31.4 (5.9)	23.8 (7.5)	5.2 (6.3)	39.6 (4.3)
WILCOXON T	9	7	9	13

SD Standard Deviation

5.3.1.2 Adult Response to Child Initiations

There was no significant difference demonstrated between

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the two groups on the measure of adult response to child initiation (Wilcoxon: T = 4, N = 6). Group A presented a mean score of 36.1 and Group B presented a mean score of 51.6.

5.3.1.3 Rate of Communication

There was a significant difference demonstrated between the two groups. (Wilcoxon: T = 3, N = 7, p <.05) Group A with a mean rate of 21.4 was significantly faster in communicating (measured in communication acts per minute) than Group B with a mean rate of 16.8.

Table 5.4   Contact 1 - Rate of Communication: Number of Communication Acts Per Minute for Each Dyad.

SUBJECTS	GROUP A	GROUP B
1	23.9	17
2	14.6	16.2
3	19.1	23.2
4	19.3	12.4
5	24.7	20.1
6	27.8	12.6
7	20.4	16
MEAN (SD)	21.4 (4.4)	16.8 (3.9)

SD Standard Deviation

5.3.1.4 Function

There was no significant difference between the two groups on the measure of Communicative Functions. Data presented a similar profile to Study 1, Contact 1. Nearly 50% of the communication offered by the children in both groups fell into the category of Function 6 - Confirmations and Denials. Approximately 30% fell into Function 7a - Provision of Information, when there are few possible answers. A small proportion of functions were coded as higher level (see Appendix 4.4 for Subject data).

Table 5.5   Contact 1 - Observed Use of Function in Adult/Child Dyads

MEAN (SD)	FUNCTION 6	FUNCTION 7a	FUNCTIONS 3,4,7b,8	OTHER
GROUP A	45.4 (18.1)	30.8 (14.5)	8.2 (7.9)	15.8 (14.3)
GROUP B	44.9 (17.2)	29.3 (21.5)	5.2 (6.5)	20.6 (17.6)
WILCOXON T	12	11	5	11

SD   Standard Deviation

5.3.1.5 Mode

Subjects predominantly relied on gestures, vocalisations and physical modes of communication (See Table 5.6) Five subjects were able to use a few recognisable words and Subjects 5A and 6A made some use of signing and symbols. Subject 1A used some symbols and Subject 4A some signs. No subject had access to an electronic aid.

Table 5.6 Contact 1: Modes of Communication observed in Adult/Child Dyads

S	VERBAL		VOCAL	GEST.	SIGN	SYMB.	ELEC. AID	PHYS.
	++	Y/N						
1A			x			x		x
1B			x	x				x
2A			x	x				x
2B		x	x	x				x
3A	x		x	x				
3B		x	x					x
4A	x			x	x			x
4B	x		x	x				
5A	x		x	x	x	x		x
5B		x	x					x
6A	x		x	x	x	x		x
6B			x	x				x
7A		x	x	x				x
7B		x	x	x				x

Verbal ++ - Verbal mode used for more than Yes/No

Verbal Y/N - Verbal mode used for Yes/No only

5.3.1.6 Summary

Therefore at Contact 1 with the exception of communicative rate, where Group A was significantly faster, the groups displayed no differences on the measures used for analysis. The group profiles were similar to Study 1, Contact 1 demonstrating child passivity, a high proportion of responses to initiations, a restricted range of communicative functions and limited communication aid use.

5.3.2 Contact 2

5.3.2.1 Structure

There were no significant differences between the groups. The mean scores show very similar proportions to the scores for Contact 1 - Structure, although the mean scores for Child Initiation had increased for both groups (see Appendix 4.2 for Subject data).

Table 5.7 Contact 2 - Structure: Initiations and Responses Seen as a Percentage of the Total Number of Communication Acts

MEAN (SD)	ADULT INITIATION	ADULT RESPONSE	CHILD INITIATION	CHILD RESPONSE
GROUP A	27.6 (5·5)	28.4 (5·3)	8.1 (3·5)	35.9 (2·3)
GROUP B	26.4 (7·8)	25.8 (4·2)	10.9 (7·9)	36.9 (7·5)
WILCOXON T	13	8	7	14

SD Standard Deviation

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5.3.2.2 Adult Response to Child Initiation

Group A had a mean score of 92.7, Group B 65.6. This was a significant difference, (Wilcoxon: $T = 1$. $N = 6$, $p < .05$) showing that after training, Group A parents responded to a greater number of child initiations than Group B parents.

5.3.2.3 Rate of Communication

Group A, mean score 25.9 acts per minute, continued to present a faster communication rate than Group B, mean score 19.8 acts per minute. This demonstrated a significant difference (Wilcoxon $T = 2$, $N = 7$, $p < .025$).

Table 5.8   Contact 2 - Rate of Communication: Number of Communicative Acts per Minute for Each Dyad

SUBJECTS	GROUP A	GROUP B
1	26	25.1
2	29.3	21.5
3	19.5	22.8
4	21.5	11
5	34	20.4
6	23.2	19.2
7	28	18.8
MEAN (SD)	25.9 (5)	19.8 (4.5)

SD Standard Deviation

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5.3.2.4 Function

The proportion of communicative functions falling in the different categories had changed from Contact 1. There was now less than 40% in Function 6 - Confirmations and Denials, a smaller proportion is categorised in Function 7a and a larger number falling in the higher level functions category. There were no group differences. However the Other category did now show a significant group difference (Wilcoxon T = 0, N = 7, p <.01), Group B having a greater number of Acts in the Other category than Group A. This was due to a large number of unintelligible responses from three subjects: B3, B5 and B7. (See Appendix 4.5 for Subject data).

Table 5.9 Contact 2 - Observed Use of Functions in Adult/Child Dyads

MEAN (SD)	FUNCTION 6	FUNCTION 7a	FUNCTIONS 3,4,7b,8	OTHER
GROUP A	37.3 (22.8)	22.8 (20.1)	26.7 (11.2)	13.2 (11.4)
GROUP B	36 (14.2)	12.7 (10)	24.7 (20.4)	26.6 (10.3)
WILCOXON T	12	9	11	0

SD Standard Deviation

5.3.2.5 Mode

Apart from the exceptions listed below, the patterns of communication mode were largely unchanged from Contact 1.

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It was thought that there might be particular patterns between structure function and mode for different children. For example would children use one mode to always communicate certain functions. It was disappointing that the only patterns to be observed were for Function 6, where many children would attempt a verbal Yes/No and if they did not do this they would usually use a vocal response. The only other consistant pattern to be noted was for greetings where some children would attempt a verbal greeting and if this was too difficult, most would manage a vocal greeting.

There was little observable relationship between communication aids and spontaneous communicatiuon, as frequently the aid was not available for spontaneous communication. The aid would often be brought out because the Speech and Language Therapist had arrived and the child had to show what he could do. The exception to this was the child who used a multimodal approach and switched from one mode to another when she failed to communicate with the first. She was greatly assisted in this by a very supportive environment that expected her to use different modes of communication. With many of the other children the aid was either forgotten or used as a sort of teaching aid for set phrases.

Communication rate was important for maintaining the conversation and slow or problematic access was an important factor here. If the rate was too slow there was a great temptation for the communication partner to 'say it for the child'.

Two subjects: (3B and 4B) now had an electronic aid
available and were making some use of it. Subject 2B was
beginning to use some signs and Subject 4A was beginning to
use some simple symbols.

Table 5.10   Contact 2 - Modes of Communication Observed in

Adult/Child Dyads

S	VERBAL		VOCAL	GEST.	SIGN	SYMB.	ELEC. AID	PHYS.
	++	Y/N						
1A			X	X		X		X
1B			X	X				X
2A			X	X				X
2B			X	X	X			X
3A	X		X	X				
3B		X	X	X			X	X
4A	X			X	X	X		X
4B	X		X	X			X	X
5A	X		X	X	X			X
5B		X	X	X				X
6A	X		X	X	X	X		X
6B			X	X				X
7A			X	X				X
7B		X	X	X				

Verbal ++ - Verbal mode used for more than Yes/No

Verbal Y/N - Verbal mode used for Yes/No only

5.3.2.6 Summary

Therefore at Contact 2, between groups there were significant differences seen on some measures.

Communicative rate - Group A showed a faster rate; adult responses to child initiations - Group A showed a greater percentage of appropriate responses; and on the Other category of communicative functions - Group A showed a greater number of communicative acts in this category.

5.3.3 Comparison of Contact 1 and Contact 2 Within Groups

To test Hypothesis 3 - that parents will become more responsive to the child's communication and that the child will use more sophisticated communication after the training intervention, it was necessary to compare the results at Contact 1 and Contact 2.

Only results that were significant at p <.05 are reported.

5.3.3.1 Structure

There were increases in the percentage of Child Initiations at Contact 2 which demonstrated a significant difference for both groups (Wilcoxon: Group A: T = 0, p <.01 and Group B: T = 2, p <.025). There was a decrease in the percentage of Child Responses in Group A demonstrating a significant difference (Wilcoxon: T = 0, p <.01). (See Figure 5.1 and Table 5.11)

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Child Initiation &
Child Response

% Communication Acts

Group CI & CR
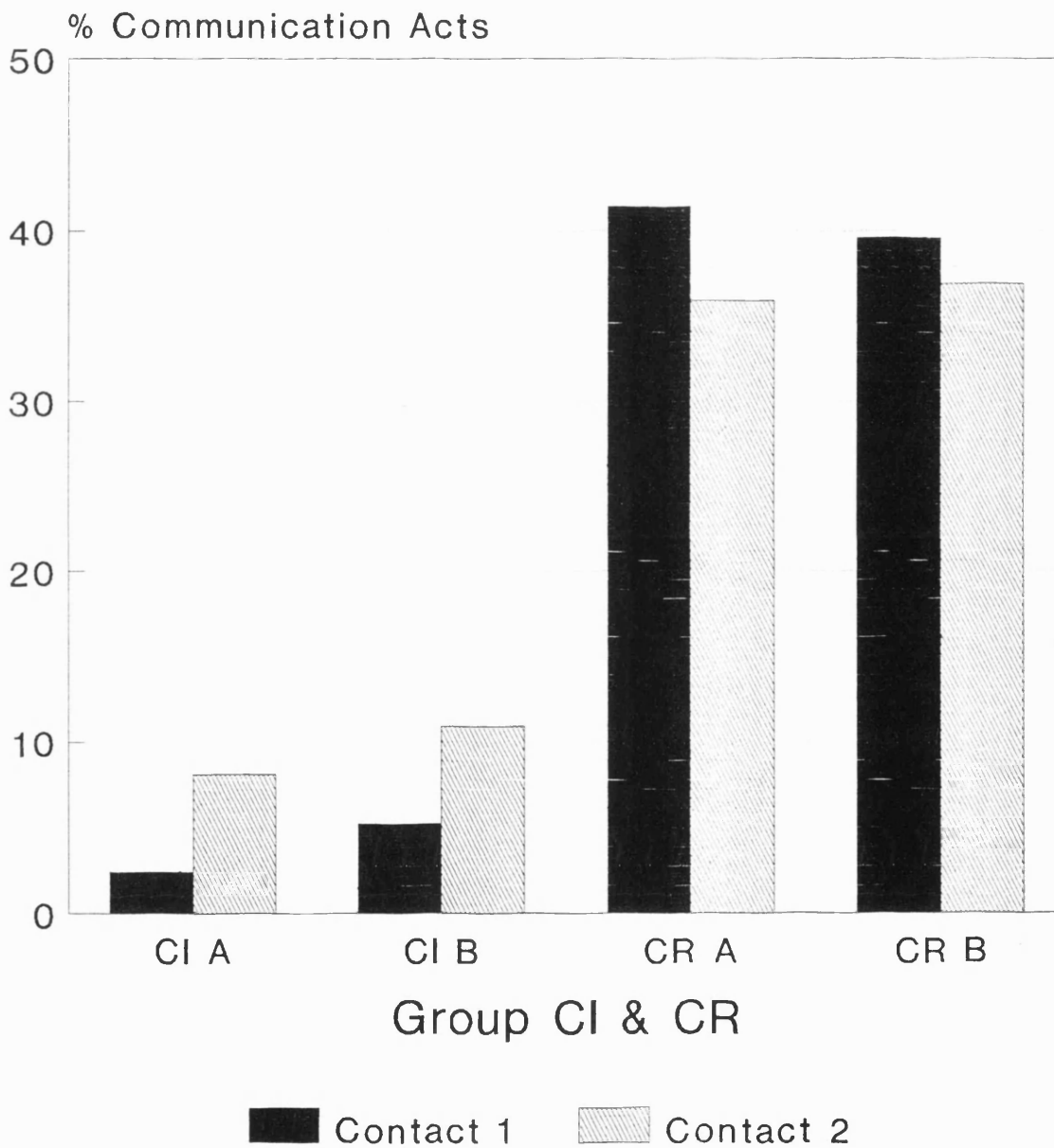
■ Contact 1   ▨ Contact 2

Figure 5.1

Table 5.11 Structure - Comparison of Contact 1 and

Contact 2

	ADULT INITIATION		ADULT RESPONSES		CHILD INITIATIONS		CHILD RESPONSES	
GROUP	A	B	A	B	A	B	A	B
CONTACT 1 (SD)	26 (5)	31.4 (5·9)	30.2 (4·2)	23.8 (7·5)	2.4 (2·9)	5.2 (6·3)	41.4 (4)	39.6 (4·3)
CONTACT 2 (SD)	27.6 (5·5)	26.4 (7·8)	28.4 (5·3)	25.8 (4·2)	8.1 (3·5)	10.9 (7·9)	35.9 (2·3)	36.9 (7·5)
WILCOXON T	7	7	10	10	0	2	0	11

SD Standard Deviation

5.3.3.2 Adult Response to Child Initiations

In both groups there were increases in the percentage of
adult responses to child initiations. Group A presented
mean scores at Contact 1 of 36.1 and at Contact 2 of 92.7,
while group B presented mean scores at Contact 1 of 51.6
and at Contact 2 of 65.6. A significant effect for Group A
(Wilcoxon T: = 3, p <.025), was demonstrated (See Figure
5.2).

5.3.3.3 Rate of Communication

There was an increase in the number of communication acts
per minute demonstrated in Group A at Contact 2. (Contact
1 mean score 21.4, Contact 2 mean score 25.9). A
significant effect (Wilcoxon T: = 4, p <.05) was
demonstrated.

Adult Response to
Child Initiation
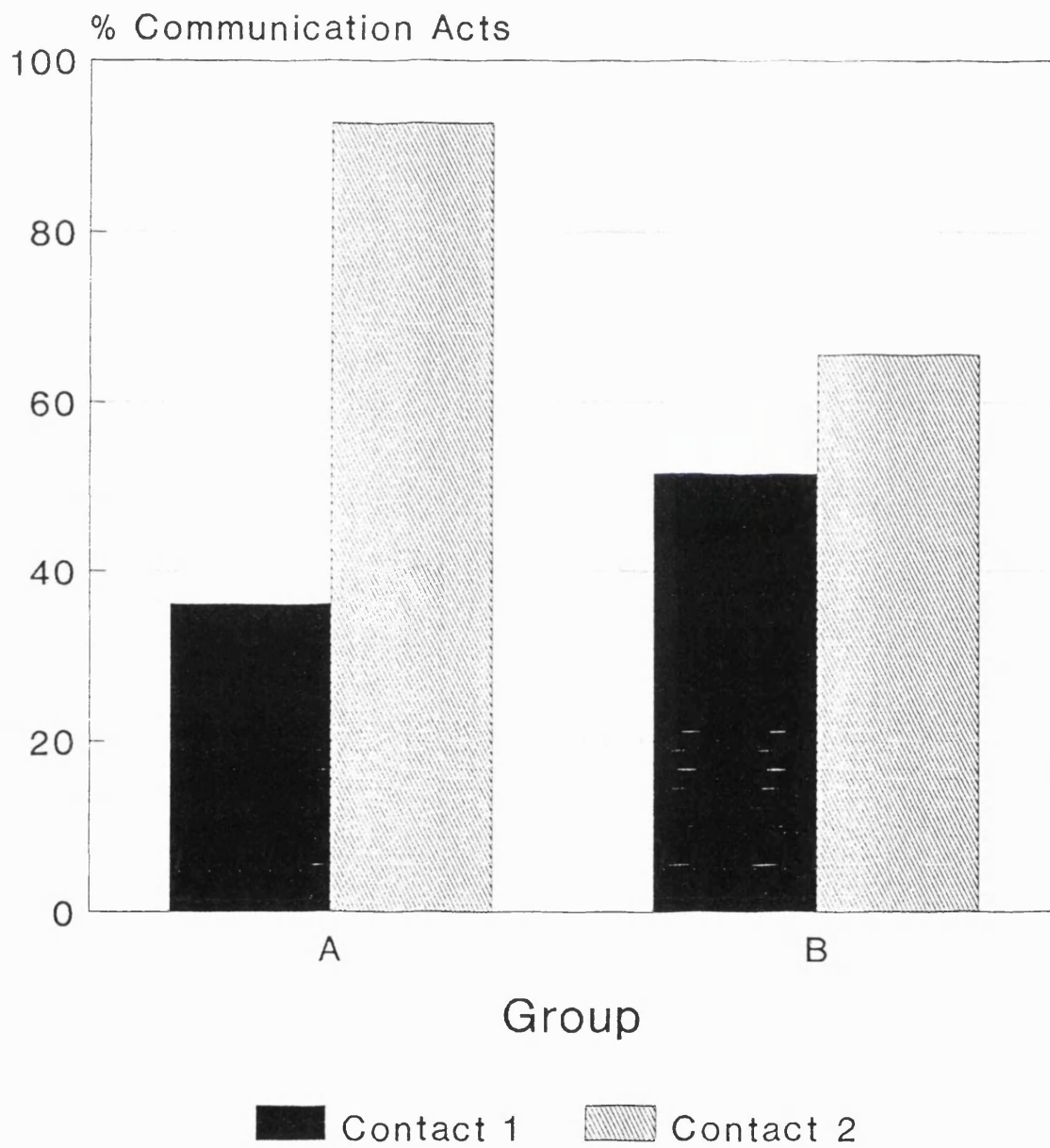
Figure 5.2

5.3.3.4 Function

For Function 7a - Provision of Information when there are only a few answers, Group B demonstrated a significant difference (Wilcoxon T: = 1, p <.025.) showing that the proportion of communication acts that fell into this category at Contact 2 was less than at Contact 1. For the higher level functions - 3,4,7b,8, both groups increased the percentage of higher level communication acts at Contact 2 and demonstrated a significant difference. (Wilcoxon T: = 0, p <.01; Group B: T = o, N = 6, p <.025). (See Figure 5.3 and Table 5.12)

Table 5.12 Observed use of Function - Comparison of Contact 1 and Contact 2

	FUNCTION 6		FUNCTION 7a		FUNCTIONS 3,4,7b,8		OTHER	
GROUP	A	B	A	B	A	B	A	B
CONTACT 1 (SD)	45.4 (18.1)	44.9 (17.2)	30.6 (19.5)	29.3 (21.5)	8.2 (7.9)	5.2 (6.5)	15.8 (14.3)	20.6 (17.4)
CONTACT 2 (SD)	37.3 (22.8)	36 (14.2)	22.8 (20.1)	12.7 (16)	26.7 (11.2)	24.7 (20.4)	13.2 (11.4)	26.6 (10.3)
WILCOXON T	5	7	7	1	0	0	11	13

SD Standard Deviation

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Functions 7a &
3,4,7b,8
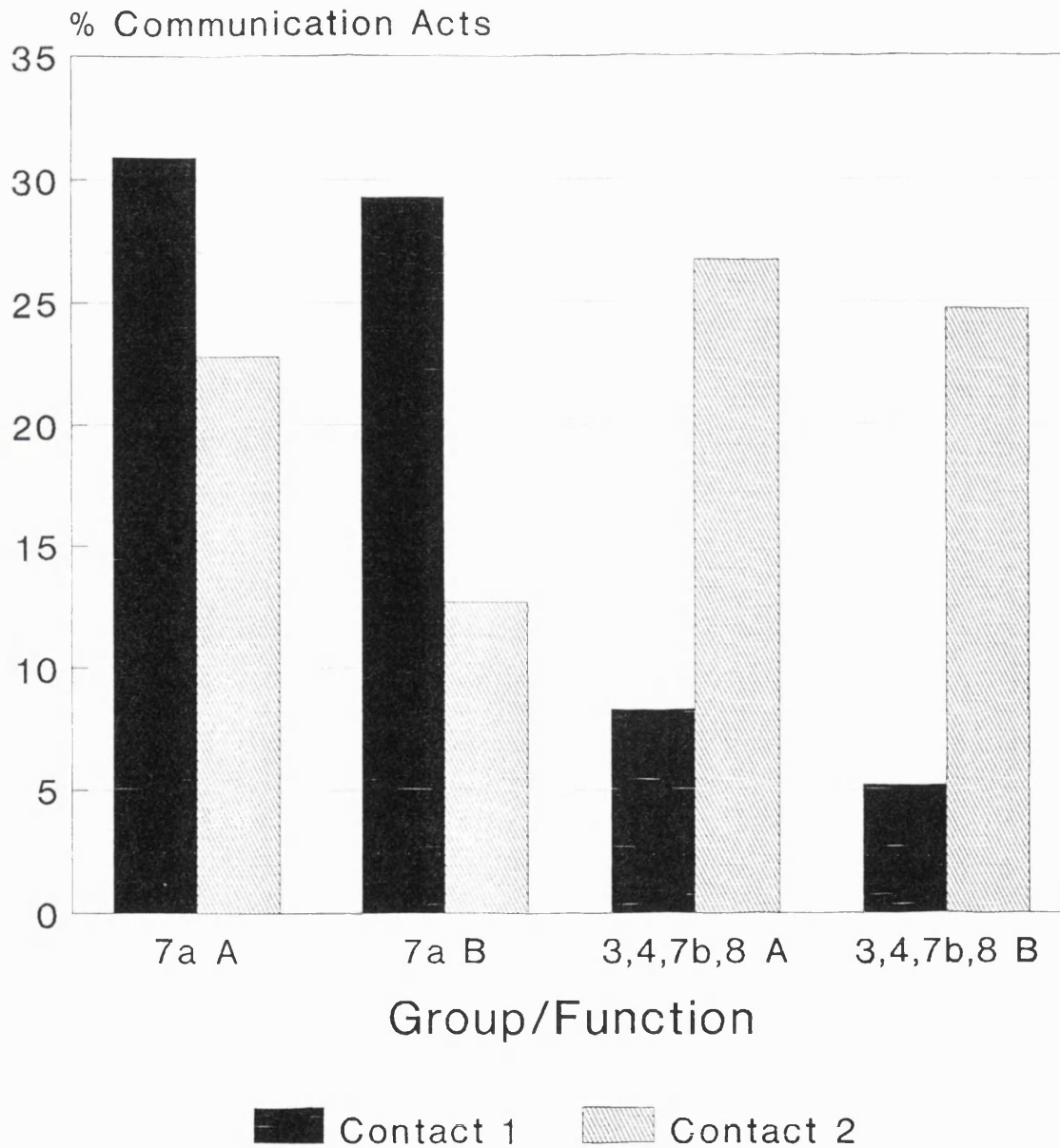
Figure 5.3

5.3.3.5 Summary

Therefore at three months after the workshop training there were significant effects demonstrated for group A for the measures of Child Initiations and Child Response, Adult Responses to Child Initiations, Communicative Rate and for the Higher level Functions (3,4,7b,8). There were also significant differences demonstrated for the control group for Child Initiations, Function 7a and the Higher level Functions (3,4,7b,8).

5.3.4 Comparison of Contact 1 and Contact 3 Within Groups

To test hypothesis 4 - that 12 months after the workshop training intervention the old parent/child patterns will have returned it was necessary to compare communication at Contact 1 and Contact 3.

5.3.4.1 Structure

There were no significant differences demonstrated on the measure of Structure (see Appendix 4.1 & 4.3 for Subject data).

Table   5.13 - Structure: Comparison of Contact 1 and

Contact 3

	ADULT INITIATION		ADULT RESPONSE		CHILD INITIATION		CHILD RESPONSE	
GROUP	A	B	A	B	A	B	A	B
CONTACT 1 (SD)	26 (5)	31.4 (5·9)	30.2 (4·2)	23.8 (7·5)	2.4 (2·9)	5.2 (6·3)	41.4 (4)	39.6 (4·3)
CONTACT 3 (SD)	28 (5·9)	33.5 (7·8)	26.8 (4·8)	21.6 (9·6)	3.9 (3·7)	4.7 (5·4)	41.3 (3)	40.2 (5·3)
WILCOXON T	6	11	3	12	5	11	8	11

SD   Standard Deviation

5.3.4.2 Adult Response to Child Initiation

There was a significant difference demonstrated for this measure for Group A only. (Wilcoxon T: = 1.5, p <.05). This result leads to a rejection of Hypothesis 4, as the improvement in Group A on this measure by Contact 2 was maintained at Contact 3. (See Table 5.14 and Figure 5.6)

Table   5.14 - Adult Response to Child Initiation: Comparison of Contact 1 and Contact 3

GROUP	A	B
CONTACT 1 (SD)	36.1 (46)	51.6 (39)
CONTACT 3 (SD)	81.6 (36·6)	54.5 (45·7)
WILCOXON T	1.5	9

SD Standard Deviation

5.3.4.3 Rate of Communication

There was no significant difference demonstrated on this measure.

5.3.4.4 Function

For group A, a significant difference was demonstrated (Wilcoxon T: 3, p <.05) for function 7a showing a decrease in the use of this function at Contact 3. All other categories of function showed no difference between Contact 1 and Contact 3 (see Appendix 4.4 & 4.6 for Subject data).

Table 5.15 Observed use of Function: Comparison of Contact 1 and Contact 3

	FUNCTION 6		FUNCTION 7a		FUNCTION 3,4,7b,8		OTHER	
GROUP	A	B	A	B	A	B	A	B
CONTACT 1 (SD)	45.4 (18.1)	44.9 (17.2)	30.6 (19.5)	29.3 (21.5)	8.2 (7.9)	5.2 (6.5)	15.8 (14.3)	20.6 (17.4)
CONTACT 3 (SD)	46.4 (23)	44.6 (11.6)	21.4 (19.9)	21.1 (8.7)	9.7 (15.9)	12.5 (9.6)	22.4 (23.9)	21.7 (13.3)
WILCOXON T	13	13	3	8	5	7	7	13

SD Standard Deviation

5.3.5 Comparison of Contact 1, Contact 2 and Contact 3 Within Groups

To test whether there was overall a significant intervention effect, a comparison of the three Contact times was made for each group.

Using the Friedman two-way analysis of variance, significant results for Group A only were obtained on three measures - Functions 3,4,7b,8 (p <.05); Child Initiations (p <.05) and Child Response (p <.01). Functions 3,4,7b,8 and Child initiations demonstrate an increase at Contact 2, while Child Response demonstrates a decrease at Contact 2. At Contact 3 all three measures show a return to the levels of Contact 1 (see Figures 5.4 and 5.5).

This pattern supports Hypotheses 3 and 4. The significant results for Group A and not for Group B tend to indicate an intervention effect. The only measure to demonstrate maintenance of effect was Adult Response to Child Initiation (see Figure 5.6).

Child Initiation &
Child Response

% Communication acts

Figure 5.4

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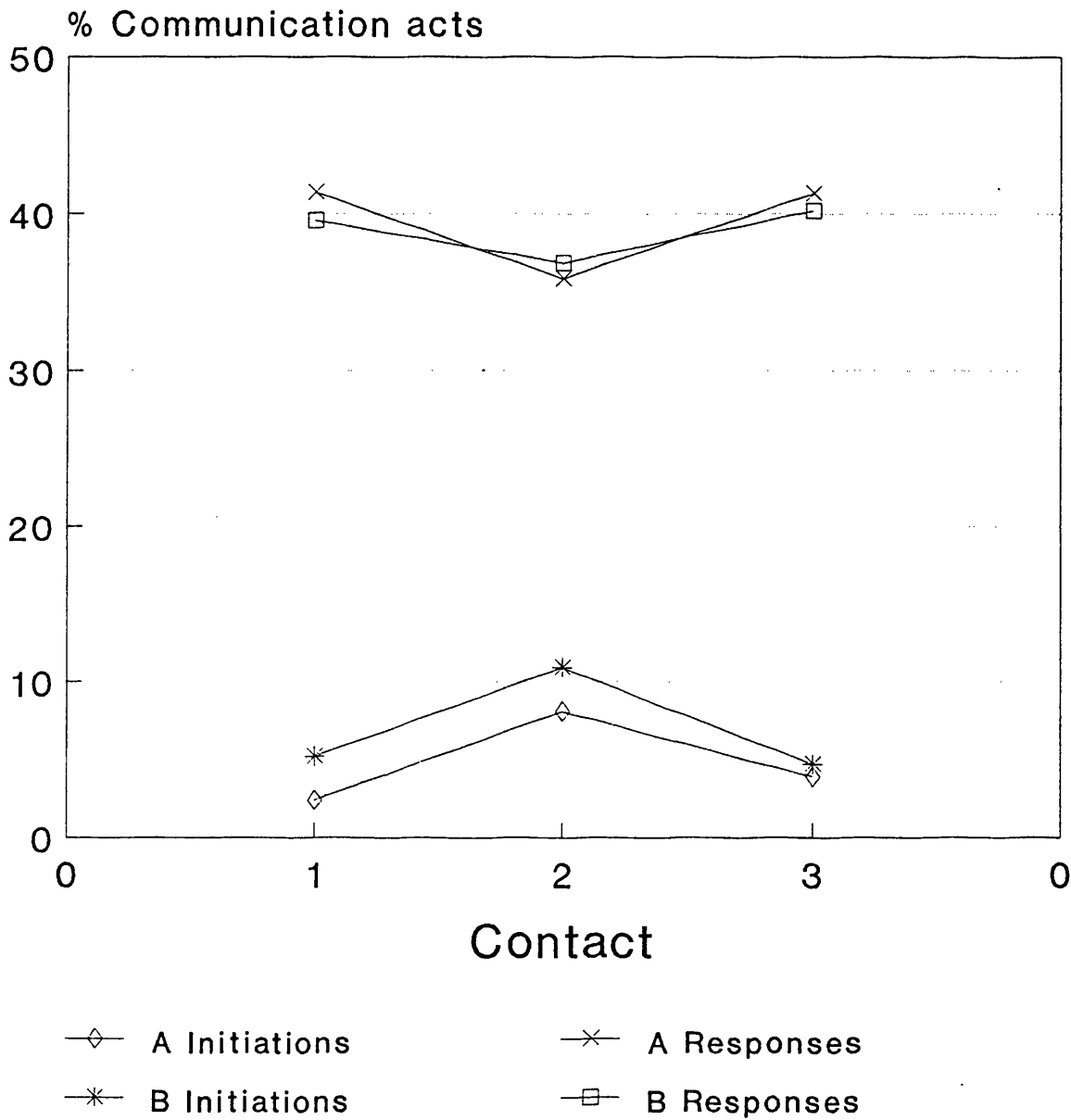
Functions 3,4,7b,8
Contacts 1,2,3

% communication acts
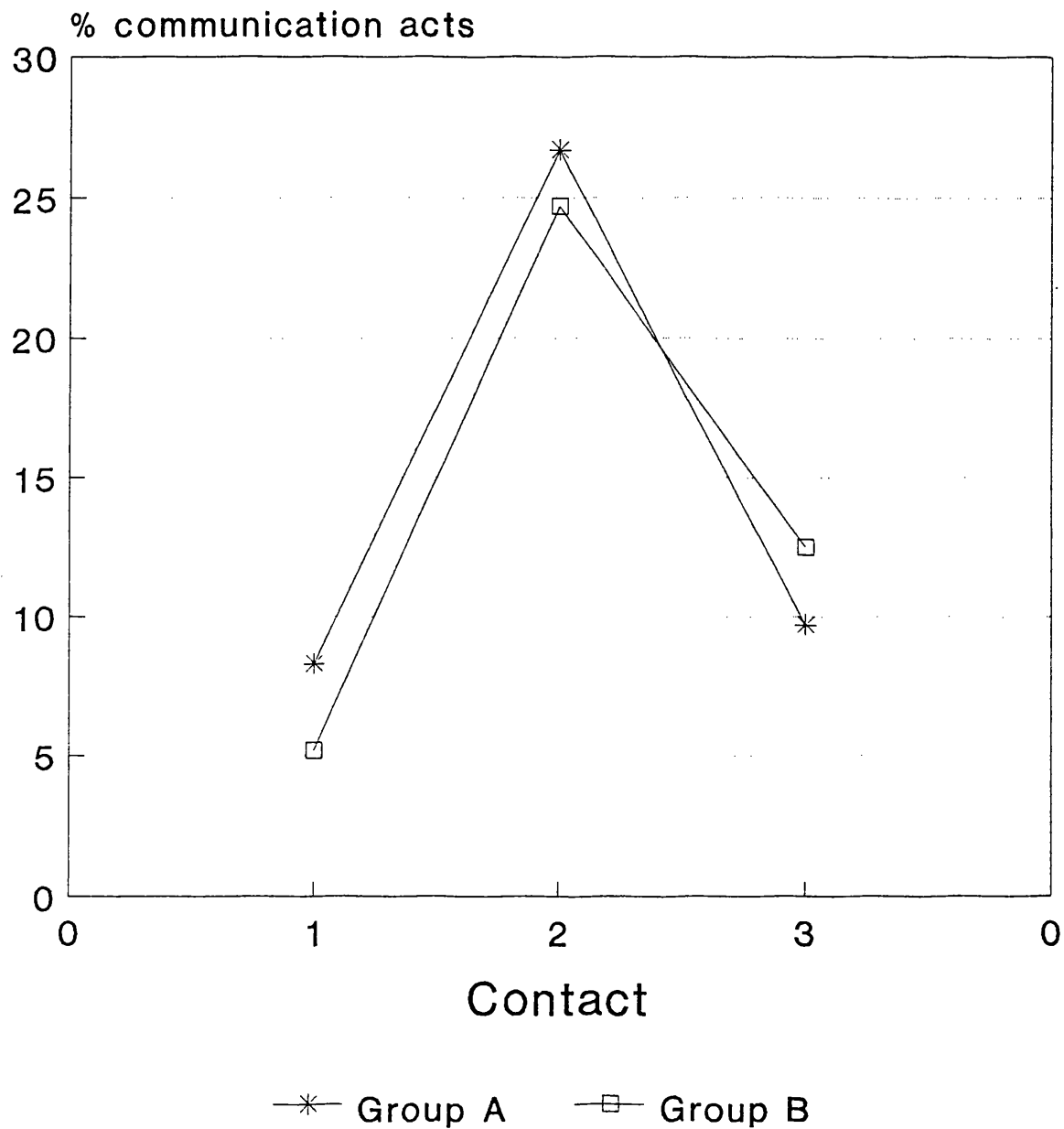
Figure 5.5

Adult Response to
Child Initiation

%communication acts
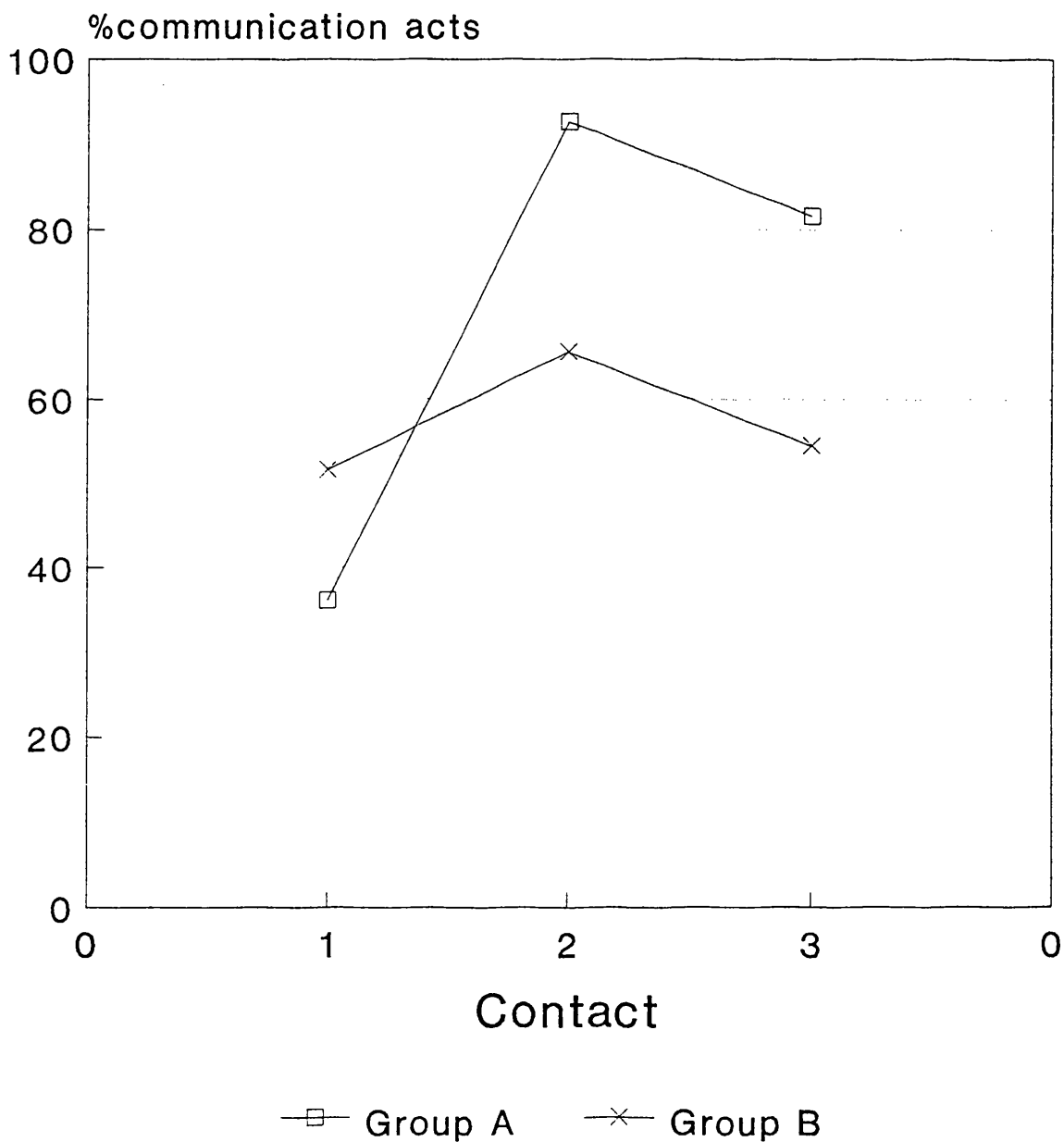
Figure 5.6

CHAPTER 6

DISCUSSION

6.1 Limitations of the Study

6.1.1 Methodological Issues

At the time of these two studies, The Wolfson Centre Communication Aids Centre accepted referrals from a very wide area in the south of England eg children in the studies came from as far afield as Suffolk, Bedford and Southampton. This resulted in follow up being a very expensive and time consuming process. It would have been more satisfactory for the follow up study to have involved a larger sample and particularly in view of the subsequent delays in provision of aids to have continued for longer with at least one other data collection, perhaps at two years post assessment. However, difficulties in funding the project and service delivery pressures rendered it impossible to expand and lengthen the study at that time. Although more data would have been desirable, the study has produced some interesting and useful results.

Study 2 used a matched pairs design with subjects being matched on the variables of access (direct or indirect) and language comprehension as measured by standardised assessments. The matching of these subjects was carried out by Allen (1988) as she was the major researcher for the first stage of the workshop study. When the current manuscript was being prepared it was difficult to find details of the matching procedures for the subjects.

In view of the difficulties experienced in matching subjects for Study 2 it would be reasonable to consider using a single case study design for future work in this area. Single case study design relies on repeated observations of performance over time - before the intervention is applied and afterwards. This study attempted to monitor the effects of intervention that was tailored to individual children's needs and a research design that allowed observable and identifiable changes to be monitored and measured would be very appropriate.

A Multiple Baseline design would be preferable to an ABA design as the latter requires the introduction, withdrawal and reintroduction of intervention. The intervention used in Study 2 was training and this would be difficult to withdraw or reverse, while the Multiple Baseline design would lend itself well to the training intervention. Each child would serve as her own control and repeated measurements could be taken during the baseline phase to ascertain the child's communication skill before training was started. During the intervention phase repeated measurements would continue. Examination of all the measures would enable some conclusions to be drawn as to the effectiveness of the intervention.

Satisfactory matching on access is evident, but matching for language comprehension is open to question. When the subjects' chronological age and test results are examined as a quotient, it is possible to accept the matching of all subjects but pairs four and five. In each case, the child in Group A had severe learning difficulties, which would tend to suggest slower progress, and may have obscured group short-term learning effects.

Nonparametric statistics were chosen for the analysis of these data because they are suitable for studies with small numbers of subjects and are sensitive to both the direction and the size of the change. For both studies there were ten small calculations for each contact and twenty for each comparison between contacts. Study 1 also attracted fifteen for the structured interview. As there is a 1:20 chance probability of significance, caution needs to be used in interpreting isolated significant results.

6.1.2 Adequacy of Assessment Procedures

The descriptive profile of communication that was developed for these studies proved to be effective in accurately describing the dyad's communication performance and in being sensitive to changes. However, like the other methods available (eg Light, Collier & Parnes 1985a, 1985b, 1985c) it proved to be a time-consuming and cumbersome procedure that would need considerable adaptation for regular clinical use. Current work at The Wolfson Centre

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(Price et al 1992) is piloting a scripted interaction elicitation which relies on videorecording at the moment, but should eventually be available for "real time use".

In addition to this, the profile relied on analysing videotaped recordings, and although care was taken to make the session as natural and comfortable as possible it was still artificial. Parents and teachers were asked about the presence of the camera and most reported that although they were nervous and aware of the camera when the filming began, they soon forgot it was there and felt they behaved naturally.

It is not possible to be with the child all the time, and it is very difficult to capture a cameo of everyday natural communication in such short samples. Therefore, it was originally planned to request that parents and teachers keep a diary of the child's communication and the mode used for five days, to supplement the observed video data. However, this proved very unpopular and less than 50% of the first batch of diary requests were returned even after reminders. It was therefore decided to abandon the suggestion. It is well known that children perform differently with different people in different situations (Tizard & Hughes, 1984; Wells, 1985); in the current study sampling the child's communication with different familiar partners and in different environments by report and observation did broaden the picture considerably. It

specifically offered information on availability and use of different communication modes in particular situations with variable people.

The total rated filmed interaction time for each child is only twenty minutes and although this took place in three different environments it may be that this small sample does not offer an accurate indication of the child's competence; eg the topic of conversation or the child's communication partner or the particular context might not allow the child the opportunity to demonstrate some of the communication skills he possesses. The interview with parents and teachers was an attempt to obtain a measure of the child's competence to supplement the observed data collection. In the event both parents and teachers found it difficult to answer. They needed an example of most functions and even then often expressed some uncertainty about their replies.

In summary, the assessment procedures show reasonable reliability and validity, and some patterns in the results are as hypothesised, and can be discussed further. The inclusion of a short filmed interaction time in the assessment procedure is acceptable to clients and professionals and the rating of small samples of videotaped interaction takes an acceptable length of time. The approach is now being refined by The Wolfson Centre team. However, it should be remembered that generalisations from

any sample of severely disabled children is problematic, and therefore replication at other centres would be helpful.

6.1.3 Provision of Recommended Aids

One of the main aims of Study 1 was to look systematically at changes in communication patterns after the introduction of a communication aid. This was not possible as the majority of families were still fundraising one year later. Hypothesis 1 could therefore, not be tested as the recommended aid had not been purchased. In view of this, the study would need to run for longer than one year to evaluate intervention with an aid. Funds for recommended expensive aids for these children took from 11 months to 28 months to raise, (Jolleff et al 1992) and with the two exceptions, was achieved without help from the child's local District Health Authority.

There is not 'the right' to a communication aid as there is to a wheelchair or a hearing aid (Hamilton, 1981). A leaflet (HMSO, 1980) entitled "Aids for the Disabled" clearly states that aids may be prescribed by a consultant as part of a patient's treatment. It does not however stipulate that Health Authorities are obliged to fund the recommendation. The DHSS only allocated a small amount of money to each Health Authority for this purpose and more expensive items were frequently difficult or impossible to fund. Rowley et al (1988) carried out a national DHSS

funded study and reported that difficulties in obtaining funding and delays in provision were common, partly due to inconsistency in policies across the country. This was true of the study subjects, as even the two subjects who received aids funded by their District Health Authority experienced some difficulties in accessing the system to release the funds. Rowley et al suggest a national policy on provision with regional specialists who control a loan bank of aids. The five subjects in the study who raised their own funds could all have benefitted from such a loan system.

6.2. Results - Study 1

6.2.1 Observed Communication Patterns

Data demonstrated that children's communication patterns tended to remain the same over time and to reflect child passivity, control by the speaking partner and a very restricted range of communicative functions. These results support those obtained by researchers such as Harris, 1982; Kraat, 1985; Light, Collier & Parnes, 1985abc; Udwin & Yule, 1990, 1991a.

Two significant changes were recorded at Contact 2: a reduction in the use of Function 7a with parents and an increase in Child Initiations with teachers. As the recommended aids were generally not in evidence, the change could not be attributed to aid provision, but it could be argued that over one year it would be expected that some

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maturational changes would occur and both the changes observed were in the expected direction. In addition to this, when discussing the child's communication with parents and teachers, two of the issues that are frequently addressed, by the intervention team are how the child rarely initiates and how the child is frequently required to reply to simple questions with a known answer. These issues are often raised naturally during the assessment and the team illustrates the points by drawing attention to particular interactions as they occur. While this is not intended to be 'formal training' it does seem to raise caregivers' awareness of the communication process for a short time.

A number of the children preferred to rely on speaking even when they were completely unintelligible to all but very familiar partners, and this was actively supported in most cases by parents and teachers. One - Subject 5 - of the two children who had received a DHA funded communication aid, was refusing to use it both at home and at school, preferring to rely on unintelligible speech while the other one - Subject 4 - was using it with limited success as the quality of his interaction had substantially decreased.

<u>6.2.1.1 Subject 4 and His Communication Aid - Problems and</u>
<u>Benefits</u>

The summary of group results may obscure more than it reveals, however if we take this child as an example, we can examine more closely some of the difficulties which must be overcome before the benefits of a communication aid can be enjoyed.

<u>Figure 6.1 Subject 4 at Assessment</u>

Figure 6.1 shows Subject 4 at assessment. He is communicating with his mother using a Bliss Symbol Chart.

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It can be seen that he is poorly positioned in his chair and is looking at the chart, not at his mother. Communication was slow (23 acts per minute) and limited to the symbols available. The adult took a major role in directing the conversation and interpreted much of Subject 4's communication before he had finished it.

The multidisciplinary assessment recommended different seating and the use of head switches and the results of this can be seen in Figure 6.2.

Figure 6.2 Subject 4 at Contact 2 in His New Chair

It is interesting to note that this change in position immediately 'normalises' the child and improves communicative interaction as the child and mother are on the same level and are able to utilise eye contact and facial expression as modes of communication. The improved position also releases the subject's attention from physical problems like maintaining his posture and allows him to concentrate on learning and interacting.

Figure 6.3   The Light-Talker
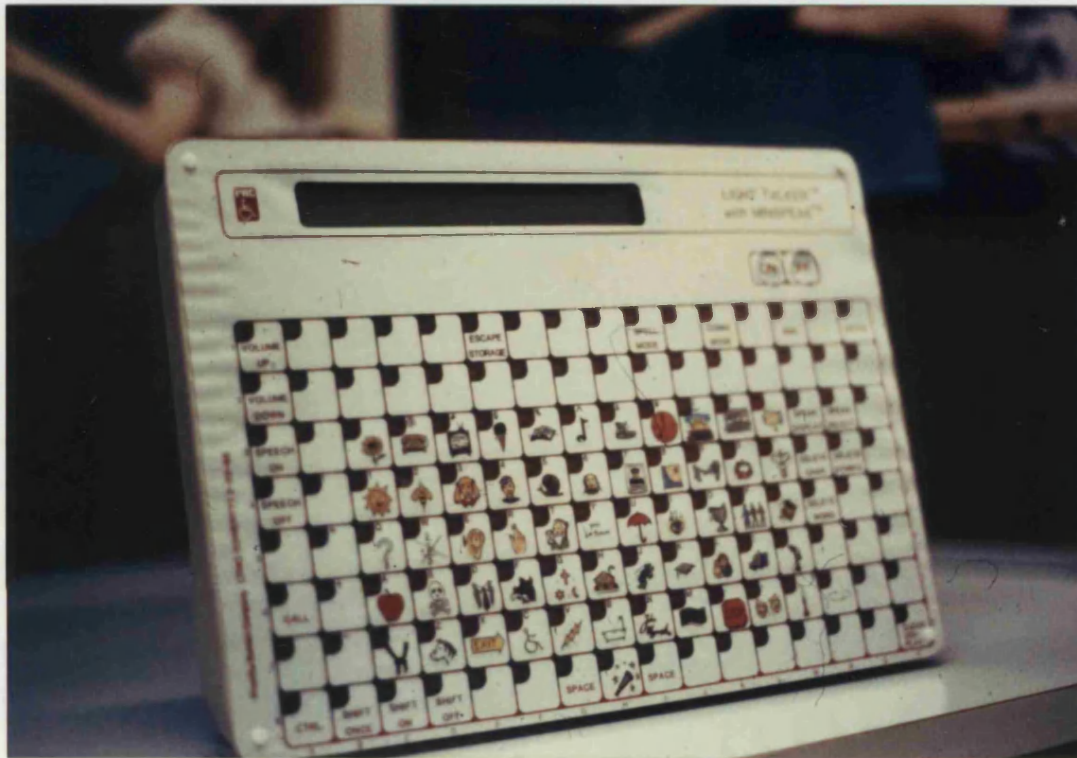
The child was recommended a Light-talker (see Figure 6.3) accessed by scanning which has an inverse relationship between speed and accuracy.   The Light-talker functions primarily with preprogrammed phrases which is likely to

inhibit the range and sophistication of communicative functions used. In addition the child made no initiations at Contact 2. In the recorded and rated interaction sample the speed of his communication with his mother had dropped from 23 acts per minute at Contact 1 using a Bliss board to just 9 acts per minute at Contact 2 with the new electronic aid.

Figure 6.4   Subject 4 Communicating using His Aid

Not only is the aid slow but as can be seen in Figure 6.4 it requires great concentration for the subject to use it.

This figure also demonstrates how the aid is a barrier to communication (Kraat, 1985a) and interferes with interaction as both communicators are concentrating on the aid and not on each other. However, Figure 6.5 demonstrates the delight experienced by the subject when he succeeds.

Figure 6.5 Subject 4 - Communicating Successfully

Although the child's mother had been on the standard two day training course run by the company supplying the Light-talker, both she and the child demonstrated a lack of skill

in using and programming the aid and this was undoubtedly an important factor in reducing the quality of communication interaction. The skills needed to communicate using an electronic device need to be learned by both the user and his partner and are not necessarily transferable from a board system (Kraat 1985b). Also likely to have been significant was the lack of professional support available, particularly in programming the aid with useful language for the child's environment. In particular the school used and encouraged a different communication system although they had been active in obtaining the child's referral to the CAC.

6.2.1.2 Parents and Teachers

The study showed no significant differences between teachers and parents when communicating with the same child demonstrating that Hypothesis 2 was not supported. Parents were at least as effective in eliciting communication from the child as the teacher was.

6.2.2 Reported Communication Patterns - Study 1

The structured interview produced some interesting results which supported some of the longterm observations of the CAC team. Agreement between parents and teachers was generally poor although they did demonstrate a 100% agreement for the use of Function 6 - Confirmations and Denials - as easy. There was also a high percentage agreement on communicative functions that were easy for the

child to use and that he communicated mainly at home with his family. At assessments when parents and teachers meet it is frequently difficult to recognise that they are discussing the same child as their views about the child's abilities are so diverse.

There were two significant differences within the results and both these were in the expected direction. The first of these concerned the use of Communicative Function and showed that teachers consider more children never used a number of the functions. When this result is examined in conjunction with one of the Mode results (ie a higher level of use of verbal mode reported by parents) it suggests support for the CAC team's observations that teachers are generally more objective and realistic about the child's performance. Parents are frequently heard to say phrases like "he talks", "we understand everything he says", "he can tell me everything". Parents in this study and in other work (Larson & Woodfin 1986) often prefer to talk and not use an aid even when it is available. This is almost certainly linked to a lack of knowledge, training and support. However, it may also reflect a fundamental inability to come to terms with the disability of their child and its longterm effects on communication. This inhibits their view on the need for an additional mode of communication to foster not only the development of active communication but also general cognitive and social growth. This in turn could well be facilitated by more

professional support.

The second significant result from the structured interview
was that teachers report a greater use of aids. This
supports the CAC team's observations that aids are
generally more in evidence in the school than in the home.
Other studies (Larson & Woodfin, 1986; Udwin & Yule, 1991b;
Culp et al 1986) have also noted that parents prefer not to
use aids and attach very little priority to them. Until
very recently aids have frequently been bulky, not portable
and often used and left at school. This means that unless
the child is settled in one place like a classroom where
there is an expectation of the need for communication, his
aid is often not out and ready to communicate with. Harris
(1982) suggests that the listener needs to be expecting
communication via certain modes and therefore for an aid to
be used successfully there must be an expectation from the
environment that it is going to be used.

The formal setting of the classroom should allow more time
for the aid user to access his system. This should allow
him to participate in the wide range of topics which need
complex communication, available at school. However, Udwin
& Yule (1991b) found there was very little expectation of
the aid being used. As mentioned in the literature review,
communication aids have many shortcomings like slow speed,
lack of vocabulary etc. for spontaneous communication.
This is particularly true when interacting with normal

speakers and it is perhaps this factor which is a major contribution to their nonacceptance by parents who want to communicate in a natural way in a natural setting, even though this usually restricts their child to a respondent role.

6.2.3   Intervention, The Training Workshop - Study 2

Study 2 involved a workshop style training day for parents. It was hypothesised that after the workshop parents would have become more responsive to their children's communication and that the children would be communicating in a more sophisticated way. A matched pairs design was used and when data at Contact 1 were compared for both groups it was found that there were no differences in structure, function, and adult initiation to child response, but that Group A the experimental group were faster communicators.

6.2.3.1   Short Term Effects

To test Hypothesis 3 - short term effects, data from Contact 1 and Contact 2 were compared, which demonstrated that there were differences between the groups after the training day. Results were very encouraging as although there were some parameters which showed a change for both groups like Child Initiation and Functions 3,4,7b,8, there were changes for more measures for the experimental group A.   As already discussed in relation to parents and

teachers, there is considerable discussion at assessments about communication and some change could be attributed to the general raising of awareness about communication and the professional support offered at that time. For example it is sometimes the only occasion that the child and his communication is discussed by the group of people that most usually spend time with him and theoretically should be offering a consistent approach.

However for Group A there were significant changes across some parameters for both structure and function. For Structure, Child Initiation increased and Child Response decreased. This is a very encouraging result as it is well known that increasing initiation is difficult and even after formal training is often found to produce no change (Rowland 1988). For Function, there was a significant increase in Functions 3,4,7b,8 and a significant increase in Adult Responses to Child Initiations. All these increases were directly related to the activities carried out at the training workshop.

Group A were significantly faster at Contact 1 and 2 between groups. They were also significantly faster than Group B at Contact 2; however, they have also shown a greater post workshop increase than the control group. The increase in speed is important as speed has been identified (Harris, 1982; Kraat, 1985a) as a barrier to effective communication for aid users. The faster rate could be

related to the increase in adult responsiveness to the child's signals. Therefore there is some support for Hypothesis 3 in that the parents seem to be more responsive and the children are using some more sophisticated strategies. However it would be useful for the experiment to be replicated with larger groups.

6.2.3.2 Long Term Effects

To test Hypothesis 4 a comparison of Contacts 1, 2 and 3 within groups was made. Three significant results were obtained for Group A and not for Group B: in Child Initiations, Functions 3,4,7b,8 and Child Responses. This pattern of results strongly suggests an intervention effect in Group A.

The pattern was of increases in a positive direction at Contact 2 and a return to original levels by Contact 3. These results therefore support Hypothesis 4 which stated that 12 months after the workshop training, old patterns of communication would have returned. As all these measures were seen to respond to the training input it could be argued that the lack of maintenance of the positive results of the intervention was due to the time without training, professional support and guidance. It is easy to lose direction and feel unsupported when working with very disabled children and indeed programmes like the Portage Project (Shearer & Shearer, 1972; Revill & Blunden, 1980; Cameron, 1982) attribute much of their success to regular

support and monitoring of intervention programmes. Parental confidence was documented as a factor in a parent based sign training programme (Willems, Lombardino, MacDonald & Owens, 1982). Berry (1987) suggests that specific strategies like parental/professional teams and support groups and parental training with good information resources are very important for successful aided communication.

The parents who attended the workshop commented on how helpful they had found the day, particularly mentioning knowledge, personal confidence and the support sharing and discussing problems offered. This clearly indicates a role for support groups both with and without professional support. It also suggests that the knowledge offered to parents of physically disabled children is still inadequate, although some progress from the 1966 position of Shere & Kastenbaum has clearly been made.

At 12 months, the only measure to suggest maintenance of the post workshop level was Adult Initiation to Child Response. Significant results on this parameter were achieved between and within groups at Contact 2. If we examine this result in relation to the literature on normal responsiveness and turntaking (McLean & Snyder-McLean, 1978; Schaffer, 1977; Jones, 1980; Kaye & Charney, 1980) it can be seen that this responsiveness to the child is very important for language development. Of all the measures

However it should be noted that the communication profile of Group A appeared superior to that of Group B at Contact 1 and remained so throughout the study. This can be seen particularly in Rate of Communication and in Modes used. Group A were faster communicators, used more verbal communication and had access to more aids than Group B. Although Group A had greater access to communication aids, there was not a noticeable greater use of them. Observing the groups their communication patterns seemed very similar, but it may be that extra speed and the greater use of verbal communication, although the most verbal child only had a spoken vocabulary of a small number of words, enabled a better level of communication to be achieved.

Certainly any spoken language that was used by the children was always very positively responded to by communication partners and this 'more natural' communication interaction, limited though it was, may well have provided a more encouraging environment for communication and contributed to the significant results obtained for Group A.

taken in the study, this is perhaps the most important for building interaction and conversation skills, as the sensitivity the parent is developing should encourage many other facilitatory strategies like expecting communication from the child and allowing the child to initiate.

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6.3   Summary

Hypothesis 1 - measuring change in communication after the introduction of an aid was unable to be tested because of long delay in the provision of aids.

Hypothesis 2 - that children will use more mature communication patterns and make more use of aids with their teachers than with their parents was not supported by the video analysis but received some encouragement from the results of the structured interview.

Hypothesis 3 - that children's communication will improve after a workshop training day for their parents was partly supported by the demonstration of some short term effects at Contact 2.

Hypothesis 4 - that twelve months after the workshop training the old communication patterns will have returned was supported by all the short term effects returning to baseline except in the measure of Adult Response to Child Initiations which showed a good maintenance of effect.

CHAPTER 7

IMPLICATIONS FOR FURTHER RESEARCH AND SERVICE DELIVERY

It is clear from the preceding discussion that communication aids often fall short of the high expectations placed on them. It is all too easy for them to become just one more mode for very limited and unimproved communication. There are a number of reasons for this:

- a lack of information on the availability and potential of communication aids.

- a lack of appreciation of the complexity of communicating using a communication aid.

- a lack of proper comprehensive assessment of the environment as well as the child.

- poor management of the introduction of the aid to the child which needs to include training and continued support for parents and teachers.

These studies represent a first attempt at describing non-verbal children's communication patterns in a way that allows:

- categorisation of natural communication

- identification of strengths and weaknesses

- intervention planning

- monitoring and evaluation.

The methodology and the problems the study highlighted have helped stimulate significant improvements at the Communication Aids Centre. The profile proved to be comprehensive and sensitive to change but in need of some simplification, if it was to become a useful clinical tool.

In recognition of this problem, Price et al (1992) are building on the work of this study and are using a scripted elicitation procedure loosely suggested by the work of Light, Collier & Parnes (1985b). In this procedure the child faces situations that might not naturally occur and is consequently forced into a communicative position. eg "The child is offered an opaque box with an enticing toy inside: they are unable to remove the lid themselves and must ask for help if they want to reveal the contents."

Pilot results from this approach indicate that the scripted situation does elicit more communicative functions than a naturalistic assessment. This communication competence would be an important additional measure for assessment, although it is still necessary and important to have a measure of the child's normal communication performance. Knowledge of both these measures should make targeted intervention to raise the level of performance easier to plan.

The successful refinement of a "real time" procedure that is able to demonstrate the child's competence and

performance in communication, and to document their partner's interaction and facilitation strategies, will considerably strengthen the existing well established assessment procedures (Jones et al, 1990) used at The Wolfson Centre.

Currently, the assessment procedure and The Communication Aid Centre's brief only allows limited access to assessing the environments the aid will be used in and to the education and training of carers and teachers. The CAC's capacity for ongoing professional support is also limited by their own service delivery commitments and the NHS internal market.

In 1984, the team were already facing problems of lack of information and continuity and began to address these issues by setting up a system of Link Therapists. Each health district nominated a therapist to receive information about communication aids, new initiatives etc. and to meet on a regular basis with the teams from the London Communication Aids Centres - The Wolfson Centre and Charing Cross Hospital (the equivalent centre for adults).

The system has proved popular and useful and it is planned to expand it with further training so that the Link Therapist can support children who have aids recommended. This support will include contacting and helping the child's teacher and local therapist who are training the

child in specific aided communication skills.   The Link
Therapists will continue to be updated on communication aid
initiatives; in addition they will need a good knowledge of
sources of funding and an ability to help people access
funding systems.

The results of the workshop training reported here and by
Allen   (1988)   were   encouraging.   As   a   result,   an
augmentative training package has been developed entitled
My Turn to Speak (Pennington et al, 1993).   This package
incorporates interaction training and a team approach to
solving practical problems like accessing the aid, carrying
it about, how to use it at mealtimes etc.   It is often
practical problems that result in the aid being underused
or not used at all.

The published work in the training field is mainly from the
USA and is currently very limited; however, it does seem to
offer encouraging possibilities, (Berry, 1987; Calculator,
1988).   There is still a pressing need for detailed case
studies to increase knowledge within the alternative and
augmentative communication field.   Indeed Crystal (1986)
states "I do not see how the field can progress without a
core of descriptive studies to which practioners can
routinely refer."

Training must also take account of different modes that are
open to the non-verbal child. Communication in normal

speakers is multimodal; and this is even more crucial for the communication aid user. There is a great tendency for adult helpers either to ignore the aid or to focus rigidly upon it. (Larson & Woodfin, 1986; Smith-Lewis & Ford, 1987).

In many ways the most successful aid user in the present study was the child who used many modes - a few words, some vocalisations, some signs, some symbols, some gestures. The responsibility, falls on communication partners, not only for encouraging this but also for facilitating it by being open to and expecting signals from different modes and then responding to them. This must all be communicated to the child's different environments including school, grandparents etc. as it is not appropriate for multimodal communication to be acceptable in one environment and not in others. For normal communicators the non-acceptance of a mode of communication could be likened to being able to write and speak at home but only be able to write at school.

When the CAC first started taking referrals in 1983 many older children came for assessment, but recently the majority of children have been much younger - between 2 and 5 years (Jolleff et al, 1992). Viewed in the framework of normally developing communication (eg Bruner, 1975a, 1975b; Wells, 1981) it would seem very important that assessment, the introduction of communication systems, training and

Although children are being referred to the CAC at an earlier age there still seems to be little recognition of the importance of early intervention in the field of communication. The Primary Health Care Team are often more concerned with physical progress, making referrals to the physiotherapist, but not to the speech and language therapist. This is possibly because the importance of building good interaction skills for communication is not well recognised even in the normally developing child.

There is also often still a preoccupation with physical skills in the physically disabled child. This to parents and many professionals is the most obvious area of skill that is not developing as expected. To many people communication is seen as developing after motor skills like sitting and crawling. While this is incorrect, the child that does not indulge in communicative intent does not appear as abnormal as the child who cannot hold her head up or sit up at the expected age.

There needs to be early intervention with 'at risk' children at Primary Health Care Team level either from a speech and language Therapist attached to the Team or from a member of the Team who has been trained by a Speech and Language Therapist. This should occur during the first six months of life or as soon as developmental problems are recognised. The early understanding of the communication process and the importance of the facilitator for enabling communication is crucial to laying the foundations for good interaction patterns and communication.

support are considered as soon as possible. Clearly the
children who use communication aids are a different group
and using such a model may not be appropriate. Gerber &
Kraat (1992) suggest that the "ultimate goal is to use
information from both the normative model and existing
descriptions of subgroups of AAC users to determine
clinical directions." Once assessed the children's
communication can be monitored and systems upgraded and
changed in response to individual learning styles and
maturation (Iacono, 1992). Therefore there is a need for
very early referral and regular review from the team.

Early referral and regular review is also important for co-
ordinating systems the child may have and relies on the co-
ordination of the team. For example, access is often a
problem for the severely disabled child and using one
access system for a number of aids and appliances is often
a very efficient method. For the access to work well and
therefore the system to work well it needs to be
individually tailored to the child (Clayton, 1991; Clayton,
1992) and this requires multidisciplinary teamwork.

In conclusion, current work refining the communication
profile for use as a clinical tool and the evaluation of
the training package - My Turn to Speak should be
continued.

The Communication Aids Centre which already acts as a

resource centre should expand this role and in addition offer much more professional support and play some role in the education of the public. In response to the DHSS report (Rowley et al 1988) the small loan library at The Wolfson Centre should be properly funded and greatly expanded to enable children to experiment with communication aids before buying and while waiting for the provision of the recommended aid.

In addition, and perhaps most importantly, there is a need for longitudinal outcome data about intervention to enable ongoing audit of effectiveness of policies on the recommendation and provision of communication aids to be evaluated.

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Videotaped Observation of Communication of Severely Physically Handicapped
Children.

SUMMARY OF CODING PROCEDURE

Transcript

Two-column page, separating adult and child acts, leaving space to indicate
the timing of the interaction, either taking turns, or simultaneously. When
(sign/symbol indication/vocalisation) of child is unclear but appears to be a
word, then write what that is in brackets, eg. vocalisation (?"aeroplane").

Initiation versus Response

Within a partner's turn, note:

- Initiation   I

- Response   R

- Other   O   (eg. parent talks to observer, or to self)

The coding is based on separate 'communication acts' i.e. a verbal and/or non-
verbal message conveying one general idea from one person to another.
Initiation is the introduction of a new idea or request. Response has a
direct connection with the content of the partner's previous turn.

NOTES (1) In the case of a child particularly, an initiation or response can
be purely physical (eg. turns page of book).

(2) The child's communication is coded as initiation when s/he takes
over control of the dialogue. Where the adult gives an open question and the
child responds, that is not a child initiation even though a new topic is
introduced (eg. What shall we talk about now? - child points to symbol of

school). Requesting clarification of the partner's previous communication is also a response.

(3) The coding of child intentions depends greatly on the nature of the adult's reactions. This seems unavoidable.

Units

Within each initiation or response, count the number of units; that is, the number of separate sentence ideas (with verb explicit or implicit). Where two sentences could stand alone semantically in the discourse, but are joined by a conjunction (eg. and, but, because), count two units.

Functions (child only)

1) social conventions

2) request for object or action

3) request for information

4) request for clarification

5) request for joint attention

6) confirmations and denials

7) provision of information:

   (a) answering question which has one or few possible answers;

   (b) giving new idea;

   (c) past

8) provision of clarification, repair

9) expression of self:

   (a) protest, humour

   (b) description of feeling

10) elicited imitation

11) taking turns in a game

12) unintelligible

13) rejection of interaction

NOTE   Function is not coded when the mode of response is purely physical

(see below).

Communication Modes (child only)

Verbal

Vocal

Eye point

Point with fist, finger, etc.

Gesture: nod, shake, wave, lift arms (for 'pick me up'), confirming smile

etc.

Sign from signing system

Symbol from system

Other aid

Physical – includes looking (eg. looks up at mother in response to

request), except when it is eye-pointing;

– if the child is pointing vaguely around when using a symbol

system, then code as physical.

NOTES (1) Function may have more than one mode (eg. vocal/gestural to indicate

"yes").

(2) Do not record additional physical actions where a communicative

function and mode is coded. (eg. "I did", a verbal response plus looks

up – record only 'verbal' mode).

Example A

Parent		Child	
What colour do you			
fancy for your swimsuit?			
What's the colour of the			
one you've got now?			
Say it.	1		
		Uhoh (yellow)	2
Yellow, isn't it a nice			
bright yellow.	3		
And what's the school colour?	4		
		Blue	5

Rating Summary.

No	Adult Child	Initiation Response	Units	Child Function	Modes
1	A	I	3		
2	C	R	1	7a	verbal
3	A	R	1		
4	A	I	1		
5	C	R	1	7a	verbal

Example B

Parent		Child	
Look, they've got velcro on.	1		
(looking at frog puppet's legs)		yeh.	2
		vocalisation (? "Kermit"	
		but very unclear)	3
Don't know why, perhaps			
it fits on something. It's			
got velcro on here. It's			
all the same sort.	4	child points to symbol on board	5
Hang on. Let me take			
it out of the way.	6		
		child points to symbol again	7
Eh?	8		
		child points again, same symbol	9

Rating Summary

No.	Adult Child	Initiation Response	Units	Child Function	Modes
1	A	I	2		
2	C	R	1	6	verbal
3		I	1	12	vocal
4	A	O	4		
5	C	I	1	7b	symbol
6	A	R	2		
7	C	I	1	7b	symbol
8	A	R	1		
9	C	R	1	7b	symbol

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Interview about Functional Communication in Everyday Life

Instructions

Ask the questions using the suggested prompts and any others that arise as being appropriate for the specific child.   (After each, ask supplementary questions about preferred mode and people indicated below.)   The response sheet lists the question numbers with three columns against each:

Column 1 - Use of each function

The three categories are: E   easy/usual

D   difficult/rare

N   never

Column 2 - Mode

Ask in what way the child usually expresses that function.

The categories are: V   verbal

G   gestural, eyepoint, non-verbal

A   aid, sign

Column 3 - People

Finally, for each question ask "Does he do this with anyone other than you?"

The categories are: H   home

F   familiars, including school

S   strangers

1.   How does the child react when a visitor:-

a)   comes in?

b)   goes away?

2.   How does the child ask for:-

a)   objects? e.g. toys/food

b)   things to be done? e.g. television on/go outside

3.   How does child ask for information about something?

e.g. a visitor, going out

4.   If the child has not understood something you have just said or

done, how does he ask you to explain or make it clear?

5.   How does he get your attention?

e.g. If he wants you to look at something with him, such as a

book, or to listen to him.

6.   How does the child indicate 'Yes' and 'No' to questions you ask?

7.   How does the child provide you with information:-

a)   when the answers are known?

e.g. "How did you get to school today?"

"What's your brother's name?"

b)   When the child offers new ideas or when there is a wide

variety of possible answers, how does he tell you?

e.g. "Which flowers in the garden do you like best?"

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c)   Does he ever talk to you about things you don't know about?

e.g.   Past, future.

8.   If you don't understand what he's communicating, does he try to help you by expressing it another way?

9.   How does the child show his feelings?
e.g.   What makes him sad, angry, amused.   How does he protest?

10.   If he says something that is difficult to understand will he repeat it or sign it or use a symbol when you ask him to, or you do it?

11.   Does the child play games with you that involve taking turns?
e.g.   dominoes

picture lotto

snap

cards

12.   Does he say things that are not understood even by familiar people?

	Use of function E, D, N (one only)	Preferred mode V, G, A (one only)	People H, F, S (include any)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

.

STUDY 1

Contact 1 - Structure: Adult and Child Initiations and

Responses   seen   as   a   Percentage   of   Total   Number   of

Communication Acts

S	Adult Initiations		Adult Responses		Child Initiations		Child Responses	
	PC	TC	PC	TC	PC	TC	PC	TC
1	29.5	27.3	27.3	28.4	3.4	1	39.8	43.3
2	28.2	39.6	28.2	18.7	0	0	43.6	41.7
3	18.2	27.8	34.3	28.9	0	1	47.5	42.3
4	26.5	34.2	28.9	26.6	1.2	1.2	43.4	38
5	31.3	32.8	25.4	26.2	0	0	43.3	41
6	26.6	29.8	29.8	31.6	0	0	43.6	38.6
7	27.1	20	25.7	36.7	2.9	5	44.3	38.3
8	32.2	20.8	23	29.7	3.4	9.9	41.4	39.6
9	25.	27.8	28.4	27.8	4.5	0	41.7	44.4
MEAN	27.2	28.9	27.9	28.3	1.7	2	43.2	40.8

S - Subjects

TC - Teacher/Child

PC - Parent/Child

STUDY 1

Contact 1 - Observed Use of Function in Adult/Child Dyads

S	FUNCTION 6		FUNCTION 7a		FUNCTION 3,4,7b,8		OTHER	
	PC	TC	PC	TC	PC	TC	PC	TC
1	33.3	54.1	50	35.1	5.6	8.1	11.1	2.7
2	65.7	80	28.6	0	0	0	5.7	20
3	73.9	62.5	15.2	32.5	0	0	10.9	5
4	23.3	58.1	20	32.3	3.3	3.2	53.4	6.4
5	44.8	29.2	51.7	29.2	3.4	12.5	0	29.1
6	18.8	31.8	43.8	59.1	3.1	4.5	34.3	4.6
7	44.4	14.3	33.3	46.4	16.7	10.7	5.6	28.6
8	64.3	47.6	16.7	22.2	7.1	20.6	11.9	9.6
9	46.9	45	46.9	40	6.2	0	0	5
MEAN	46.2	47	34	33	5	6.6	14.8	12.3

S - Subjects

TC - Teacher/Child

PC - Parent/Child

STUDY 1

Contact 2 - Structure: Adult and Child Initiations and Responses seen as a Percentage of Total Number of Communication Acts

S	ADULT INITIATIONS		ADULT RESPONSES		CHILD INITIATIONS		CHILD RESPONSES	
	PC	TC	PC	TC	PC	TC	PC	TC
1	32.5	33.3	23.4	24.2	1.3	1.5	42.8	41
2	38.8	31.5	12.2	25.9	2.1	11.1	46.9	31.5
3	27.7	30.5	25.5	27.8	1.1	5.6	45.7	36.1
4	34.1	34.2	20.4	18.4	0	0	45.5	47.4
5	34.8	33.3	24.6	22.7	0	0	40.6	44
6	17.4	33.3	36.1	22.8	18.6	3.5	27.9	40.4
7	32.3	30	25.8	26.7	0	1.7	41.9	41.6
8	34	25	18.6	29.3	0	13	47.4	32.7
9	20.8	21.6	33.3	36.9	2.1	10.8	43.8	30.7
MEAN	30.3	30.3	24.4	26.1	2.8	5.2	42.5	38.4

S - Subjects

TC - Teacher/Child

PC - Parent/Child

STUDY 1

Contact 2 - Observed Use of Function in Adult/Child Dyads

S	FUNCTION 6		FUNCTION 7a		FUNCTION 3,4,7b,8		OTHER	
	PC	TC	PC	TC	PC	TC	PC	TC
1	58.8	70.6	29.4	17.6	5.9	5.9	5.9	5.9
2	60	38.1	25	14.3	5	4.8	10	42.8
3	91.4	80	2.9	13.3	0	0	5.7	6.7
4	30	29.4	30	41.2	0	0	40	29.4
5	42.3	51.4	38.5	28.6	0	5.7	19.2	14.3
6	20.5	48	31.8	28	40.9	12	6.8	12
7	34.6	37.5	26.9	12.5	7.7	20.8	30.8	29.2
8	75	49.1	5	26.4	5	22.6	15	1.9
9	52.4	41.4	28.6	41.4	0	13.8	19	3.4
MEAN	51.7	49.5	24.2	24.8	7.2	9.5	16.9	16.2

S - Subjects

TC - Teacher/Child

PC - Parent/Child

STUDY 1

Structured Interview - Use of Function

	COMMUNICATIVE FUNCTIONS													
S	1	2	3	4	5	6	7a	7b	7c	8	9	10	11	12
1P	E	E	N	D	E	E	E	E	D	E	D	D	E	D
1T	E	E	E	E	E	E	E	D	D	D	D	D	D	D
2P	E	E	D	E	E	E	E	D	D	D	E	D	E	E
2T	E	E	N	D	E	E	E	D	D	D	D	D	E	D
3P	E	E	E	E	E	E	E	E	D	E	E	D	E	E
3T	D	E	D	D	E	E	E	D	N	D	D	D	E	D
4P	E	E	E	D	E	E	D	D	D	D	D	D	D	E
4T	E	E	E	D	E	E	E	E	N	D	D	D	E	E
5P	E	E	E	E	E	E	E	E	E	D	D	D	D	D
5T	E	E	E	E	E	E	E	E	E	E	D	D	D	D
6P	D	E	E	E	E	E	E	D	E	E	E	E	D	E
6T	N	D	N	N	E	E	E	E	D	E	D	E	E	D
7P	D	E	E	D	E	E	E	E	D	D	E	D	E	D
7T	D	E	E	E	E	E	E	E	E	E	D	D	E	E
8P	E	E	E	E	E	E	E	E	E	D	D	E	E	D
8T	E	E	E	E	E	E	E	E	E	E	E	E	E	N
9P	E	E	E	D	E	E	E	D	E	D	D	D	E	D
9T	E	E	E	E	E	E	E	E	E	E	E	E	E	D

P   Parents
T   Teachers
S   Subjects
E   Easy
D   Difficult
N   Never

STUDY 1

Structured Interview - Mode

S	1	2	3	4	5	6	7a	7b	7c	8	9	10	11	12
	COMMUNICATIVE FUNCTIONS													
1P	G	A	-	G	V	V	A	A	A	G	G	G	A	A
1T	G	A	G	G	G	V	A	A	A	A	G	A	A	A
2P	G	V	V	V	V	V	V	G	G	V	V	V	V	V
2T	G	V	-	G	G	V	V	G	G	G	V	G	G	V
3P	G	G	G	G	G	G	G	G	G	G	G	A	G	G
3T	G	G	G	G	G	G	G	A	-	A	G	A	A	A
4P	G	G	G	G	V	V	G	G	G	G	G	G	G	G
4T	G	G	G	G	A	G	G	G	—	G	G	A	A	G
5P	V	V	V	V	V	V	V	V	V	V	G	V	V	V
5T	G	V	V	V	V	V	V	V	V	V	G	V	V	V
6P	V	G	V	V	V	V	V	V	V	V	G	V	V	V
6T	-	G	-	-	G	G	G	V	V	V	V	V	V	V
7P	V	V	V	G	V	V	V	V	A	A	G	V	V	V
7T	V	V	V	V	A	V	V	V	V	V	G	V	V	V
8P	G	G	G	G	G	G	G	G	G	G	G	A	G	G
8T	G	G	A	A	G	G	G	G	G	G	G	A	A	-
9P	A	A	A	A	G	G	A	A	A	A	G	A	A	A
9T	A	A	A	A	G	G	A	A	A	A	G	A	A	A

P   Parents
T   Teachers
S   Subjects
V   Verbal
G   Gesture
A   Aid

STUDY 1

Structured Interview - People

	COMMUNICATIVE FUNCTIONS													
S	1	2F	3	4	5	6	7a	7b	7c	8	9	10	11	12
1P	F	F	-	F	F	S	F	F	F	F	F	F	F	F
1T	S	S	S	F	F	S	F	F	F	F	F	F	F	F
2P	S	F	F	F	F	S	F	F	F	F	F	F	F	F
2T	S	F	-	F	F	S	F	F	F	F	F	F	F	F
3P	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3T	F	F	F	F	F	S	F	F	⸺	F	F	F	F	F
4P	F	S	F	F	F	F	F	F	F	F	F	F	F	F
4T	S	S	S	S	S	S	S	S	-	S	S	S	S	S
5P	F	F	F	F	F	S	F	F	F	F	F	F	F	F
5T	S	F	F	F	F	F	F	F	F	F	F	F	F	F
6P	H	F	H	H	H	H	H	H	H	H	H	H	H	H
6T	-	F	-	-	F	S	F	F	F	F	F	F	F	F
7P	S	F	F	F	F	S	F	F	S	F	F	F	F	F
7T	F	F	F	F	F	F	F	F	S	F	F	F	F	F
8P	S	S	S	F	F	S	F	F	F	F	F	F	F	F
8T	S	S	S	S	S	S	S	S	S	S	S	S	S	-
9P	S	F	S	F	F	F	F	F	F	F	F	F	F	F
9T	F	F	F	F	F	S	F	F	F	F	F	F	F	F

P   Parents
T   Teachers
S   Subjects
H   Home
F   Familiars
S   Strangers

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STUDY 2

Contact 1 - Structure: Adult and Child Initiations and
Responses seen as a Percentage of Total Number of
Communication Acts

S	GROUP A				GROUP B			
	AI	AR	CI	CR	AI	AR	CI	CR
1	27.6	29.6	7.1	35.7	26	34.2	2.7	37
2	19.6	37.5	5.4	37.5	35.7	20	4.3	40
3	31.3	25.4	0	43.3	26.5	28.9	1.2	43.4
4	28.2	28.2	0	43.5	27.1	25.7	2.9	44.3
5	27.5	29.4	0.9	42.2	28.2	28.2	0	43.5
6	29.5	27.3	3.4	39.8	41.3	17.5	6.3	35
7	18.2	34.3	0	47.5	35	12.5	18.8	33.8
M	26	30.2	2.4	41.4	31.4	23.8	5.2	39.6

S - Subjects

AI - Adult Initiation

AR - Adult Response

CI - Child Initiation

CR - Child Response

 M - Mean

STUDY 2

Contact 2 - Structure: Adult and Child Initiations and
Responses seen as a Percentage of Total Number of
Communication Acts

S	GROUP A				GROUP B			
	AI	AR	CI	CR	AI	AR	CI	CR
1	20.2	34.6	11.5	33.7	22.2	27.8	3.3	46.7
2	29	24.8	12.8	33.3	23.3	27.9	25.6	23.3
3	32.1	29.5	2.6	35.9	28.6	25.3	7.7	38.5
4	25.6	33.3	6.4	34.6	25.5	29.1	7.7	38.2
5	25.2	29.4	5.9	39.5	40.2	16.7	3.9	39.2
6	24.2	28.4	9.5	37.9	30.3	26.3	11.8	31.6
7	36.6	18.8	8	36.6	15	27.9	16.3	40.7
M	27.6	28.4	8.1	35.9	26.4	25.8	10.9	36.9

S - Subjects

AI - Adult Initiation

AR - Adult Response

CI - Child Initiation

CR - Child Response

M - Mean

STUDY 2

Contact 3 - Structure: Adult and Child Initiations and Responses seen as a Percentage of Total Number of Communication Acts

S	GROUP A				GROUP B			
	AI	AR	CI	CR	AI	AR	CI	CR
1	32.5	20	5	42.5	18.5	37	4.3	40.2
2	17.6	33.8	10.3	38.2	39	22	1.7	37.3
3	34.8	24.6	0	40.6	34.1	20.5	0	45.5
4	26.5	31.3	2.4	36.8	32.3	25.8	0	41.9
5	24.8	28.7	6.9	39.6	38.8	12.2	2	46.9
6	32.5	23.4	1.3	42.9	30.1	26	12.3	31.5
7	27.7	25.5	1.1	45.7	41.5	7.7	12.3	38.3
M	28	26.8	3.9	41.3	33.5	21.6	4.7	40.2

S - Subjects

AI - Adult Initiation

AR - Adult Response

CI - Child Initiation

CR - Child Response

M - Mean

STUDY 2

Contact 1 - Observed Use of Function in Adult/Child Dyads

S	GROUP A				GROUP B			
	6	7a	3,4, 7b,8	OTHER	6	7a	3,4, 7b,8	OTHER
1	42.4	18.2	12.1	27.3	38.1	33.1	0	28.6
2	61.5	0	0	38.5	23.5	70.6	0	5.9
3	44.8	51.7	3.5	0	23.3	20	3.3	53.4
4	42.9	45.7	11.4	0	48.5	36.4	9.1	6
5	17.8	37.8	22.2	22.2	65.7	28.6	0	5.7
6	34.3	45.7	8.6	11.4	62.5	6.25	6.25	25
7	73.9	15.2	0	10.9	52.5	10	17.5	20
M	45.4	30.6	8.2	15.8	44.9	29.3	5.2	20.6

S - Subjects

6 - Function 6

7a - Function 7a

3,4,7b,8 - Functions 3,4,7b,8

OTHER - All other functions

M - Mean

STUDY 2

Contact 2 - Observed Use of Function in Adult/Child Dyads

S	GROUP A				GROUP B			
	6	7a	3,4, 7b,8	OTHER	6	7a	3,4, 7b,8	OTHER
1	16.3	27.9	39.5	16.3	56.3	9.4	12.5	21.8
2	36.1	2.8	25	36.1	28.1	15.6	9.4	46.9
3	17.2	44.8	24.1	13.9	48.6	0	22.9	28.5
4	20.7	51.7	24.1	3.5	16.7	16.7	50	16.6
5	37.3	23.5	33.3	5.9	39	29.3	0	31.7
6	54.8	6.5	35.5	3.2	40	16	24	20
7	78.4	2.7	5.4	13.5	22.9	2.1	54.2	20.8
M	37.3	22.8	26.7	13.2	36	12.7	24.7	26.6

S - Subjects

6 - Function 6

7a - Function 7a

3,4,7b,8 - Functions 3,4,7b,8

OTHER - All other functions

M - Mean

STUDY 2

Contact 3 - Observed Use of Function in Adult/Child Dyads

S	GROUP A				GROUP B			
	6	7a	3,4, 7b,8	OTHER	6	7a	3,4, 7b,8	OTHER
1	38.9	5.6	11.1	44.4	40.5	16.2	16.2	27.1
2	27.3	6.1	0	66.6	47.1	29.4	23.5	0
3	42.3	38.5	0	19.2	30	30	0	40
4	31.3	56.3	6.3	6.1	34.6	26.9	7.7	30.8
5	31.1	15.6	44.4	8.9	60	25	5	10
6	62.5	25	6.3	6.2	40.7	11.1	25.9	22.3
7	91.4	2.9	0	5.7	59.4	9.4	9.4	21.8
M	46.4	21.4	9.7	22.5	44.6	21.2	12.5	21.7

S - Subjects

6 - Function 6

7a - Function 7a

3,4,7b,8 - Functions 3,4,7b,8

OTHER - All other functions

M - Mean

COMMUNICATION AIDS FOR CHILDREN: PROCEDURES AND PROBLEMS

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In 1982, the then Department of Health and Social Security (DHSS) and the Royal Association for Disability and Rehabilitation (RADAR) launched a joint initiative to establish a network of communication aids centres (CACs) within the Health Service in Britain. This was inspired by a Swedish initiative, known as the International Project on Communication Aids for the Speech Impaired (IPCAS), and by the Assistive Communication Aid Centre at Frenchay Hospital, Bristol, which had been opened for adults in 1981. The CAC network was established in February 1983. The Wolfson Centre CAC in London is the only one of six which deals solely with children. Those referred are primarily non-speaking, physically disabled, and seeking an augmentative form of communication.

Aims

The aims of the CAC, as set out in the original DHSS document, were extensive and ambitious, and included the following:

(1) to develop and and spread good practice
(2) to assess patients' needs for communication aids and, where appropriate, recommend the provision of aids
(3) to review patients' changing needs regularly
(4) to develop the use of alternative communication systems if aids are not appropriate
(5) to advise and train therapists
(6) to establish an information bank
(7) to display a range of communication aids
(8) to evaluate communication aids.

The Wolfson Centre CAC has developed a number of areas of research interest. For example small-scale studies have been carried out to evaluate the effects of the communication systems introduced, as well as the benefits of training parents and teachers in their functional use. Current projects include the development of a tongue-sensitive accessing system and an encoded emulator for an IBM computer. The CAC team has already developed several accessing systems, including a wheelchair selector box, touch-switch, light-pointer and head-pointer, which are now commercially available.

Staff

The present CAC staff consists of speech therapists (one full-time equivalent), occupational therapists (one half-time equivalent), a full-time electronics engineer and a secretary (part-time). A paediatrician and a clinical psychologist participate in assessments.

This paper briefly describes the organisation and procedures of the CAC, including the steps involved in assessment

and recommendation of appropriate aids. It also presents a review of the population served by the CAC during an 18-month period during 1989 and 1990. Finally, detailed follow-up of the outcome for nine children is reported. The aims of the paper are to describe the complexity involved in making recommendations for augmentative communication, and to suggest some of the steps required to enable children to derive maximum benefit.

Referral and assessment procedures
Referral and pre-assessment process
Referrals are received at a rate of six to eight per month. They are accepted from any source, but must be supported by medical information from a paediatrician or general practitioner involved with the child.

There is a strict procedure on acceptance of a referral. Before assessment, two forms need to be completed. The first is a source-of-funding form which requires someone to take responsibility to seek funding for any equipment recommended by the CAC; there is no commitment to have funds available before assessment. The second is a pre-assessment form, which is usually completed by a number of professionals involved. It includes administrative details, basic medical information on diagnosis, and checklists for vision, hearing and cognitive, physical and communicative skills. An important section elicits information on prerequisite skills, as follows (yes/no answer):
(1) *Visual function.* Can visually locate brightly coloured 6·5cm spinning ball at 1 metre.
(2) *Visual attention.* Can attend to a visual stimulus for five seconds.
(3) *Verbal comprehension.* One-word understanding. Can select object from choice of two on verbal command.
(4) *Cause and effect.* Demonstrates understanding of cause and effect relationship, *e.g.* consistent action for reward, such as use of switch to operate toy.
(5) *Communicative intent.* Child communicates specific messages, *e.g.* requests object.

From the pre-assessment information, it is usually possible to determine whether a child would benefit from a full assessment. There are several reasons why a referral may be considered inappropriate: a child may not have the prerequisite skills and therefore would be unable to use the simplest communication systems; a child may have needs which are beyond the remit of the CAC, *e.g.* requesting software and computer recommendations for educational use; or a child may have fundamental social interaction difficulties which would not be improved by a communication aid (*e.g.* autism).

Once the forms have been completed and a referral has been accepted, the first appointment can be made.

Assessment procedure
A typical first appointment lasts for a complete day. The child's parents or carers are the only people invited to the morning assessment session; the key professionals involved in the child's education and therapy are asked to attend for a detailed discussion in the afternoon. The involvement of parents and key professionals is essential so that the basis on which recommendations are made will be understood and a joint process of implementing recommendations and training can be initiated.

The day begins with an informal interview between the assessment team and the caregivers. It is important to establish at this stage the child's current communication methods, the caregivers' perception of the communication needs and the expected outcome of the assessment. This is followed by an integrated assessment session, involving both observational and standardised methods. The Wolfson Centre model has developed over a number of years and follows a basic pattern. Not all assessment areas are relevant to each child; however, generally the assessment includes consideration of seating and mobility, vision and oculomotor abilities, hearing, non-verbal cognitive skills, symbolic/verbal comprehension, communicative functions/ modes and determination of the most reliable methods of accessing a communication system, such as eye-pointing, light-pointer or switch with scanning device. (See Jones *et al.* (1990) for a more

detailed description of the assessment model and the links between observed skill levels and decision-making.)

Once conclusions have been reached in all the assessment areas, the team selects the most appropriate communication system and method(s) of accessing to meet the child's abilities and needs.

In the afternoon, the assessment and recommendations are discussed with the child, caregivers and professionals. Expensive equipment is not recommended for purchase without a trial period, which often involves the loan of equipment from the CAC library. The recommendations usually consist of several components, for example: seating adjustments where necessary; switch-training using toys or tape-recorder; use of computer for switch-training, early concept development and learning a symbol system; training of visual skills; design or revision of a communication chart; and loan of an electronic aid to supplement a communication chart.

In addition, interactive communication goals are discussed, such as helping the child to take the initiative in choosing activities or to learn to ask appropriate questions during conversation. Usually there is consultation over some weeks between the CAC team and local staff concerning the recommendations.

A review appointment is offered in order to re-assess the child's needs and to evaluate the effectiveness of a loaned item.

Characteristics of children attending the CAC

The 91 children seen for first appointments at the CAC over an 18-month period during 1989 and 1990 had the characteristics described in Table I. The majority had cerebral palsy; over half of these had a severe physical disability. 65 per cent of the whole group were wheelchair-dependent, over half of whom required some form of contoured seating (Mulcahy et al. 1988). 60 per cent of the whole group required switch access to technology.

The largest group of children was seen between the ages of two and five. There appeared to be an even spread of ability, 33 per cent falling within or above the

TABLE I
Characteristics of 91 consecutive children seen for CAC first appointment (% of total)

Medical diagnosis	
Cerebral palsy	81
Degenerative	6
Other	13
Physical disability	
Severe	56
Moderate	21
Mild	23
Mobility	
Wheelchair-dependent	65
Aided walking	17
Independent walking	18
Sitting	
Placeable, cannot maintain	38
Maintains sitting, needs support to function	33
Independent sitting	29
Hearing	
Profound loss	4
Partial loss	4
Normal	92
Visual acuity	
Partial deficit	23
Normal	77
Speech and language disorders (may be more than one)	
Language delay	45
Language disorder	4
Dysarthria	82
Dyspraxia	10
Intellectual status*	
Severe learning difficulties	37
Moderate learning difficulties	30
Average	31
Above average	2
Age when seen	
2- 5 yrs	43
6-11 yrs	29
12-18 yrs	20
19+ yrs	8

*Level taken from reports of assessments by local professionals; where unclear, assessment done by CAC staff.

average range of intellectual ability. 37 per cent had severe learning difficulties. Over the past seven years the referral trend has shifted to younger children, and from a majority of children with additional marked learning difficulties to children who are more cognitively able. In 1990, 13 per cent of new referrals were felt to be inappropriate from the pre-assessment information. Of those, half were lacking some prerequisite skills and were offered

TABLE II

Source and reason for referral to CAC (% of total)

Source		Reason	
Speech therapist	53	Speech synthesiser	29
Paediatrician	16	Chart	17
Occupational therapist	7	Computer	15
Parent	6	Non-specific	12
Teacher	3	Switch	10
Other	15	Back-up to speech	10
		Keyboard system	4
		Seating	3

TABLE III

Summary of recommendations from first appointment (% of total)*

	All ages	2-5 yrs	6-11 yrs	12-18 yrs
Communication chart	62	65	71	42
Switch	37	70	12	17
Software	30	35	12	33
Computer	29	35	12	33
Speech synthesiser	23	0	24	58
Pointer	14	26	0	8
Seating	11	13	12	0
Keyboard system	9	13	12	0
Other	9	17	6	0

*More than one can be recommended.

general multidisciplinary assessment and advice at the Wolfson Centre.

As expected, most children assessed had a dysarthric speech disorder, complicated by additional language delay in 45 per cent of cases. Generally there appeared to be no significant hearing loss in this population, but 23 per cent had some degree of visual difficulty.

Referrals were largely instigated by speech therapists (Table II) and consultant paediatricians. The other two significant groups were occupational therapists and parents. Only 3 per cent of referrals came directly from teachers. Reasons for referral varied, but the three main categories appeared to be for advice on charts/symbol systems, speech synthesisers and types of computer/ software. Although only one area may be singled out on the referral form, the range of a child's needs would be taken into account during assessment.

A summary of recommendations after first appointments is given in Table III.

The largest proportion of children were recommended a communication chart or modifications to their existing chart; we feel strongly that this should always be a basis for any augmentative system. Electronic equipment should not completely replace the 'low-tech' symbol-based system, for example because of the likelihood of equipment breakdown. Devices such as switches are always an essential part of a physically disabled child's life, for example for activating systems of environmental control, and this was reflected in the recommendations, particularly for the younger children. Computers and software very often are important tools in education, and they were recommended for 29 and 30 per cent of the children, respectively.

It is significant that at present only 23 per cent of the children are considered ready for speech synthesisers*, and only in the older age-groups. This is because

*See 'Note' at end of text.

children need to have good communicative skills in order to use a sophisticated aid effectively as part of their battery of communicative modes (Cassatt-James 1986). The follow-up study reported below suggests that speech synthesisers do not necessarily improve the range of a child's communication. Deciding on strategies to facilitate the child's total communicative competence then becomes essential.

Outcome of recommendations
The average period between the first CAC appointment and review is nine months. Generally the review is done by telephone, followed by a firm appointment when necessary. Local staff changes and slow fund-raising preclude a standard review interval.

The implementation of recommendations and subsequent progress are assessed at the review, and there is considerable variation in outcome. Practical problems, in addition to those mentioned above, include the lack of adequate speech therapy in special schools and limited knowledge of how to introduce the child to using the communication system. Some caregivers assume that the child, if motivated, will be able to assume responsibility for using the system. However, it seems clear that the environment needs to be adapted to the child and a co-ordinated implementation programme needs to be designed by educators and caregivers. Lack of appreciation that this is a necessary process may mean that little time is allocated to the task. Where implementation is successful, it is usually because of one well-organised and motivated key person who is frequently involved with the child— usually a parent or teacher. Although speech therapists are the most frequent referring agents, they usually have much less contact with the child.

Many of the difficulties encountered by the CAC team in establishing the use of communication aids have been noted in the literature. For example Harris (1982) studied the processes involved in communicative interaction and concluded that non-speaking children often fail to make progress in communicative competence because of habitual roles taken by those who interact with them. Adults tend to dominate the conversation and simply ask for information and fail to involve the child in, for example, humorous exchanges or talk about feelings. Udwin and Yule (1990) studied a group of children learning to use Makaton signing or Bliss symbol systems, following them for 18 months. They found little improvement in the children's range of communication, and noted that training practices in schools were very limited.

Problems with the technology are another reason for a disappointing outcome. Culp *et al.* (1986) carried out a follow-up study of clients of an augmentative communication service. Informants reported a high percentage of rejection of aids and a low percentage of use. Children were much more likely to use an aid at school than at home. This would be likely to reduce generalisation and to limit opportunities for using new modes of communication in new situations.

There have been surprisingly few studies on the outcome of recommendation of communication aids. However, identification of relevant outcome variables is complicated by a number of factors, including the heterogeneity of the non-speaking population (Culp 1987, Light 1988). Apparently appropriate measures, such as number of keystrokes/switch-presses per message, do not tend to correlate with effectiveness of communication (Vanderheiden 1991). Since communication is a two-way process, the skills of the listener and the empathy within the dyad are also important in determining effective communication (Calculator 1991).

Evaluating provision of aids
A one-year follow-up study was made of nine non-speaking, physically disabled children. The original aim was to determine whether the provision of aids actually did improve communication, and to explore some limiting factors. However, the intention to compare communication patterns before and after the provision of aids could not be accomplished fully because of delay in their provision (see below).

An additional objective of the study

TABLE IV

Children's characteristics—one year follow-up study

Child	Diagnosis	Chronological age (yrs:mths)	TROG[1]	BPVS[2]	CMMS[3]	Communication aids	
			Age equivalent (yrs:mths)			Before assessment	Recommended
1	Cerebral palsy (athetoid), intellectual disability	9:2	4:0	4:0	4:1	Signs	Bliss-symbol chart, signs
2	Cerebral palsy (athetoid)	9:8	9:0	9:6	9:1	Bliss chart	SpeechPac
3	Cerebral palsy (athetoid)	9:9	8:0	8:11	6:10	Bliss chart	SpeechPac
4	Cerebral palsy (athetoid)	12:3	9:0	9:6	8:9	Bliss board, computer with 'Beeb Bliss'	Light talker
5	Cerebral palsy (spastic quadriplegia)	13:2	11+*	12:2	6:3**	Bliss board, computer with head-pointer	Bliss board with redlight pointer, Light talker
6	Severe verbal dyspraxia, intellectual disability	13:4	6:0	7:9	7:11	Typewriter, signs	Touch talker or SpeechPac
7	Cerebral palsy (spastic quadriplegia), intellectual disability	15:2	11+*	10:2	8:9	—	Lightwriter SL1 or Memowriter
8	Cerebral palsy (athetoid)	16:3	11+*	13:10	11:10	Bliss chart	SpeechPac
9	Cerebral palsy (spastic quadriplegia)	18:3	11+*	14:9	6:4**	Bliss board, computer	SpeechPac

[1]Test of Reception of Grammar; [2]British Picture Vocabulary Scale; [3]Columbia Mental Maturity Scale.
*Performance at test ceiling.
**Recorded level considered underestimate.

was to compare children's interaction with parents and with teachers. There is some evidence in the literature that children's maximum competence as communicators may be obscured in their interaction with parents, and that a trained person can elicit greater variety of communication (Light et al. 1985). It may be that teachers will be more skilled at promoting a child's communication; on the other hand, parents may have more knowledge of what their child wants to express. It was thought that examination of different interaction patterns should provide information on which future advice to caregivers might be based.

Subjects

Nine children were seen at the CAC for assessment and recommendation of aids, and about one year later were seen again at school and at home. Eight had cerebral palsy and one had severe verbal dyspraxia. Three also had intellectual disability, but none had a major sensory deficit. Their ages at first assessment ranged from nine to 18 years, with a minimum mental age of four years (Table IV): they are thus generally older than the present pattern of referrals. They were first seen early in 1988, and were selected for the study as being relatively homogeneous in the level of recommendations made.

Procedure

At follow-up, parents and teachers were interviewed about the availability of the recommended aid(s) to the child, and how regularly each was used.

At the initial assessment, one parent and the child were video-taped during interaction. The situation was a natural one, but incorporated a small amount of structure so that different tapes could be compared. First they pursued a joint activity, such as imaginative play with toys or dominoes, then they conversed

about a book, or through a symbol system. Within a week or two, the child was also video-taped at school while interacting with the class teacher in a similarly structured one-to-one session. At follow-up, the child was video-taped again with the teacher at school and with the parent at home.

Measures

About five minutes of taped interaction (both joint activity and conversation) were transcribed from each tape, giving a total of 20 minutes per child. Coding focused on the structure of interaction, and the modes and functions of the child's communicative acts.

STRUCTURE: initiation, response, other.
FUNCTIONS (Child only): social conventions; request for object or action; request for information; request for clarification; request for attention; confirmations and denials; provision of information (*a*) few possible answers (*b*) new idea; provision of clarification; expression of self; elicited imitation; turn-taking in a game; unintelligible (adapted from Light *et al.* 1985).
COMMUNICATION MODES (Child only): verbal; vocal; eye pointing; fist or finger pointing; gesture; sign; symbol; other aid; physical.

Reliability

Inter-rater reliability was established at acceptable levels (Table V). 12 separate functions could be coded; data are presented only for those with more than eight instances represented in the reliability samples. For a total of 143 child acts, the over-all agreement on function was only 66 per cent. However, the major source of disagreement was the independent rater (H.M.) coding an act as 'unintelligible', when the speech therapist who carried out the study (S.W.) ascribed a specific function. Since S.W. knew the children and adults and the aids (whereas H.M. did not), it seemed acceptable to use S.W.'s coding in the data analysis. When these 27 instances are taken out of the calculation, over-all agreement was 81 per cent for coding communicative functions.

Within the functions coded, four were taken to represent 'higher-level' com-

TABLE V
Inter-rater reliability for coding structure and function of communication

	Total acts	Agreements (%)
Structure		
Adult		
Initiation	111	98
Response	30	80
Child		
Initiation	5	100
Response	132	93
Functions		
Confirmations/denials	57	85
Provision of information	48	80
Unintelligible	13	93

munication: providing new information, clarifying misunderstandings, requesting information, and requesting clarification (*cf.* Dale 1980, Light *et al.* 1985, Baumgart *et al.* 1990). Inter-rater reliability was 73 per cent, but 100 per cent if disagreements about poor intelligibility were excluded.

Results

Ability level

There was no relationship between communication pattern variables and receptive language-age (*i.e.* rank on TROG, further differentiated by BPVS) on either the first or second occasion of video-taping; this applied to children's interaction with both parents and teachers. Similarly, there was no consistent relationship between language-age or intellectual disability and eventual success in using an aid (Table VI).

Provision of recommended aids

The study was intended to assess children's use of recommended aids for communication. However, a major limiting factor was delay in provision of aids (see Table VI). After about a year, only two children (4, 5) had received an aid from health-authority funding (and one of these was refusing to use it at follow-up). One child (7) had a CAC aid on loan, which she used infrequently to back-up her unintelligible speech. The families of five children spent the year fund-raising. (The youngest child was

TABLE VI
Provision of recommended aids following CAC assessment

Child	Action	Available after (mths)	Follow-up (mths)		Later outcome
1	Expanding Bliss-symbol chart	(Continuously)	13	+ +	Introtalker loaned (21 months), uses successfully
2	Raising funds for SpeechPac	11	11	−	Continuing problems with reliable switch access, therefore little used
3	Raising funds for SpeechPac	16	15	+	Switch needing constant adjustment but used well, particularly at home
4	DHA-funded Light talker	9	15	+	Used at home, no school support in programming it
5	DHA-funded Light talker; redlight-pointer not purchased	9	15	−	Refuses to use it; speech understood by parents and some teachers
6	Raising funds for SpeechPac	28	9	+ +	Very successful user, wide range of phrases accessed by codes; used in all settings
7	Loan from CAC of Lightwriter; own purchased	6	13	+	Uses it as back-up to unintelligible speech
8	Raising funds for SpeechPac	18 (alternative equipment)	13	+ +	Uses Campac 4 well at college and home; operated with 6-switch coding system
9	Raising funds for SpeechPac	12	9	+ +	Uses with eyebrow switch; also user of fast colour-coded Bliss chart

progressing well with a Bliss symbol chart, in addition to signing, gestures and vocalisation, and did not require a high-tech aid during the follow-up study.)

Change in communication patterns
At the one-year follow-up, the children as a group showed no significant change in their observed communication patterns when interacting with either a parent or a teacher, despite parents being at home on the second occasion and therefore perhaps more relaxed. A case-control study by Allen (1988) analysed changes in communication patterns after parents received training. That study demonstrated that the coding method can be sensitive to alteration in structure and function of observed interaction over time. A longer period of time may be required to assess whether introduction of an augmentative system does lead to positive change in communication patterns.

Parent/teacher differences
It was expected that the children's communication with teachers would be more sophisticated because of the teachers' training and relative unfamiliarity with the child's daily life. However, only one significant difference was found: parents elicited more responses from the children than did teachers (Table VII). Children's initiations did not differ between the two communication partners.

However, there was a trend for teachers to elicit more sophisticated communication from children. They tended to ask

more open questions, and to demand more real information from the child. They were also more likely to encourage children to use alternatives to spoken communication than parents were: only four of the children used a chart, speaking device or computer when observed with their parent, but eight did so with their teacher.

Discussion

Looked at in the longer term, the reported outcome with communication aids for the majority of the study children was positive, representing for some a very significant boost to their ability to express themselves, particularly in extending the range of people with whom they could communicate.

However, it was not possible in the follow-up study to look systematically at changes in communication patterns with the introduction of high-tech aids, as intended. The lengthy delays in making available to children the aids recommended for them require further investigation. In 1983, a national study was undertaken by the DHSS: it found that long delays in provision are common because of lack of communication between professionals, changing personnel, *etc*. The majority of new aid-users had them on loan. Few health districts had budgets for the purchase of communication aids. A national policy on provision is required, with designated regional specialists who control a large loan bank (Rowley *et al.* 1988).

Our follow-up study suggested that children's patterns of communication tend to stay the same over time, and to reflect a picture of passivity and restricted topics and functions. Several preferred to rely on speech, even if it was almost unintelligible, which restricted their communication partners to a few, very familiar people. The study showed few differences between parents and teachers as communication partners: parents were at least as adept at eliciting active responses from children.

When an electronic aid is provided for a child, our study suggests that intensive training is vital, so that the child's communication is enhanced rather than restricted by the aid (*cf.* Calculator 1988).

TABLE VII

Children's interaction with parents and teachers (mean % of total)

	Parent	Teacher
Structure		
Adult		
Initiation	28·7	29·6
Response	26·2	27·2
Child		
Initiation	4·1	5·5
Response	42·8*	39·6*
Adult response to child initiation	95·6	93·9
Acts per minute (freq.)	21·3	20·3
Functions		
Confirmations/denials	50·2	51·0
Provision of information	30·5	30·8
Higher-level functions	6·7	9·1

*Difference: $p<0.05$, Wilcoxon matched-pairs signed-ranks test.

At follow-up, the only child (4) who enjoyed using his aid frequently, and who had had it for several months, had gained in independence and could now interact with strangers. However, the quality of his interaction had apparently decreased: in filmed interaction, the speed of communication with his mother dropped from 23 acts per minute to only nine per minute with the aid. This is because his access to the Light-talker is by scanning, which has an inverse relationship between speed and accuracy. Pre-programmed phrases were used most, which led to constriction in the range and sophistication of his communicative functions. The child made no initiations during the follow-up interactions. The child's and the adults' lack of experience with the aid was a significant factor, as was inadequate professional support; a different communication system was in use at the child's school, and his parents had no support in programming the aid. Children require thorough training in accessing an aid, so that difficulties such as slow scanning rate, poorly controlled switches, *etc.* do not remain inhibiting factors.

Training of communication partners is also essential, both to tap the aid's potential and to facilitate more flexible communication. The video-taped interaction samples suggested many ways in which partners could be trained to

provide more sophisticated communication with severely physically disabled children. An example is the child who had an aid on loan: her pattern of communication was essentially unchanged, merely transferred on occasion to the aid, leaving untapped much of its (and her) potential. Her parents and teachers could be trained to ensure that she had ample time to initiate communication and, by example, to encourage greater use of the aid. Video-tapes of interactions can be used to make parents and teachers aware of how little the children initiate, whether and how the adults respond, and the limited expectations they have for the child's role in communication.

Conclusions

In retrospect, the aims originally set for CACs reflect a belief that recommending aids would have much in common with prescribing spectacles. Experience has shown otherwise.

For non-speaking, physically disabled children, the process of developing effective social interaction skills is complex. A communication aid can help to make the process easier, but essentially it is only one of many forms of expression available to the child. The development of communicative competence may require broad-based intervention to ensure effective and functional use of an aid. This is likely to go beyond language training and technical training in the workings of the aid to areas of social competence, such as taking control of a conversation and appropriately adapting interactional strategies to particular partners and settings (Harris 1982, Light 1989).

Any child eventually is likely to require more than one communication aid—indeed to require an augmentative system—which may include: computers for educational use; a small portable device for written messages, a letter-board, or a symbol reference book (*e.g.* like a personal organiser) when moving around in the community; and a speaking device when at home, with friends or at school. Co-ordination of the systems for accessing communication aids and computers, and achieving wheelchair and environmental control is a further challenge to be met.

Implications

For the Wolfson Centre CAC, clinical experience and the follow-up study have led to the following decisions.

(1) Further training will be conducted with 'link' speech therapists in each health district, to expand their role in supporting (*a*) children who have had aids recommended, and (*b*) the local therapist and teachers who are training the child in communication skills and in aid use.

(2) These 'link' therapists will provide back-up knowledge and continuity in obtaining aids for children. This must include thorough knowledge of potential sources of funding.

(3) Following the initial assessment at the CAC, more intensive follow-up has been instituted for a proportion of the children. This usually takes the form of school-based workshops with teachers, therapists and parents. The aim is to solve the practical problems encountered in using technological aids (*e.g.* accessing, portability, programming initial vocabulary). Practice in devising communication charts is also given (Jolleff *et al.* 1990).

(4) Further training is required to facilitate children's social communicative skills, through altering their environment and others' expectations and habits. A pilot 'interaction workshop' has examined present patterns of communication and how to enhance the range and frequency of children's spontaneous communication (Allen 1988). Techniques such as creating 'deliberate failures' in familiar routines (*e.g.* the child's coat is not where it usually is, the tape-recorder has no batteries) create opportunities for children to have something 'real' to say.

Elements from these last two areas of training are to be combined in the development of an augmentative communication training package, 'My Turn to Speak', funded by the Nuffield and Baring Foundations.

Note

Speech synthesisers are divided into two main types: digitised speech and text-to-speech systems. Digitised speech records the human voice and is incorporated into communication aids such as Introtalker, Dave, My Voice and Macaw. This tends to be high-quality intelligible speech, and words and phrases can be readily recorded and replayed. The number of phrases that can be recorded is likely to be limited. Text-to-speech systems rely on words

typed into the device and converted by the computer into speech according to the rules stored. These systems can be either incorporated into communication aids such as Light talker, Touch talker, Vois 136, Speech Dec and Compac 4, or stand-alone hardware devices, *e.g.* Apollo, Dectalk, for use with existing computers. The quality of this speech is variable, according to price, and can sound artificial. The number of phrases that can be stored is almost unlimited. (For further information, see Southgate, T. N., Cochrane, G. M. (1990) *Communication: Equipment for Disabled People.* Mary Marlborough Lodge, Nuffield Orthopaedic Centre, Headington, Oxford OX3 7LD.)

Authors' Appointments
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SUMMARY
This paper describes the organisation and procedures of the Communication Aids Centre for children at the Wolfson Centre, London, including a model for assessment and recommendation of appropriate aids, such as symbol charts, switches and speech synthesisers. Of the children seen over an 18-month period, most had cerebral palsy and two-thirds were wheelchair-dependent. Almost half were assessed before the age of five years. A detailed follow-up of nine children is presented which reveals how long children may have to wait for the provision of an aid in the UK. Possible problems in establishing use of an aid are discussed; these include inadequate training of children and their communication partners. Suggestions for future improvements of communication-aids services are explored.

RÉSUMÉ
Aides à la communication pour les enfants: procédés et problèmes
L'article décrit l'organisation et les procédés du Centre d'aide à la communication du Wolfson Centre, de Londres, incluant un modèle d'évaluation et des recommandations pour des aides appropriées, telles que des chartes de symboles, des interrupteurs et des synthétiseurs de voix. Parmi les enfants examinés durant une période de 18 mois, la plupart étaient des IMC et deux tiers étaient en fauteuil roulant. Presque la moitié avaient bénéficié d'une évaluation avant l'âge de cinq ans. Un suivi détaillé de neuf enfants est présenté, indiquant combien les enfants peuvent à avoir attendre longtemps pour bénéficier d'une aide au Royaume Uni. Les problèmes qui peuvent se présenter durant la mise en place d'une aide sont discutés; ils incluent un apprentissage inapproprié pour les enfants et leurs interlocuteurs. Des suggestions pour des améliorations future des aides à la communication sont explorées.

ZUSAMMENFASSUNG
Kommunikationshilfen für Kinder: Maßnahmen und Probleme
In dieser Arbeit werden Organisation und Maßnahmen des Zentrums für Kommunikationshilfen für Kinder am Wolfson Centre in London, sowie ein Modell zur Beurteilung und Empfehlung von geeigneten Hilfer, wie Symbolkarten, Schaltern und Sprachsynthesiser, beschrieben. Von der Kindern, die über einen Zeitraum von 18 Monaten beobachtet wurden, hatten die meisten eine Cerebralparese und zwei Drittel waren auf einen Rollstuhl angewiesen. Etwa die Hälfte wurde vor dem fünften Lebensjahr untersucht. Von neun Kindern wird ein genauer Untersuchungsverlauf wiedergegeben, wodurch aufgezeigt wird, wie lange Kinder im UK auf die Versorgung mit einer Hilfe unter Umständen warten müssen. Es wird über Probleme bei der Einführung solcher Hilfen diskutiert; diese ergeben sich auch beim angemessenen Training der Kinder und ihrer Kommunikationspartner. Die Autoren überprüfen Vorschläge zur weiteren Verbesserung des Kommunikationshilfedienstes.

RESUMEN
Comunicación asistida para niños
Este trabajo describe la organización y técnicas del Centro de Ayuda a la Comunicación para niños en el Wolfson Centre de Londres, incluyendo un modelo para la evaluación y recomendaciones de ayudas apropriadas, tales como mapas símbolo, interruptores y sintetizadores del lenguaje. De los niños vistos durante un periodo de 18 meses, la mayoria tenían parálisis infantil y dos tercion dependían de silla de ruedas. Casi la mitad fueron evaluados antes de los cinco años de edad. Se presenta un seguimiento detallado en neuve niños, que revela el largo tiempo qu los niños tienen que aguardar para conseguir una ayuda en el Reino Unido. Se discuten los posibles problemas que pueden surgir al establecer la utilización de una ayuda, incluyendo un entrenamiento inadecuado de los niños y de sus compañeros de comunidad. Se exploran sugerencias para la mejora futura de los servicios de ayuda.

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