ORTHOGRAPHY AS AN AUGMENTATIVE SYSTEM IN CEREBRAL PALSIED

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To MADAM MANJULA

————*for channelizing and shaping my thoughts into a productive one*

————*and for activating my sentiments for cerebral palsy.*

CERTIFICATE

     This is to certify that the Dissertation entitled:

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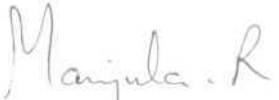
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This is to certify that the Dissertation entitled " **ORTHOGRAPHY AS AN AUGMENTATIVE SYSTEM IN CEREBRAL PALSIED**" *has been prepared under my supervision and guidance.*

MYSORE
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Mrs. R.MANJULA
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DECLARATION

This dissertation entitled **"ORTHOGRAPHY AS AN AUGMENTATIVE SYSTEM IN CEREBRAL PALSIED"** *is the result of my own study under the guidance of* **Mrs. R. MANJULA,** *Clinical Lecturer, Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore and has not heen submitted earlier at any other University for any other Diploma or Degree.*

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INTRODUCTION

Augmentative communication systems designed and used with nonverbal children have generally facilitated communication both expressive and receptive language. For the last two decades, researchers have documented the usefulness of alternative and augmentative communication techniques (Porter, Brink and Hagen, 1973; Archer, 1977; Clark, 1981; Luftig and Bersani, 1985; Ecklund and Reichle, 1987; Sevcik, Romski and Wilkinson, 1991) with various clinical groups. Various studies have also attempted to identify the symbol sets which are the easiest, simple, useful and more pragmatic (Clark, 1981; Mussel White and Ruscello, 1984; Ecklund and Reichle, 1987; Mizuko and Reichle, 1989) with these clinical groups.

It has been demonstrated that the usefulness of the different symbol sets depends on the individual's cognitive abilities, spoken language comprehension abilities and intentional communicative abilities (Romski and Sevlik, 1988). The symbol and its relationship or resemblance with the referent (ICONICITY) has remained an area of interest while discussing the usefulness of different symbol sets in cerebral palsied individuals.

Iconic symbols have been found to be useful as it not only facilitates learning of vocabulary but also facilitates building a better association between the symbol and its

referent or gloss (Knudson, 1980; Griffith and Robinson, 1980; Reichle, Williams and Ryan, 1981; Dennis, Reichle, Williams and Vogelsberg, 1982; Goossens, 1983). Hurlbut, Iwata and Green (1982) have suggested that Blissymbols are more difficult as compared to iconic line drawings and that they are acquired more rapidly, retained longer and generalized more quickly. Raghavendra and Fristoe (1990) used enhanced Blissymbols for augmenting communication in normally developing children and compared it with the standard Blissymbols. Their results indicated that enhancement did improve their identification of the symbols.

Yet many investigators have commented on the generalisability, functional utility and flexibility of various logographic symbols (Silverman, 1980). Though the logographic symbols may be easy to learn, nonverbal handicapped children may not be able to utilize it for daily interaction in the natural environment (Light, 1989). Considering all these factors it is often suggested that the use of traditional orthography either or not accompanied with pictographic symbols might be a better choice for clinical group of patients put on alternate and augmentative communication. Adequacy of communication is often achieved through this mode of alternative and augmentative communication system because it can express the user's knowledge in a better way, it is known, and understood and learnt by majority of the population. However, since studies

have continually argued on the issue of iconicity of symbols (Luftig and Bersani, 1985; Mizuko and Reichle, 1989; Bloomberg, et al., 1990; Gamble and Lieberth, 1990), the issue regarding the use of enhanced traditional orthography would be one area which warrants further exploration. Enhancement in augmentative techniques, though familiar, is totally a recent advancement. The use of Blissymbols with enhancement has been approached by Fristoe and Raghavendra (1990). Enhancement, according to The Blissymbolics Communication Institute (1984), gives additional cues and helps in the guessing of the gloss or the referent. The same may hold true for traditional orthography too. Enhancement helps in building the association between the gloss and the symbols, and in ameliorating the comprehension skills of language.

India presently being on the threshold of literacy makes it much more essential for us to judiciously select orthography as a symbol set for the clinical population. The present trend is to integrate the handicapped population with normal children. Since most schools in India use traditional orthography, the use of logographic symbols, exceptionally with clinical groups would make it less generalisable and flexible. At the same time, rural parents, consider orthography to be more realistic as compared to other logographic symbol sets. Considering all these practical problems, language therapists should essentially emphasize on

orthography. In addition, if we explore with regard to enhancement on traditional orthography, it may become more meaningful not only to the impaired population but also to their family members. Hence, rehabilitation is achieved, in toto.

Enhancement in traditional orthography may also give us an idea as to how easily the cerebral palsied individuals learn the words, how they perceive the symbol (whether the lexicon as whole or only the enhanced symbol). The study, though seems to be enigmatic, may also enhance the clinical utility of the vocabulary items in that they could be used as initial lexical items for augmentative therapy. In the present study, an attempt has been made to enhance some of the Kannada orthographic symbols. Enhancement is done for an alphabet in a word so that the orthographic symbol represents the "whole" or the "gloss". This study aims at evaluating the efficacy of enhanced orthographic symbols in simple Kannada words in facilitating the learning of the lexicon in cerebral palsied individuals.

REVIEW OF LITERATURE

"Speech is civilization itself. The word, even the most contradictory word, preserves contact - it is silence which isolates" Thomas Mann

Human beings are endowed with language and communicative skills. This is an important fact to consider, for human beings cannot remain silent and isolated. They verbalize ideas and their thoughts with others because of which the very human society exists. Communication is possible not only through verbal mode but through other nonverbal modes. Nonverbal modes of communication includes the use of gestures, signs and symbol sets, replacing the traditional articulophonatory mode of speech. This mode of language becomes essential for nonverbal children, who may in addition be non-ambulatory or intellectually retarded. Language may be comprehended using any modality such as auditory, visual or tactile and expressed through speech organs, hands or visual organs.

"NON VERBAL COMMUNICATION" implies language communicated by means other than the speech organs. The non-verbal communication is also termed as "AUGMENTATIVE and ALTERNATIVE COMMUNICATION" "Augmentation" means facilitation. Thus alternative and augmentative communication may be defined as communication using modes of expression or comprehension other than speech by which language is facilitated to any individual. These non speech modes include techniques to

encode messages and then transmit them without verbally producing them (Bridgman, 1927; Silverman, 1980).

Augmentative and alternative techniques have now become integral part of rehabilitative strategies especially for nonverbal children.

AAC SYSTEMS FOR COMMUNICATION DISORDERS

AAC systems or non speech communication modes have been used with varieties of communicative disorders. AAC makes functional communication possible. Non vocal communication has been the focus in the field of rehabilitation for the past twenty to thirty years. Various researchers (Harris-Vanderheiden, 1976a; Archer, 1977; Fristoe and Lloyd, 1980; Mizuko and Reichle, 1989; Sevcik et al 1991) have attempted to teach alternate modes of communication to persons with severe aphasia, autistic children, cerebral palsied children, and other dysarthrics, mentally retarded, apraxics (verbal) laryngectomees, dysphonics, glossectomees and severely hearing impaired.

Augmentative and alternative communication systems may be unaided or aided. Unaided symbol sets and systems include gestures, manual signs, AMESLAN, AMER-IND, MAKATON and the like which do not require any device. But aided or gestural – assisted communication systems consist of the read out device which is activated by the gestures or movements. They make use of visual-graphic symbols. The messages are encoded

on the display and the user points to the display, to transmit the message he wants. Gestural – assisted modes may either have an electronic switching mechanism or a non electronic display and switching mechanism.

The displays used in gestural-assisted modes consist of symbols which are representative of a particular object by way of association. The symbols used in the aided modes are different from speech or manual signs in that, the symbol which have spatial representation on the display may be selected by the user using an associative memory. This in turn may depend on the arbitrariness of the symbols as compared to the referents. Some symbol sets, hence, may be more arbitrary as compared to others.

The common types of symbol sets used in aided modes are as follows:

Photographs or Pictorial Drawings:

These may be used to teach initial lexicon to a child who may be functionally non-verbal. Cerebral palsied children, dyslexics, severe-intellectually retarded who are not able to speak as well as read or write may learn using pictures in the form of flash cards. The pictures may be either three dimensional or two dimensional or simple line drawings. Pictures should neither be too large nor too small.

PICSYMS

This was developed by Carlson and James (1980) to teach language to young children who were communicatively handicapped. The symbols in the PICSYMS have a semantic correspondence with the referents (a shape-meaning correspondence). A number of tactics such as displaying background, dotted lines and major features in solid lines are used to enhance meaning. PICSYMS is still not the popular symbol set.

REBUSES

Rebuses, developed by Clark, Davis and Woodcock (1974), are pictographic-line drawings and represent word or part of a word. The rebus symbol may indicate the meaning or may have a phoneme sequence with the symbol to indicate the referent.

Thus rebuses may be either a single line drawing or several drawings with a combination of alphabets. The morphemic variation in English are indicated as a suffix to the rebus symbols.

BLISS SYMBOLICS

This symbol system developed by Charles K. Bliss (1965) is pictographic, ideographic and not language specific. It was developed as a language system to facilitate cross language communication. It is also used with nonvocal children who have fairly adequate intellectual ability and

cognition. In this system, the symbols are categorized to represent similar concept. The symbols within a particular category are derived from a basic symbol and may be further modified to derive a more complex symbol. The Bliss-symbols are line drawings and have specific spacing between the lines.

CARRIER SYMBOLS

The carrier symbols were developed from Premack's symbols by Carrier (1974). Carrier symbols are abstract geometric shapes each of which have a particular referent. The learning of this is based on association and the child has to respond by pointing to these symbols by association memory. These symbols can be categorized into various grammatical categories (such as nouns, verbs) by using different colour coding.

TRADITIONAL ORTHOGRAPHY

Often for a non vocal preschool child or an adult, alphabets of his or her language may be introduced as a symbol system for nonvocal communication. The alphabets may, either be taught in single or in the form of simple functional words associated with their respective pictures. Pictorial and orthographic symbol representation on a display simultaneously increases the association between the referent and the orthographic symbol. Using orthography, word boards may be made. Words which are more meaningful, functional and easy to the child are represented on the board initially.

Once the association between picture (referent) and the symbol (gloss) is formed, the stimuli or the picture may be faded off and only the orthographic responses may be established in the child. Traditional orthography enhances the communication between the client and observers (Silverman 1980). Once learnt the handicapped child may be able to communicate effectively through this mode. It does not need much training on the part of the observer to communicate.

The symbol systems discussed above have their own merits and demerits in terms of their flexibility, arbitrariness and level of difficulty. Whenever a clinician introduces gestural assisted system he should be careful and critical in making a choice for any individual. The choice of any symbol set should be in correspondence with the child's intelligence, cognition, impairment, visual acuity, age, and level of comprehension.

A BRIEF HISTORICAL REVIEW ON THE USE OF AAC WITH THE SPEECH AND LANGUAGE IMPAIRED

Until very recently, human language has been studied from the point of spoken language. Till the past decade or so, speech (oral) and language was always thought to be hand in hand. It was only in late 1960s and early 1970s that the use of symbolic signs and gestures took its shape when the dearth for these was felt. However Lavoy (1951) developed a circular display board and a pointer. Electro-mechanical

devices have been advantageous over the regular communication boards, in that, they demand lesser effort on the part of the child (especially cerebral palsied child).

Premack (1970) was one of the early researchers who was able to make chimpanzees communicate through symbolic signs, plastic chips. From his experiments, it was hypothesised that a symbol set may be used to facilitate learning in children and thus provide an efficient means of teaching communication to severely retarded children. Thus based on this, an attempt was made by many researchers as Davis (1973), Carrier (1974), and others, to teach symbols to persons with mental retardation, cerebral palsy, aphasia, autism, and profound hearing impairment. McDonald and Schultz (1973) determined that early use of communication boards for cerebral palsied individuals (with severe motor disability) facilitated language development. According to them, children using these communication boards were more relaxed, their oral responses and vocalisations also were facilitated and there was an overall improvement clinically. They claimed that cerebral palsied children because of severe disturbances in respiratory, phonatory, and articulatory mechanisms have difficulty in producing intelligible and functional speech. This becomes a barrier in overall language development, socio-emotional development and in general maturity. Porter, Brink and Hagen (1973) have shown in their study that with electromechanical devices children could communicate their

basic needs and feelings and thereby preserve some amount of communication.

Carrier (1974) trained many intellectually retarded individuals on noun usage. Each noun form was represented by a particular geometric shape. After training, the children had to pick up a geometric shape when it was named. This experiment showed that even severely mentally retarded could be trained to learn "nouns" when non-speech mode was used.

Blissymbols, originally developed by Charles.K.Bliss around 1965, was also studied by many investigators. The use of Blissymbols increased because they not only ameliorated the communication, but also accelerated cognitive development and reading readiness (Archer, 1977). Archer (1977) found Blissymbols very useful with cerebral palsied children with poor oral communication. According to him, Blissymbols training provided a means of grammatically adequate communication as against the use of only picture or word-boards. Studies by Kahn (1981), Romski and Sevcik (1988) showed that many individuals with severe language impairment could learn 'referents' or 'symbols' that represented objects or actions.

1980s was a period of expansion in the field of alternative communication not only in terms of improved technologies and better symbol systems but also in terms of their clinical applications (Kraat 1990). Blissymbols,

traditional orthography, sign systems (AMER-IND, AMESLAN, MAKATON) became more popular. They were increasingly used to train severely affected physically handicapped, nonverbal children and adults to facilitate speech and communication. Moreover studies on comparison between these various symbol systems was interestingly increasing.

Clark (1981) compared the efficacy of four symbol systems; traditional orthography and logographic symbols of Rebus, Carrier and Bliss. He selected words common to all these symbol systems and studied the learning of these words with different representations in normal children. He found that simple and more meaningful representations were learnt earlier and easily. All logographic symbols were found to be easier than traditional orthography. This in turn has many implications in training the handicapped children. Luftig and Bersani (1985) investigated the efficiency of Blissymbols as against traditional orthography in preschool (non reading) children and found that Blissymbols were easier to learn. Blissymbols were also faster to learn as compared to traditional orthography. Ecklund and Reichle (1987) in their investigation compared the ease of symbol recall among BLISS and REBUS, in which they used sets of symbols for initial vocabulary acquisition. Their results were supportive of Clark (1981). Rebuses were easier to learn than Blissymbols and they found no difference between children who had different response modes. Raghavendra and Fristoe (1990)

studied normally developing preschool children in the learning and using of enhanced Blissymbols by the drawing of additional components. The Blissymbolics Communication Institute (1984) has developed a set of Blissymbols that have been enhanced by the addition of components which gives cues to the meaning of the symbol. These cues are in the form of pink line drawings over the black line drawings of the standard blissymbols.

In the above study, the children were shown enhanced symbols and were asked to guess the meaning. The children could guess twice as great as the standard Blissymbols. They identified perceptual features and related elements of the symbols to familiar entities. This study may reflect the role of enhancements and the use of such symbols even for normal children.

Interestingly, studies have often concentrated on a single aspect, that is, ICONICITY (signs or symbols which represent the features of the referent). All augmentative techniques are not as simple as one may think. A child learning symbol sets may need adequate cognition, good visual sensation, and perception though often, simpler versions of these have been deemed useful for intellectually disabled. In general, research findings (Sevcik, Romski and Wilkinson 1991) suggest that like speech, unaided symbol sets/signs are arbitrary and temporally dynamic. Unaided symbol sets, like

speech need recall memory while producing them. They are very arbitrary that is there is no association between the sign and the referent (except for American sign Language). Aided symbols are spatially organised and do not change with respect to time or space. Of course, aided symbols themselves have different levels of arbitrariness.

SYMBOLS - ARBITRARINESS VERSUS ICONICITY

Symbols are physical components that represent features of the referent in the environment. According to Sevcik, Romski and Wilkinson (1991) symbols play a dual role in early cognitive and linguistic development in a child. They act as internalized representations in the process of language learning and secondly they reflect on the child's perceptual abilities, when the child verbalizes his ideas; a process of externalization.

Language is thus considered as symbolic in nature. In this regard, it is worthy to mention, Bruner's (1968) three-staged model, which is representative of child's symbolic development. The 1st stage is an ENACTIVE stage - a level of action where several activities experienced by the child are organised. The 2nd stage is an ICONIC representation which is imagery -when a child makes use of external image (picture) to represent various objects in the environment. The 3rd stage is the SYMBOLIC-REPRESENTATION in which highly abstract concepts are learnt even when there is no relationship between the referent and the symbol (alphabets).

In a normal child these stages are learnt as a developmental process. But language handicapped children such as cerebral palsied, retarded individuals may not be able to achieve the 3rd stage. Thus, in children, symbolic representations of the gloss helps in mediating internalization and externalization. This is the reason why augmentative and alternative communication systems are found to be very useful for nonverbal children.

As already mentioned, symbols can be represented in a continuum- on one end symbols being completely arbitrary and on the other end, symbols bearing high level of iconicity.

<————ARBITRARY SYMBOLS————————ICONIC SYMBOLS----->

Iconicity has been defined from 2 points of view. Mizuko (1987), Mizuko and Reichle (1989) have defined iconicity on the physical basis as the visual resemblance of the elements of sign or symbol to the referent or the degree to which a sign is defined by or resembles its referent.

Luftig and Bersani (1985) defined iconicity on perceptual basis as "how apparent the relationship between a symbol and its meaning (gloss) is to learners". Iconicity, as a continuum, has been defined in terms of transparency, transluency and opacity of symbols. These terms define the degree to which each symbol may be guessed. Transparency is

the guessability of the meaning of the symbol when the
referent is not present (Bellugi and Klima 1976). Thus
transparent symbols are those that are easily guessable even
in the absence of the referent or cues (Mizuko and Reichle,
1989). Translucent symbols may refer to those ideo-graphic
symbols whose meaning cannot be easily guessable in the
absence of the referent; however when instructions are given
or an association between the symbol and the referent is
established, the meaning may be understood (Luftig and
Bersani 1985, Mizuko and Reichle 1989; Bloomberg et al 1990,
Sevcik, Romski and Wilkinson 1991). Translucent symbols such
as blissymbols may be learnt only when contextual cues are
given. Opaque symbols are not guessable. The relationship
between the symbol and the gloss is not understandable even
when referent is presented (Mizuko and Reichle 1989; Sevcik,
Romski and Wilkinson, 1991).

Iconicity has been the main issue of discussion in the
past five years. Research studies have tried to establish
transparency or transluency of various symbol systems (both
unaided and aided). There are other studies which have tried
to define the extent of iconicity in learning of symbols in
different population.

Griffith, Robinson and Panagos (1981) studied hearing
impaired children to compare perception of iconicity of signs
from ASL by three groups of subjects using three tasks.

According to this, iconicity was defined as associations made between the sign and the referent. This in turn depended on the age and experience of the subjects. Thus according to this study, iconicity did not depend on its resemblance with the referent, secondly iconicity was found to be an important but not the only factor in learning of signs or symbols.

There were many other studies which supported the limited role of iconicity. As against the above study, Lieberth and Gamble (1990) pointed out that transparency was an important feature that facilitated the learning of manual sign. This study on sign-naive college students indicated that though both transparent and non-transparent signs were retained, over a long period of time, the number of non transparent sign retention decreased temporally.

Sevcik, Romski and Pate (1988) found that iconicity served as an important factor if a disabled individual was learning to associate an already known spoken word with a symbol. But iconicity did not become the primary issue if the word was not in the receptive vocabulary of the child.

Various comparative studies came in parallel in the eighties (Clark 1981; Musselwhite and Ruscello 1984; Mizuko and Reichle 1989). These studies compared various symbol sets in terms of their transparency or transluency. It was generally agreed by all researchers that pictographic symbols

(pictures, rebuses) were highly transparent as compared to ideographic symbols (Bliss or Carrier symbols) and these were in turn easier when compared to the abstract orthography.

Clark (1981) compared the learning of words using traditional orthography and three logographic symbols of Rebuses, Bliss and Carrier. It was seen that simple, meaningful or iconic symbols were learnt easier or faster; secondly, logographic symbols were easier than traditional orthography. Among the three logographic symbols, Rebus and Bliss symbols were easier than Carrier; and Rebus was learnt faster than Bliss symbols. These results may have several implications in teaching symbols through augmentative and alternative techniques.

In another study, Mussel white and Ruscello (1984) studied the performance of preschool and primary school children against adults in their ability to guess the meaning of Blissymbols, Picsyms and Rebus symbols. Blissymbols were less transparent or guessable than Picsyms or Rebus. Accordingly they inferred that Blissymbols were highly abstract and incorporated less graphical details and had poor discrimination ability. An increase in performance with increasing age was also found.

Page (1985) in his study found that in American sign language system, action signs and basic signs had more iconicity. He claimed that iconicity was one among several

variables that became important while selecting initial lexical items for handicapped individuals.

Ecklund and Reichle (1987) compared the ease of symbol recall of Bliss and Rebus symbols and their findings supported earlier studies by Clark (1981) and Musselwhite and Ruscello (1984). A similar study by Mizuko and Reichle (1989) on intellectually handicapped adults showed that Blissymbols were relatively difficult to learn as compared to picture communication systems or PICSYMS. They hypothesised that ease of recall of these symbols varied with the degree of their iconicity. This is of significance when abstract symbols such as traditional orthography has to be taught to cognitively impaired individuals.

To summarize each of these studies have focussed on how children and adults with different impairments learn the association between the referent and the symbol, the ease with which they learn and their recall capacity. Most of these studies have indicated that iconicity or transparency of the symbols plays an important role in the learning of various symbol sets, though the degree of arbitrariness may vary considerably. These studies also imply that while selecting a symbol system for the handicapped children, one should consider the ease of acquisition or learning of the symbol set.

TRADITIONAL ORTHOGRAPHY

Traditional orthography, as already briefly described, is an aided symbol system. It can be either electronically or non electronically represented on a display. Communication boards or magnetic boards may be used to display orthography. Orthographical representations may be words, having the phoneme sequence. For example ELEPHANT may be written on the board as/Elifant/, CROW as /kro/ etc.

Traditional orthography has always been conventional and is often preferred by many users of AAC when compared to other symbol systems. It has its own merits and demerits.

DISADVANTAGES

Thorstein Veblen has rightly criticized by stating that English orthography satisfies all the requirements of the canons of reputability under the law of conspicuous waste. It is archaic, cumbrous and ineffective, its acquisition consumes much time and effort; failure to acquire it is easy of detection'.

1) Traditional orthography of most languages is idiosyncratic in nature and it does not symbolise the referents in any way.

2) Opacity is the foremost and the most important disadvantage of traditional orthography. Even with external cues, there is no resemblance between the symbol and the referent.

3) An association is to be established between the symbol and the gloss which may seem an easy task for normal children but with children having intellectual impairment or neuromotor disability, association formation may be a very difficult task.

4) For school going children, it is logical to use orthographic symbol sets, but for children who are functionally nonverbal and who are being trained for the first time, the use of simpler symbol sets may be preferable.

5) Even for preschool normal children (apart from handicapped children), traditional orthography is considered uninteresting. Moreover, orthography in any language is difficult to learn as compared to pictographic and ideographic symbol sets. Thus it may prolong the period of learning for children.

6) Message in traditional orthography has to be conveyed through recall memory. A child having impairment may in addition have poor recall memory which may reduce the level of performance.

The disadvantages might have some implication if this system is chosen as the symbol system for use in alternate or augmentative communication.

ADVANTAGES

Traditional orthography or spelled words are used universally and hence we can consider it as the desired form of communication.

1) The major advantage of traditional orthography as an aided symbol set is that it is easy to encode and transmit the messages, both by the user and the receiver as it is the most widely used system in the universe (Silverman 1980).

2) Since it includes alphabets of a particular language it does not require special training for the receiver. In other symbol sets, like Blissymbols, the observers need special training before communicating with the user. This reduces GENERALISABILITY of other ideographic symbol sets. In such cases orthography is the only symbol set which may serve to be useful.

3) The functional utility of orthography is enhanced. Orthography is highly flexible because once learnt it can be used to express anything and encode any number of messages (Silverman 1980).

4) If the studies on iconicity refute the use of traditional orthography, we may establish iconicity by building an association between the symbol and the referent. In such a case, transparency does not become important.

5) In an Indian situation, where all schools stress the use of alphabets, traditional orthography may be the only choice as a system that can be adapted even with the handicapped individuals, who are integrated in these schools.

6) The schools all over India, more so in rural areas, are not yet as advanced to use symbol systems other than orthography. Moreover with such a large population it may

be impossible for teachers to teach other symbol systems (as Bliss, Picsyms) to limited candidates.

7) The parents in India, especially from rural, may prefer the use of traditional orthography because of the lack of knowledge, motivation and time available to learn the other symbol sets.

8) Use of traditional orthography is highly economical. This is due to the fact that orthography may make use of limited symbols to transmit messages. With the phoneme-spelling, transcription, orthographical messages can be efficiently transmitted making use of fewer symbols.

In general, encoding and transmitting the information on a display board is relatively easy. The display board (unlike pictographic and ideographic symbols) may represent single letters, words, phrases or sentences according to the convenience of the child. It may easily be modified once learnt, the individual may transmit any message (concrete as well as abstract) which thus place, traditional orthography in the advantageous rank.

Considering the economy benefits and generalisability one may choose to adopt traditional orthography for all handicapped individuals. Yet it might seem an important fact that traditional orthography is not transparent which may hinder a handicapped person's language acquisition (Clark, 1981; Luftig and Bersani 1985; Ecklund and Reichle 1987).

Traditional orthography hence, has often been used as a support set to other simpler symbol sets and not as a substitute at least initially. However in practice advantages of traditional orthography seem to supersede the disadvantages.

It may be relatively easy with normal school going or preschool children but with handicapped children having neuromuscular deficits, intellectual impairment, brain damage, it seems necessary for us to reconsider transparency and opacity of this system. If the iconicity of the orthographic symbol sets could somehow be improved, traditional orthography could be considered as one of the best symbol systems for all handicapped children such as cerebral palsied children, intellectually retarded, autistic and the like. Although physically based iconic symbols are learned faster, generalisation may be better with arbitrary symbols such as traditional orthography.

ORTHOGRAPHY IN CEREBRAL PALSIED INDIVIDUALS

Research work has not gone so far yet as to concentrate on each disabled group including the group of cerebral palsied. It may become an interesting area to probe into because it has often been found that cerebral palsied have mild to severe perceptual problems as an associated problem. They may also have other visual defects. In such a case, would AAC, including traditional orthography be beneficial to cerebral palsied children?

The studies mentioned previously such as by(Clark, 1981; Ecklund and Reichle, 1987) have established that iconicity is an important factor in learning of symbols but very little has been done in controlling other variables such as functional utility of the gloss (referent) enactive versus nomination symbols and the like.

Traditional orthography has only been investigated in terms of arbitrariness. Further research needs to be conducted in this line concentrating on cerebral palsied children as alternative and augmentative communication systems are extensively used with this clinical population. Research should also explore cross modality equivalencies as they are related to language acquisition.

The present study attempted to answer queries such as the facility of using traditional orthography as a symbol set in AAC for the cerebral palsied. With the time and money

restraints in India, would traditional orthography serve as the most suitable system for AAC?

Also, would enhancing the orthographic symbols to improve their iconicity help in reducing arbitrariness of traditional orthography in the handicapped population?

METHODOLOGY

The present study explores the role of enhanced orthographic symbols in the learning of lexicon in the cerebral palsy population using augmentative communication systems. This study also examines whether iconicity in the form of enhancement plays an important role in learning as well as perceiving the graphic symbols.

SUBJECTS

Thirty cerebral palsied children, all exposed to Kannada language were selected as subjects for this study. Their chronological age ranged from 3 to 20 years, with 22 males and 8 females. These subjects varied in their type and severity. They belonged to spastic, athetoid or ataxic groups of cerebral palsy ranging from mild to severe forms. However, one subject among these had degenerative cerebral ataxia.

The cerebral palsied children were grouped based on the exposure to orthography as follows:

Pre School Children: Pre school children were not exposed to orthography. These children could be categorized into the following:

1) Children who were not attending speech therapy, nor any special school or those who had discontinued speech therapy due to some reasons.

2) Children who attended speech and language therapy regularly and were not exposed to orthography.

3) Children who attended a special school along with or without speech and language therapy and were still not exposed to orthography.

Transition Group : Children of this group were exposed to a few letters of Kannada alphabet. They all attended a special school and also received formal training.

I Standard Children : Children were exposed to all Kannada alphabet. However, these children were not able to read the written script in Kannada.

IV Standard & above : This group of children were sufficiently
(Pre vocational) exposed to alphabet and Kannada script. These children were learning to read Kannada script. These children were also able to read sentences in English or other languages.

CRITERIA FOR SELECTION OF THE SUBJECTS

The children were screened and matched for the following variables before their selection as subjects of the study. The variables controlled were as follows:

a) The spoken language at home should primarily be Kannada or the children should be exposed to Kannada language. This

information was obtained from the teachers, parents or speech pathologists.

b) Children exposed to written alphabet of Kannada language were preferred. Exposure to orthography, script reading in any other languages (English or Hindi) was also acceptable.

c) The children should have average, above average or borderline intelligence, as diagnosed by a clinical psychologist. Cerebral palsied children with associated problems such as mental retardation were not considered for the study.

d) None of the children, considered as subjects should have any sensory deficits - either of the auditory or visual sensation. If present, the sensory deficits should be corrected adequately. If the child had any previous history of hearing defect it should be within 60dB Hearing Level (HL) and the child should be provided with a suitable hearing aid. The children having any visual defects such as strabismus, myopia, hypermetropia, astigmatism should be provided with spectacles or their defects should be suitably corrected.

e) The children should not have any perceptual deficits. Primarily, visual perception should be fairly adequate. Auditory perception should also be normal. The information regarding perception was obtained from the case reports, the tests administered earlier or from the speech pathologists report.

f) All the 15 vocabulary items of the test should be in the receptive vocabulary of the child. If the children were not exposed to some vocabulary items, they were taught, familiarized and their functional use was described.

g) The child's overall comprehension should be adequate or at least good so as to comprehend the instructions given to him/her during the training as well as testing session.

h) The children may either be verbal or nonverbal, i.e., the children should have some mode of expression such as eyeblinking or finger pointing, yes/no response or verbal response.

These criteria were used for selection of subjects. If the children passed all the prerequisites, they were selected as subjects for the study.
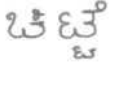
MATERIAL

Fifteen vocabulary items were selected for the present study. These vocabulary items were all nouns in Kannada language, were picturable, easy, familiar and in the receptive vocabulary of the children selected for the study. Care was taken to see that at least a part of the orthographical form of the written word of these vocabulary items could be enhanced to make it transparent so that it resembled the referent picture.

The written words of the 15 vocabulary items were subjected to two modification whereas another set of symbols

were retained in the standard orthographic form in Kannada. Thus, 3 sets of symbols and 1 set of referent cards were prepared.

The modification of the written words of the vocabulary item may be exemplified and explained as follows:

REFERENT	VOCABULARY	IPA	MEANING	ENHANCED	EMPHASISD	UN-EMPHA-SISED SYMBOL
	ಚಿಟ್ಟೆ	/tʃiˈʈʈe/	Butterfly	ಚಿಟ್ಟೆ	ಚಿ ಟ್ಟೆ	ಚಿ ಟ್ಟೆ

1) The first modification included Enhancement of the part of the orthographic form of the word so that it had a visual resemblance with the referent. This was called the ENHANCED SYMBOL. This is shown in the above table i.e, in "ಚಿಟ್ಟೆ", "ಟ್ಟೆ" was enhanced to resemble a butterfly.

2) The second modification included emphasizing a part of orthographic representation of the word by darkened or thickened line drawings.

This set of symbols were called EMPHASISED WORDS. For example: " ಟ್ಟೆ " in " ಚಿ ಟ್ಟೆ " was darkened and thickened (as in the table). In this the orthographic form of the alphabet was not modified as in the previous case, but was emphasised.

3) The third set of symbols were written or graphic words without any modification. The orthographic forms were retained (refer to the table).

A format of 15 symbol sets along with the referent is enclosed in APPENDIX-A.

To ensure that the symbols had visual resemblances with their referents (ICONICITY), ten speech pathologists knowing Kannada were asked to rate the iconicity of the symbols versus the referents. A 5-point rating scale was used by the speech pathologist to rate the iconicity which was as follows:

Rating	Degree of iconicity
1	Symbols are highly iconic
2	Symbols are very iconic
3	Symbols are fairly iconic
4	Symbols are less iconic
5	Symbols have least iconicity

All the symbols which obtained a rating of 1, 2 and 3 were accepted. Of the symbols which obtained a rate of 4 or 5, some were rejected and some modified until their transparency improved.

TEST FORMAT (Response Sheet)

A response sheet to score the response of subjects was constructed making use of the 3 symbol sets ie., unemphasised, emphasised and enhanced symbols.

The response sheet or the test format consisted of 45 items (15 of each symbol set) in a randomised order.

SYMBOLS	5	4	3	2	1	MODE OF EXPRESSION				
	a	b	c	d	e	EYE BLINKING	FINGER POINTING	YES	NO	VERBAL
శిశు 2										
బెట్ 4										
కా 2										
⋮										

Test format also had provision for recording responses of the subjects. The verbal or nonverbal (eyeblinking, pointing, yes/no) expression of these children were also recorded. Several cues were provided to the subjects to facilitate responses. If the child was unable to respond spontaneously or with self correction, cues in the form of repeating the instructions, auditory cues or visual cues were provided in a hierarchical sequence. The responses were rated in terms of the type of cues that were provided.

Spontaneous expression was scored as 5. The child who responded with self corrections obtained 4; subjects who responded by repeating instructions obtained 3; subjects who needed auditory cue (Eg. Mew for cat) obtained a score of 2; children who depended on visual tracing by the experimenter to show the resemblance between the symbol and the referent obtained a score of 1. If the subjects failed to respond even after providing all the cues, a '0' score was obtained which was marked as (x).

These scores were later used to tabulate the raw scores. The response sheet (test format) is provided in APPENDIX-B.

ADMINISTRATIOH OF THE TEST

The administration of the task consisted of two sessions.

I - a training session

II - a testing session

I - Initially each child seen individually was screened by a visual discrimination task. The visual discrimination test was administered as a visual perceptual task. For this, the same vocabulary items as the stimuli were selected. 2 sets of colourful, 2-dimensional and enlarged pictures were drawn. One set of 15 cards was placed in front of the child. The experimenter then produced a card from the second set of picture cards. The child was expected to point to a similar card from among the cards placed in front of him. If the child was able to match the cards correctly he was considered for the training session.

During the training, the child was seated comfortably on a chair at the table, wherever, the facilities were available. The cards were laid on the table, set by set, by the experimenter. Each set of cards consisted of 3 symbol cards and one referent card. The three symbol cards consisted of unemphasised, emphasised and enhanced pictures. The referent cards were 2-dimensional pictures of the 15 vocabulary items selected as stimuli. The child was explained

the visual resemblance between the symbol and the gloss/referent. A relationship between each of the four cards in a set was shown and a complete description of all vocabulary items was given. If a particular vocabulary item was not in the receptive vocabulary of the child, it was familiarized and described to the child. Each training session lasted for approximately 30 minutes.

II) Test was administered the consecutive day after the training session. In this, the referent cards were all laid on the table. The child was made to scan all the picture cards before the administration of the test. For assessment, the test format was used, (APPENDIX-B). As the experimenter provided the child with various symbols (unemphasised, emphasised and the enhanced picture) in the order of the test format, the child had to point to the corresponding referent, produce the vocabulary item (word), verbally or non verbally. If the child could not produce any response, spontaneously or with self corrections, several cues were given.

a) Initially the instructions were repeated asking the child to scan the picture and the symbol again, to see which of the picture had visual resemblance with the symbol.

2) If the child was still unable to respond, an auditory cue related to the referent was given.

3) If the child was unable to give the correct response, visual tracing was provided as the cue. This involved the experimenter tracing over the orthographic symbol to show the visual resemblance between the symbol and the referent.

d) If the child gave no response, it was marked as wrong (x).

Each child was given contingent positive reinforcement after the training as well as testing session. The testing as well as training was carried out in a well illuminated, bright room with minimal distraction, wherever such facilities were feasible.

The responses or the raw scores of the subjects obtained from the response sheet were tabulated and the results were analysed and discussed.

RESULTS AND DISCUSSION

The results are discussed under the following headings:

I   Group performance across enhanced, emphasised and unemphasised symbols.

II   Performance of children at various grades of schooling for the three symbol sets.

III   Performance of the subjects for Iconic versus non iconic symbols.

I   GROUP PERFORMANCE ACROSS THE THREE SYMBOL SETS

The results are given in a tabular form in Table-1 and also displayed graphically in Graph-1. The results clearly show a difference between the mean values of the three symbols - enhanced, emphasised and unemphasised symbols. The maximum score for all the three groups is 75. The performance of all subjects, in general is the best for enhanced orthographic symbols as compared to emphasised and unemphasised symbols. The standard deviation values are also given in Table-1. It is observed that the deviation of the mean values from the sample is not much for the enhanced symbols, but is significantly great for emphasised and unemphasised symbols. The third column in Table-1 shows significant difference between the means of the three groups of symbols. The Z-score or critical ratios show that the difference between enhanced and emphasised ($Z = 7.08$) is

TABLE-1: GROUP PERFORMANCE ACROSS THE 3 SYMBOL SETS

Symbols	Mean (M)	Standard deviation	Significant differ-rence between Means : Critical Ratios	Whether difference sign-ificant at 0.05 or 0.01 levels
Enhanced N=30	72.03	3.72	7.08 (difference between means of enhanced and unemphasised symbols	Highly significant at 0.05 and 0.01 level.
Empha-sised N=30	52.4	14.75	0.614 (difference between means of emphasised and unemphasised symbols)	Not signifi-cant at both 0.01 & 0.05 levels.
Unempha-sised N=30	49.86	17.30	6.86 (difference between means of unemphasised and enhanced symbols	Significant at 0.05 and 0.01 level

This table shows the responses of cerebral palsied individuals on enhanced, emphasised and unemphasised symbols. The responses include mean values, standard deviation, and Z scores (critical ratios). The Significant difference between means of ENHANCED-EMPHASISED; EMPHASISED-UNEMPHASISED; UNEMPHASISED-ENHANCED are also interpreted at 0.05 and 0.01 levels.

GRAPH-1: GROUP PERFORMANCE ACROSS
THE 3 SYMBOL SETS
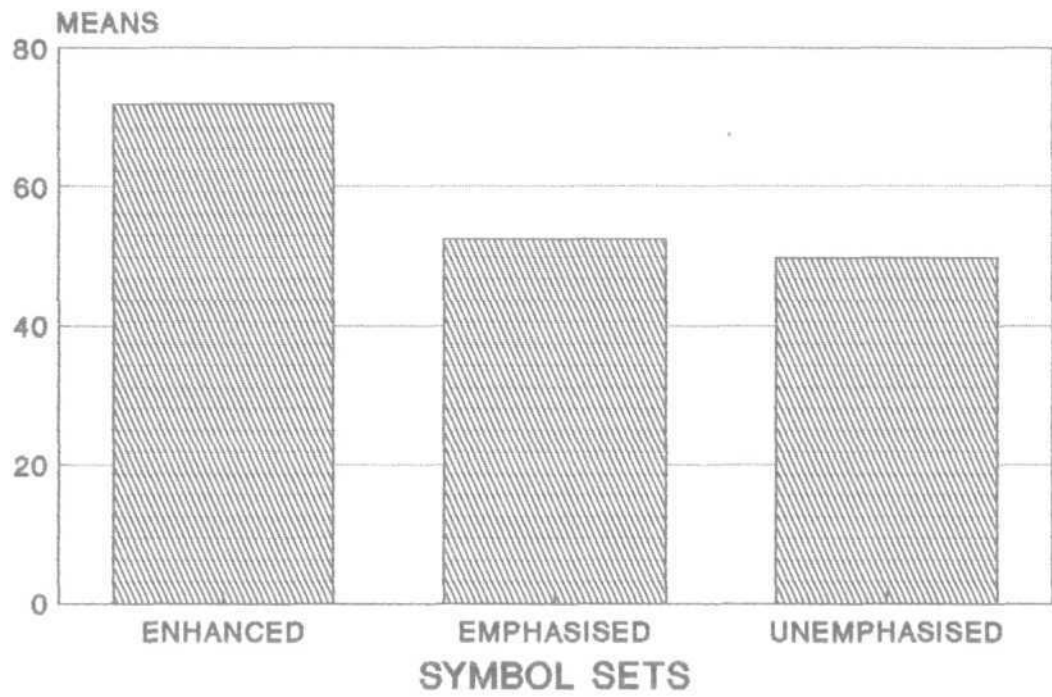
GROUP MEAN PERFORMANCE FOR ENHANCED
EMPHASISED AND UNEMPHASISED SYMBOLS

significant at 0.05 and 0.01 levels. The difference between means of emphasised and unemphasised symbols is not significant at 0.05 or 0.01 levels. The critical ratio of 6.86 between enhanced and unemphasised groups show that there is a significant difference between means of enhanced and unemphasised symbols.

The above results may be interpreted as following:

1) The performance of cerebral palsied children in this study is the best on enhanced symbols; clearly indicating that enhanced symbols with highest level of iconicity were the easiest to learn, by all the children as compared to emphasised and unemphasised symbol sets.

2) The significant difference between means of enhanced versus emphasised symbols and enhanced versus unemphasised symbols also leads to the inference that enhanced symbols are far superior in terms of their visual resemblance to the referent (ICONICITY) as compared to the other two symbol sets. At the same time, iconicity does not increase significantly by drawing thickened lines (emphasising the letters) as compared to the unemphasised group. This in turn directs us to infer that enhanced symbols might be learnt faster, easier and in a better way as compared to the emphasised and unemphasised groups. Hence iconicity is an important factor to be considered while using AAC.

DISCUSSION

The above results are comparable to earlier investigations by various researchers with regard to the role of iconicity in the learning of symbols. The results, are supported by Lieberth and Gamble (1990) according to which transparent signs (more iconic) are retained longer and number of non-transparent signs retained, decrease temporally. This is supportive to our findings that enhanced symbols which are highly transparent (as compared to emphasised and unemphasised symbols) are not only retained longer but also identified better and faster. Also, the number of enhanced symbols that are identified outnumber that of emphasised and unemphasised symbols. More over, opaque symbols or relatively less translucent symbols (unemphasised and emphasised symbols) are identified only when sufficient contextual cues are given which has been already highlighted by Mizuko and Reichle, (1989); Sevcik Romski and Wilkinson, (1991).

Another interesting finding is that iconicity is of prime importance only if the vocabulary items are in the receptive vocabulary of the child. The vocabulary items for the present study were carefully selected so that they were all in receptive vocabulary of all cerebral palsied individuals. A similar finding has been observed by Sevcik, Romski and Pate, (1988) in their study on severe cognitively disabled individuals. Hence, on one hand, role of iconicity may be considered as of prime importance, on the other hand.

iconicity by itself is dependent on factors like receptive vocabulary of the child, cognitive status and intellectual ability of the subjects.

It is still debatable as to whether symbol transparency or child's perception is a more dominant factor for learning. Luftig and Bersani (1985) state that perceived transluency is is a better predictor of learning than symbol (component) complexity.

From the findings of present study, it may be inferred that symbol complexity is what predicts learning, since a general trend of higher performance on enhanced symbols has been found as compared to the performance or emphasised and unemphasised symbols. These findings are similar to those reported by Clark (1981), Ecklund and Reichle (1987); Mizuko and Reichle (1989); Raghavendra and Fristoe (1990).

However, studies by Griffith, Robinson and Panagos (1981); Page (1985) contradict the present findings. According to these studies, iconicity, though an important factor is one among several variables that has to be considered while selecting initial lexicon for handicapped individuals.

## II   PERFORMANCE OF SUBJECTS AT VARIOUS LEVELS OF SCHOOLING

The results of the children belonging to different schooling levels in the study are tabulated. The children

TABLE-2: LEVELS OF SCHOOLING - PERFORMANCE FOR 3 SYMBOL SETS

	MEAN			STANDARD DEVIATION			T- SCORES (Significant difference between means)		
	Enhanced	Empha-sised	Unemp-hasised	Enhanced	Empha-sised	Wnemp-hasised	Enhanced Vs.emphasised	Emphasised Vs.unemphasised	Unemphasised Vs.enhanced
Preschool N= 8	69.12	39.62	37	4.19	14.31	17.31	5.23 (Difference is highly significant at to.95 and to.99 levels).	0.308 (Mo significant difference between the 2 groups at to.95 and to.99 levels).	4.77 (Difference is significant at to.95 and to.99 levels)
Transition N = 9	71.66	51.66	49.22	3.68	12.72	15.09	4.29 (Difference is highly significant at to.95 and to.93 levels).	0.3507 (Ho significant difference between the 2 groups at to.95 and to.99 levels).	4.098 (Difference is significant at to.95 and to.99 levels)
I grade N = 9	70.00	56.22	56.44	3.82	12.006	12.35	3.10 (Difference is significant at to.95 and to.99 levels).	0.036 (No significant difference between the 2 groups at to.95 and to.99 levels).	2.98 (Difference is barely significant at to.99 level but significant at to.95 level)
IV grade N = 4	73.50	69.50	70	2.50	7.29	4.69	0.899 (Difference not significant at to.95 and to.99 levels).	0.1002 (No significant difference between the 2 groups at to.95 and to.99 levels).	0.8066 (Difference is not significant at to.95 and to.99 levels)

This table indicates that there is not much difference between enhanced, emphasised and unemphasised symbols in terms of Man performance by the fourth grade (and above) group and I grade group of children. However, a significant difference in performance is seen between enhanced, emphasised and unemphasised symbols for preschool and transition group children.

GRAPH-2a: PRESCHOOL PERFORMANCE FOR THE 3 SYMBOL SETS
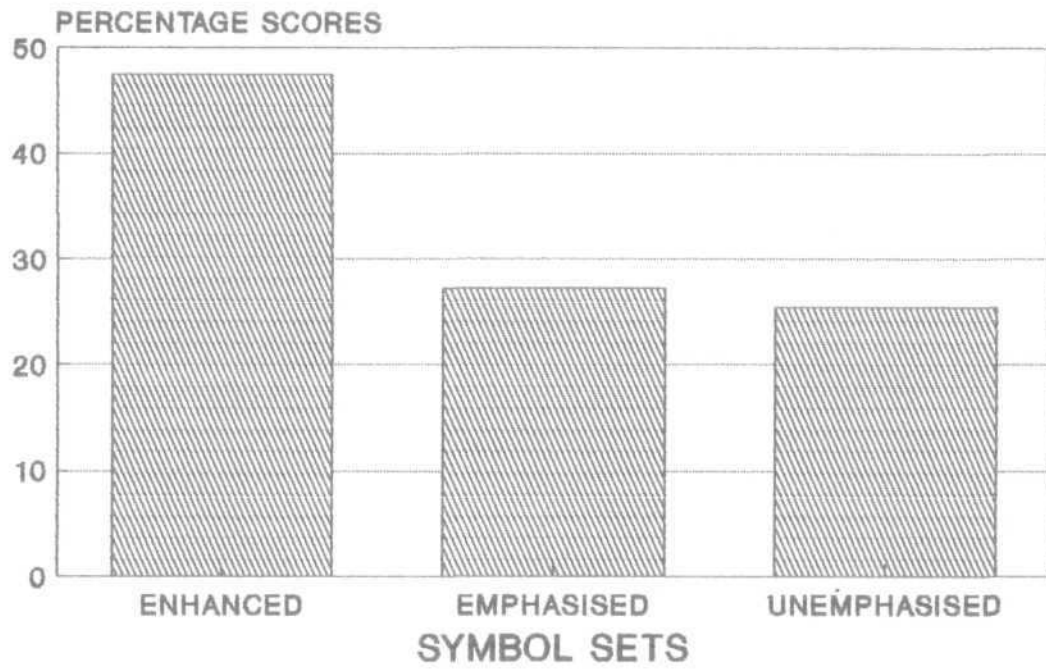
PERCENTAGE SCORES

PERCENTAGE CONVERSION OF THE SCORES:
PRESCHOOL PERFORMANCE FOR THE
3 SYMBOL SETS

GRAPH-2b: TRANSITION GROUP PERFORMANCE FOR THE 3 SYMBOL SETS

PERCENTAGE SCORES
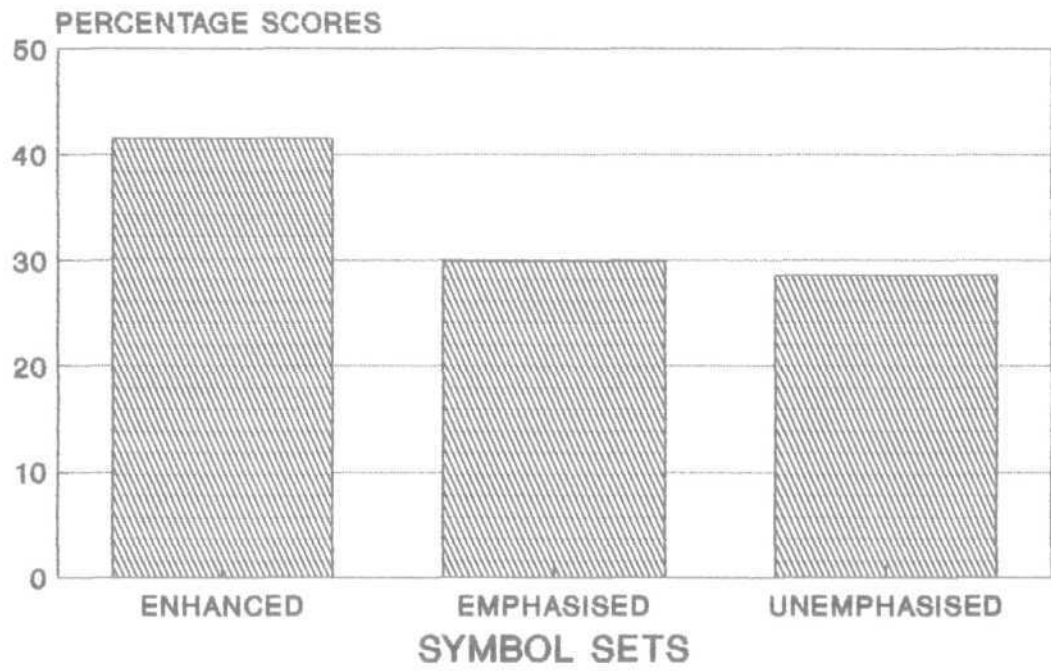
SYMBOL SETS

PERCENTAGE CONVERSION OF THE SCORES:
TRANSITION GROUP PERFORMANCE FOR THE
3 SYMBOL SETS

GRAPH-2c: I GRADE PERFORMANCE
FOR THE 3 SYMBOL SETS
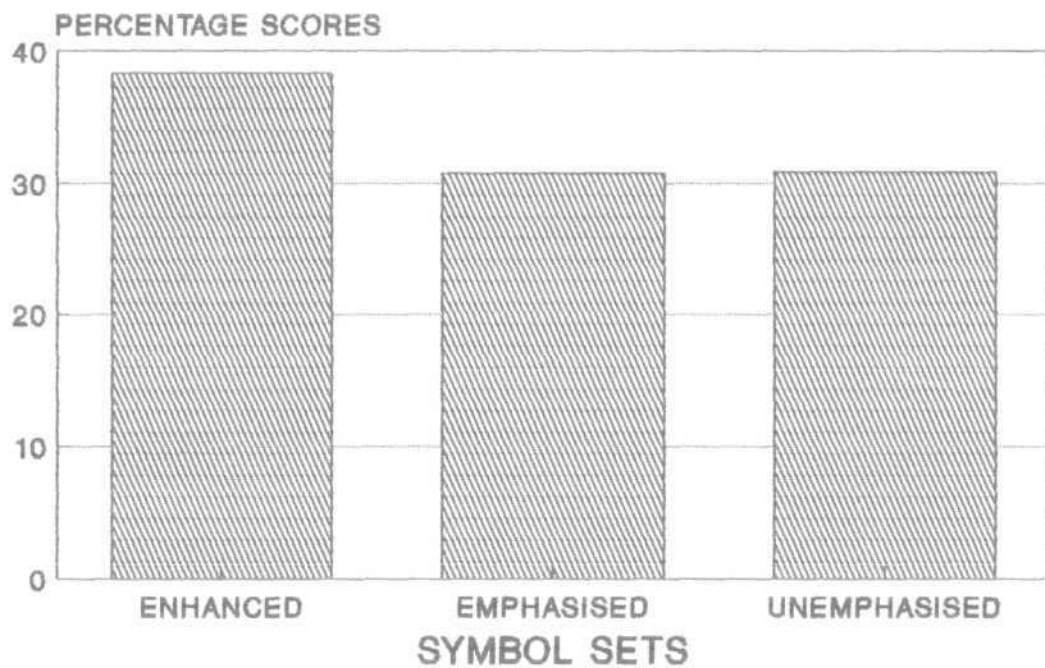
PERCENTAGE CONVERSION OF THE SCORES:
I GRADE PERFORMANCE FOR THE
3 SYMBOL SETS

GRAPH-2d: IV GRADE PERFORMANCE FOR THE 3 SYMBOL SETS
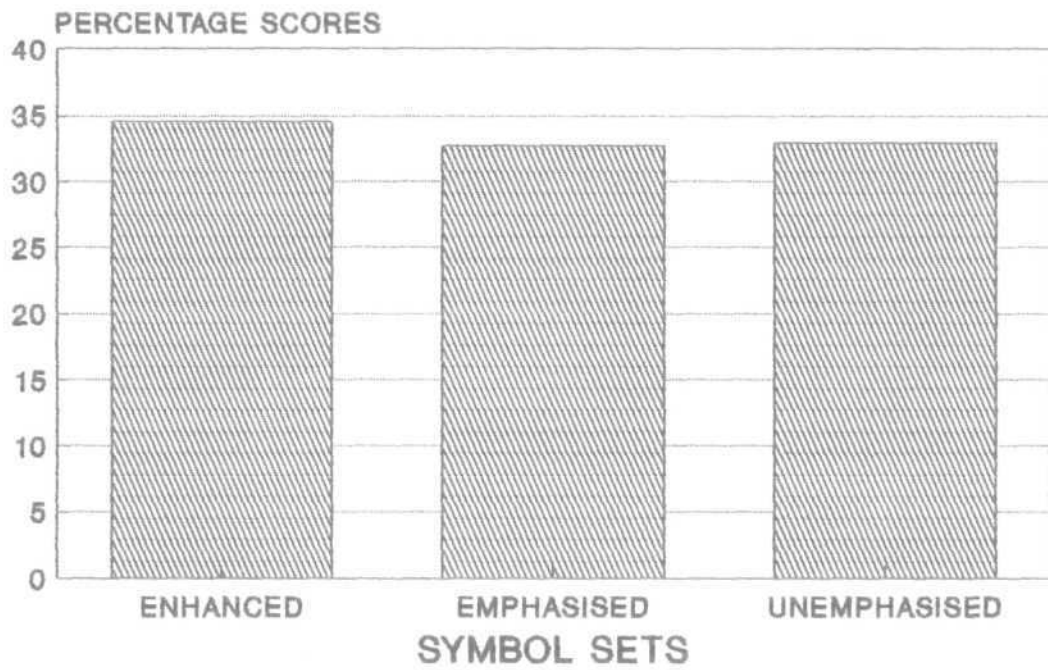
PERCENTAGE SCORES

PERCENTAGE CONVERSION OF THE SCORES:
IV GRADE PERFORMANCE FOR THE
3 SYMBOL SETS

GRAPH-2e: LEVELS OF SCHOOLING
MEAN SCORES

MEANS

SYMBOL SETS

ENHANCED   EMPHASISED   UNEMPHASISED

PRESCHOOL   TRANSITION   I GRADE   IV GRADE
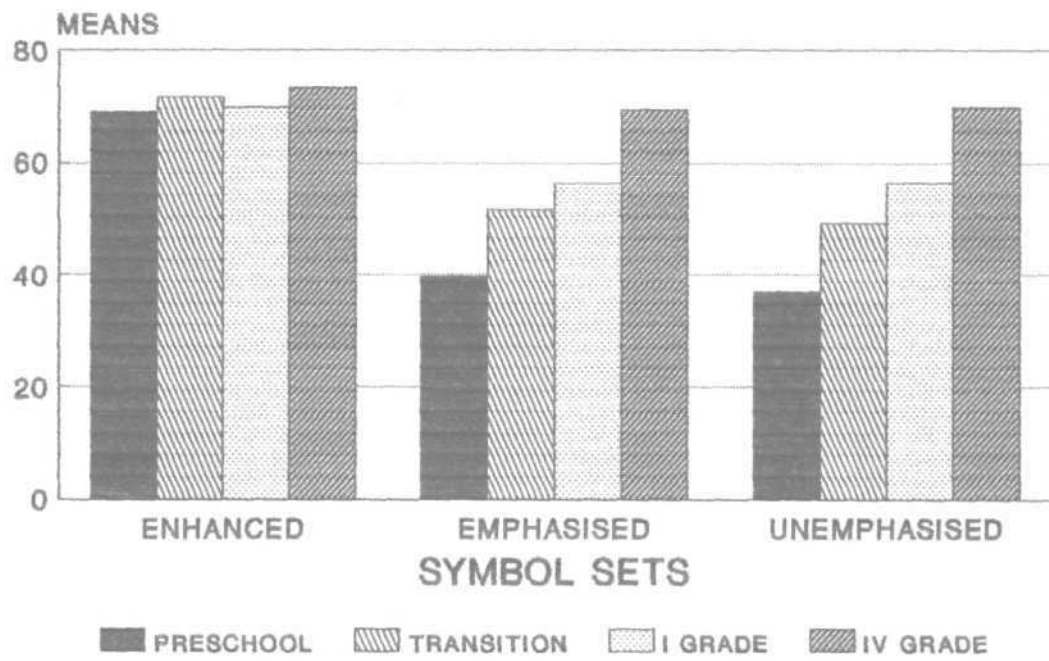
MEAN PERFORMANCE ACROSS DIFFERENT LEVELS
OF SCHOOLING

were classified into preschool, transition, I grade and
fourth grade to pre-vocational levels. The mean values,
standard deviation and significant difference between means
of different symbols are given in Table-2 and Graph-2a, 2b,
2c and 2d and 2e. The results clearly indicate an ascending
mean score from the preschool level to the prevocational
level. More over the standard deviation of the samples from
the mean is not as great for the enhanced symbols as for the
emphasised and unemphasised symbols. However a vertical trend
is also seen. The standard deviation of the samples from the
mean decreases for higher grades. The significant difference
between means of enhanced versus emphasised; emphasised
versus unemphasised and unemphasised versus enhanced symbols,
also clearly show that at preschool level there is a
significant difference between means between enhanced versus
emphasised and enhanced versus unemphasised symbols. But for
higher levels there is no significant difference between
means of enhanced versus emphasised; emphasised versus
unemphasised and enhanced versus unemphasised symbols.

The above results indicate the following:
1) In general, there is an increase in performance level on
the test, from preschool level to fourth grade; this increase
being evident for all the three symbol sets: enhanced,
emphasised and unemphasised symbols. Also, for each group,
the performance decreases from enhanced symbol to
unemphasised symbol sets.

2) Whereas, a large deviation of the samples from the mean may be observed for preschool level, there is a decreasing trend of standard deviation values for higher grades. This shows that performance does not vary much in the fourth grade (prevocational) group as compared to preschool or transition levels across different symbols.

3) The T-scores indicate that there is no difference between emphasised or unemphasised symbols in terms of performance for all grades. In other words, emphasis of orthographic symbols in terms of thickened line drawings does not ameliorate the iconicity. However, there is a significant difference between means of enhanced versus emphasised; enhanced versus unemphasised symbols for preschool and transition level. For the I grade level, the difference is barely significant and for IV grade level, there is no difference at all. This again highlights the fact that with increased exposure to alphabet and with greater cognition and comprehension level, the I grade and IV grade performance on the three symbol sets do not vary. The preschool and transition level children are least exposed to alphabets, have lesser cognition and show great difference across the three symbol sets; favoring enhanced symbols as compared to emphasised and unemphasised symbols.

DISCUSSION

It is evident from the study that the preschool children and transition level children do not identify symbols as well

as higher grade children. This has been supported by Romski and Sevcik (1989) in their study in which they report that adults conceptualise symbols in a broader way as compared to children for the same referents. However, characteristics findings specific to cerebral palsied children have not been obtained.

The present findings also supports Bruner's (1968) model distinguishing symbol representation (internal conceptualisation) from iconic representation.

The increasing performance with increasing grades are supportive of Musselwhite and Ruscello's study (1984) in which they found a general improvement in performance with increasing age. The study also indicated that less transparent Blissymbols were less guessable than Rebus or Picsyms.

The results may indicate that preschool or transition level children initially depend on concrete representations. As they are exposed to orthography, and improve in their cognitive status, conceptualisation becomes more internalised and widened. The children readily generalise the symbols, so that they are able to identify arbitrary symbols without much contextual cues.

In other words, initial exposure to orthography may effect the responses to orthographical symbols.

III ICONIC VERSUS NON ICONIC SYMBOLS

The iconic and the noniconic symbols were chosen based on speech pathologists , ratings as described earlier in the methodology. The symbols which had speech pathologists scores of 1, 2, 3, (iconic) 71-100% of the times were considered as HIGHLY ICONIC and those which had score of 1, 2, 3, less than 70% of the times were considered LESS ICONIC.

Based on this, different words of different symbol categories (enhanced, emphasised and unemphasised symbols) were rated. The mean scores, standard deviation and t-scores are tabulated in Table-3 and depicted in Graph-3.

The results do not show much difference in mean values or standard deviation scores for highly iconic versus less iconic symbols across the three symbol sets. In other words, enhanced iconic and enhanced less iconic symbols do not show much difference in score. The same is true for the other two symbol sets also.

The t scores obtained for iconic versus non-iconic symbols for the three symbol sets also show no significant difference between means.

1) The vocabulary items chosen for this study do not vary in terms of level of iconicity for enhanced, emphasised and unemphasised symbols. However, iconicity in terms of degree of enhancement (enhanced > emphasised > unemphasised symbols) does vary and is in accordance with the scores.

TABLE-3: Responses of subjects for Iconic versus Non Iconic symbols for enhanced, emphasised and unemphasised groups:

Symbols	Mean (M)	S.D.	T scores	Whether difference significant or not
Iconic enhanced N = 10	143.6	5.35	0.759 difference between	
Non Iconic Enhanced N – 5	141.2	5.45	means of iconic-enhanced and non-iconic enhanced groups	Not significant at t 0.95 and t0.99 levels.
Iconic-emphasised N-10	105.4	17.33	0.975 difference between	
Non iconic Emphasised (N=5)	95.6	16.59	means of iconic empha-sised & non-iconic empha-sised groups	Not significant at t0.95 and t 0.99 levels.
Iconic Unemphasised (N=10)	99	16.49	0.157 difference between means of	
Non-iconic unemphasised N = 5)	97.6	12.51	iconic un-emphasised and non-iconic un-emphasised groups	Not significant at t0.95 and t0.99 levels.

This table represents the mean, standard deviation values and t scores of iconic versus noniconic symbols for enhanced, emphasised and unemphasised symbol sets. The t score values indicate that there is no significant difference between ICONIC and NON ICONIC symbols.

GRAPH-3: ICONIC VERSUS NON ICONIC SYMBOLS:- GROUP RESPONSES

MEAN SCORES

SYMBOL SETS
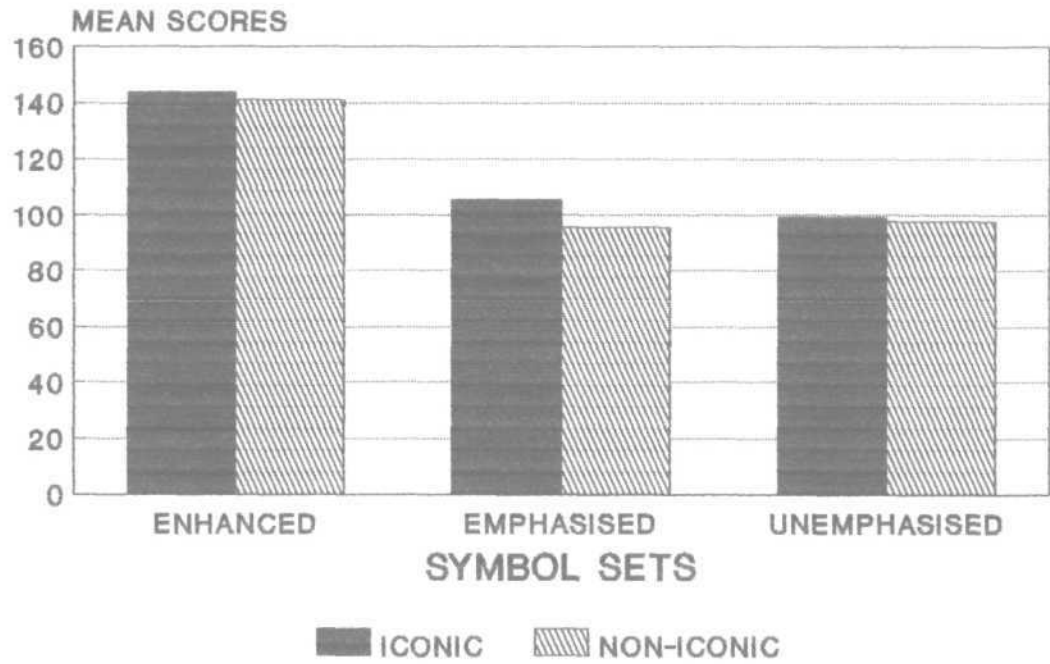
ICONIC   NON-ICONIC

GROUP RESPONSES FOR ICONIC VERSUS NON-
ICONIC ITEMS OF THE 3 SYMBOLS SETS

2) Since standard! deviation scores are also similar for iconic versus less iconic groups for enhanced, emphasised and unemphasised symbols, it clearly shows that samples are not much scattered, around the mean. In other words, iconic and noniconic symbols are alike. This reflects the fact that vocabulary items and their respective orthographic symbols chosen were similar in terms of iconicity and level of difficulty.

3) The t-scores also furthers the fact that there is no difference in performance for high iconic or less iconic symbols.

DISCUSSION

The above results indicate that the words selected for vocabulary items may be suitable for teaching initial lexicon for cerebral palsied individuals. The words did not show significant difference in terms of high or low iconicity. The better performance for enhanced symbols (highly transparent), in general, by the group agrees with the view of Raghavendra and Fristoe (1990) in which they opine that enhancement plays an important role in the learning of symbols. Mc Naughton and Warrick (1984) also suggest that enhancement of symbols facilitate comprehension of various concepts, enhance communicative skills and also encourage appropriate use of environment.

The present study also suggests that irrespective of lexicon selected, the performance of the subjects varies with transparency of symbols, as a major variable.

In conclusion, the present study discusses the following results:

1) Enhancement of symbols plays an important role in learning of lexical items. The number of symbols recalled and retained outnumbers that compared to emphasised and unemphasised symbols.

2) Performance increases from preschool level to the fourth grade level. In other words, I grade and fourth grade children are able to learn the symbols better and faster as well as retain and recall them with much ease as compared to transition or preschool children.

A greater difference in performance was found between enhanced versus emphasised and enhanced versus unemphasised as compared to emphasised versus unemphasised symbol sets. In general, it is probable that learning of orthographical symbols may vary with varying degrees of exposure to orthography.

3) There may not be much difference in performance between highly iconic versus less iconic symbols as predicted. In other words, lexical items selected for the study may not have differed in iconicity, but the enhancement of symbols solely may have effected the performance.

SUMMARY AND CONCLUSION

Augmentative communication systems are found to facilitate communicative skills in most of the nonverbal individuals including cerebral palsied individuals. Though symbol systems such as pictorial drawings, rebuses, blissymbols and many others, may be used, traditional orthography as the symbol system may be more appropriate in the present day situation in India - the reason being its acceptability, universality, generalisability, and utility in schools. However the major drawback with traditional orthography is its opacity and idiosyncracy.

The present study aimed to study the learning of easy lexical items with the use of enhanced orthography in Kannada in the cerebral palsied individuals. Thirty cerebral palsied children, verbal as well as nonverbal, were selected as subjects. These children were classified as belonging to preschool, transition, I grade and IV grade (prevocational) levels differing in the degree of exposure to Kannada orthography. It was ensured before the selection of subjects that they had no intellectual disability, cognitive disabilities, visual and auditory perceptual disabilities, or deficits. The materials selected for this study were 15 lexical items in Kannada, which were identified as part of the receptive vocabulary of the subjects (Appendix-A). A set of 15 referent cards consisting of 2-d line drawings of the chosen, lexical items were prepared by an artist. A set of 15

symbols consisting of orthographical representations of the selected referents were prepared. This set of symbols was called, for convenience, as unemphasised symbols. These were subjected to modification by emphasising a part of the written word (which resembled the referent) to obtain a set of 15 emphasised symbols. In the third symbol set, a part of the written word was enhanced to resemble the referent. This set of symbols was referred to as the enhanced symbols.

The subjects selected for the study were given a training session using the 15 referents and their respective 3 sets of symbols (enhanced, emphasised and unemphasised symbols). A resemblance between the unemphasised, emphasised and enhanced symbols and the referents were shown to the subjects for the 15 lexical items. A test was administered the following day, in which referents were laid in front of the subjects and the symbols from the 3 sets (unemphasised, emphasised and enhanced) were produced, one by one, in a random order. The subjects were expected to identify the appropriate referent picture in front of them and responses were recorded in a test format (Appendix-B).

The test format had provision for recording verbal or non verbal response of the subjects. If the children could not respond spontaneously or with self corrections, appropriate cues in the form of repeating the instructions, auditory cues or visual tracing cues were given. These

responses were scored on a 5 point rating scale according to the cues that were required to elicit the response. The raw scores were tabulated and were subjected to statistical analysis. The results were found to be as follows:

1) Enhancement of symbols facilitated learning of written words. The number of enhanced symbols identified were more as compared to emphasised and unemphasised by all groups of subjects.

2) Performance increased from preschool level to fourth grade level. In other words, first grade and fourth grade children were able to learn the symbols faster and with ease as compared to preschool and transition children. Performance on the 3 symbols sets (unemphasised emphasised and enhanced symbols) by the higher grade children was almost similar; and for preschool and transition level children, the performance on enhanced symbols was higher as compared to unemphasised and emphasised symbols. Learning of orthographical symbols may vary, in general, with varying degree of exposure to orthography. For young children below the level of I grade, enhancement of symbols used in AAC is crucial.

3) There was no difference in performance between, highly iconic and less iconic symbols of this study ie., lexical items did not differ in the degree of arbitrariness.

LIMITATIONS OF THE STUDY

The major draw backs of this study are as follows:

1) The number of vocabulary items selected for this study (fifteen) are limited and hence our interpretation regarding the overall performance of the subjects in identifying the symbols is limited to these symbols.

2) Though the overall number of children selected were large, the number of children in preschool, transition, I grade and IV grade levels were less.

In conclusion, the present study focuses on how cerebral palsied individuals identify enhanced orthographic symbols versus emphasised and unemphasised forms of orthographic symbols. This study might become clinically important in India because traditional orthography is the most suitable symbol system and widely used in schools. Moreover, in the view of integrating cerebral palsied children with the normal children in schools, orthography as a symbol may be the only suitable method in augmentative communication system. Enhancement of orthography would pave the way for cerebral palsied children, specifically the younger age groups to learn the written words with ease.

Further studies are required to investigate the effects of orthographical enhancements on the learning and their use in everyday communication. There is also a need to investigate the performance of children below I grade to different types of enhancement of orthographical forms.

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APPENDIX - A

REFERENT	VOCABULARY	IPA	MEANING	ENHANCED EMPHASISD		UN-EMPHA-SISED SYMBOL
	ಬೆಕ್ಕು	/beʼkku/	CAT	ಬೆಕ್ಕು	ಬೆಕ್ಕು	ಬೆಕ್ಕು
	ಚಂದ್ರ	/tʃʌndra/	MOON	ಚಂದ್ರ	ಚಂದ್ರ	ಚಂದ್ರ
	ಎಲೆ	/ele/	LEAF	ಎಲೆ	ಎಲೆ	ಎಲೆ
	ಬಾತು	/baːtu/	DUCK	ಬಾತು	ಬಾತು	ಬಾತು
	ಇಲಿ	/ili/	RAT	ಇಲಿ	ಇಲಿ	ಇಲಿ
	ಶಂಖ	/ʃʌnkʰa/	CONCH	ಶಂಖ	ಶಂಖ	ಶಂಖ
	ಉಂಗುರ	/ungura/	RING	ಉಂಗುರ	ಉಂಗುರ	ಉಂಗುರ
	ನಲ್ಲಿ	/nʌʼlli/	TAP	ನಲ್ಲಿ	ನಲ್ಲಿ	ನಲ್ಲಿ
	ಹುಳು	/huɭu/	WORM	ಹುಳು	ಹುಳು	ಹುಳು

REFERENT	VOCABULARY	IPA	MEANING	ENHANCED	EMPHASISD	UN-EMPHA-SISED SYMBOL
	ಪಾಪ	/paːpa/	BABY	ಪಾಪ	ಪಾಪ	ಪಾಪ
	ಲಂಗ	/lʌnga/	SKIRT	ಲಂಗ	ಲಂಗ	ಲಂಗ
	ಓಲೆ	/oːle/	EAR RING	ಓಲೆ	ಓಲೆ	ಓಲೆ
	ಕಿವಿ	/kivi/	EAR	ಕಿವಿ	ಕಿವಿ	ಕಿವಿ
	ದೀಪ	/diːpa/	LIGHT	ದೀಪ	ದೀಪ	ದೀಪ
	ಚಿಟ್ಟೆ	/tʃiʈʈe/	BUTTERFLY	ಚಿಟ್ಟೆ	ಚಿಟ್ಟೆ	ಚಿಟ್ಟೆ

APPENDIX - B

SYMBOLS	a	b	c	d	e	MODE OF EXPRESSION			
						EYE-BLINKING	FINGER POINTING	YES/NO	VERBAL
ಬೆಕ್ಕು $_2$									
ಚಿಟ್ಟೆ $_4$									
ಕಿವಿ $_2$									
ಇಲಿ $_2$									
ಉಂಗುರ $_2$									
ಯಕ್ಷ $_4$									
ಎಲೆ $_3$									
ಬಾತು $_4$									
ನಲ್ಲಿ $_4$									
ಬಾತು $_2$									
ಚಂದ್ರ $_3$									
ಉಂಗುರ $_3$									
ಶಂಖ $_4$									
ಬೆಕ್ಕು $_3$									
ಕಿವಿ $_3$									
ಶಂಖ $_2$									
ಹಾವು $_3$									
ಹಾವು $_2$									
ಚಿಟ್ಟೆ $_2$									
ಬಾವು $_3$									
ಚಂದ್ರ $_4$									
ಇಲಿ $_4$									
ಲಂಗ $_3$									
ಕಿವಿ $_4$									
ನಲ್ಲಿ $_3$									
ಎಲೆ $_2$									
ಉಂಗುರ $_4$									
ಓಲೆ $_3$									CONTD...

ದಾಪ$_4$									
ಬಾತು$_3$									
ಹುಳ$_2$									
ಕಂಬ$_3$									
ಲಂಗ$_2$									
ಬೆಕ್ಕ$_4$									
ಲಂಗ$_4$									
ಎಲ$_4$									
ಇಲ$_3$									
ಚಂದ್ರ$_2$									
ದಾಪ$_2$									
ನಲ್ಲ$_2$									
ಪಾಪ$_4$									
ಹುಳ$_3$									
ಚಿಟ್ಟ$_3$									
ಓಲ$_4$									
ಓಲ$_2$									

NOTE

	CUES	SCORE
a	SPONTANEOUS RESPONSE	5
b	SELF CORRECTION	4
c	REPEATING INSTRUCTIONS	3
d	AUDITORY CUES	2
e	VISUAL TRACING CUES	1
	NO RESPONSE	O

SUBSCRIPTS	SYMBOL REPRESENTATION
2 STANDS FOR	ENHANCED SYMBOL
3 STANDS FOR	EMPHASISED SYMBOL
4 STANDS FOR	UN EMPHASISED SYMBOL