

Speech

1962

For the cerebral palsied, speech is the heaviest handicap of all they suffer. For many years we had attempted to provide, mechanically, some means of communication, but it was fruitless, until the electronic age set new limits to our technology. Now speech for the CP is technically possible in a number of ways. It only needs the money and time, for its commercial development. What is money? What is the price tag on the gift of speech for a cerebral palsied child?

I was given a sharp lesson on its value when, in 1978, I suffered a stroke which left me speechless for twelve weeks. It was an exercise that I could well have done without, but I discovered what it was like to be personally involved, and the experience, though painful, was well worthwhile. It increased my admiration for the cerebral palsied who have coped with the speech problem, not just for one or two years but the whole of their lives.

The importance of the perceptual motor planning deficit is that all of the work done so far, on the muscles of the cerebral palsied, applies doubly to those of the neuro-transmission problems of the cortex, lead us to believe that the final answer to the riddle of the CP lies directly in those of speech - and the lack of it.

'We now have precise neurological information that allows us to tell people whether they are improving in the right direction and how close to a target they are getting. If on the thirtieth attempt, we can show a person is improving and is a few per cent less disabled, we can reward his achievement with beautiful music, because his achievement is exciting. The achievement is important for that improvement will be the base line we can begin from next session and thus gradually approach the goal of intelligible speech.'

There is little doubt that CP children are particularly prone to variations in ability and that limitations occur frequently, mainly at visuo-motor skills. Although one may argue this is due to brain damage, it might equally be argued that an inadequate or abnormal background of experiences is responsible for this.

It has been obvious that we finish up with a child who is able to adjust much better to a learning task in school than others have formerly. Possibly this is due in part to the fact that tasks in the 'Basic Abilities' programme have been pitched at the learning level of the child, that is, at the point at which correct responses are possible and frequent, but do not always occur.

For the CP child, the ability to walk opens the door, just a crack, to experience the environment. For the child, and increasingly so for the adult, in the absence of effective speech, the door is slammed tightly shut again.

Of all the handicaps the CP is heir to, the most important one is lack of speech. If you can make yourself understood by a stranger, all the other handicaps, important though they may be, can be minimised by some other means - mechanical or electronic. We are now standing on the threshold of synthetic speech and, for the CP, it is truly 'waiting for the sunrise'.

For the CP kindergarten and school child, life is demanding. During this time, intensive therapy must continue and all medical, surgical and paramedical procedures cut heavily into the time available for classroom education. Many CP have difficulties of speech and of hearing as well as visual troubles. Yet, the level of education attained by them offers the only possible hope of escape from the bonds of their physical handicap.

Communication for Non-Vocal Cerebral Palsied Children. Excerpts from a paper delivered to The Spastic Centre by Eugene T. McDonald, Ed. D., Research Professor, Speech Pathology, Pennsylvania State University, 1975:

'I'm going to talk about non-vocal communication for cerebral palsied children. You will notice that I said 'non-vocal' communication rather than 'non-verbal' communication. This is because we use verbal symbols even though expression is achieved through some modality other than speech or vocalisation. Also, I want to stress the word 'communication'. In our early experience with cerebral palsied individuals, speech pathologists spent a great deal of time trying to develop speech even when it should have been obvious that development of speech was no more feasible than the development of walking, or the development of self-feeding.

When we realised that this goal was not always a justifiable objective, speech pathologists began emphasising language training for the young cerebral palsied child. Usually the development of receptive language is emphasised. Language reception is not sufficient for establishing inter-personal relations so I will stress an even broader concept - the development of communication. Our objective should be to help the cerebral palsied child make his feelings, his ideas, his questions "common" with other human beings. If he cannot do this through the usual expressive modality, speech, then we should find some other method which will enable him to be an expresser as well as a receptor of language.

It would be impossible to overemphasise the importance of communication to the cognitive, social and emotional development of the young child. Receptive language is essential, but without the expressive component of communication the child's development will be stunted, hence, we should make early and heroic efforts to find effective ways for the non-oral infant or young child to express himself. We think that it is now possible to identify at an early age, infants who are at risk for failure to develop oral communication skills. For these children there are techniques with which we can intervene early, in order to develop an expressive ability and thus facilitate cognitive, emotional and social development.'

We have in previous pages referred to the work of Miss Beatrice Le Gay Brereton. First, she was involved as a Consultant to the Commonwealth Office of Education. While there she did a series of reports on the educational potentialities of the cerebral palsied child in 1950. The final summary of those reports stated that "the various methods of analysis seems to point to a slightly greater variability in the tests when used with children without cerebral palsy. This is the opposite to what one might expect, and no evidence has been deduced to the effect that specific characteristics of the thought process or in the type of error made by cerebral palsied children result in scores being obtained that vary according to the material of a particular test rather than overall ability of the child".

Miss Brereton was intrigued by her results, and in 1955 she agreed to join The Spastic Centre staff as a Research Officer. As an Educational Psychologist she was responsible for the integration of the teachers from the Education Department with the therapists and medical staff of The Spastic Centre. She worked well with Dr Burton-Bradley, our Medical Director at that time, and then, as the fruit of her capacity, she brought out, with the assistance of Jennifer Sattler and Margaret Ironside, under the direction of Dr Corrie Reye, a book, 'Basic Abilities for Cerebral Palsy', published in 1967. M. L. J. Abercrombie, in the preface to the book, said:

'Current thinking about child development emphasises the overwhelming importance of experience. The concept of the static, innately determined IQ has gone; we now think of a child's level of intelligence as resulting from the complex interaction of the potentialities he had at birth, and all that has happened to him since - what he has smelled, tasted, touched, seen and heard, and all the movements he has made.

So, if a cerebral palsied child is less intelligent than a normal child of the same age, we think this is not only because he was born with a damaged brain, but because his experience has been damaged also. His hearing may be deficient, and he has by no means heard every word that was spoken to him; his eye movements may be erratic so that he has not fixed his attention easily, or for long, on what he has looked at; he may squint. He has been less mobile than a normal child, and such movements as he has been able to make were jerky and ill-controlled. The experience that came to him through movement, both experience of his own

joints and muscles, and experience of the world that exploring it with movement gives, all this has been impoverished.

We recognise for a cerebral palsied child the importance of enriching his experience, of talking and playing with him, even if the signs he gives of responding with understanding are meagre and less rewarding to us than those we expect from a normal child.

A cerebral palsied child's sensory experience is not only impoverished, but it is less ordered. Muscles that are too tense or too slack, so that they do not move the hand or eye skillfully to its target, feed back to the brain a lot of messages it would do better without. The map the child gets of the world, the picture of the relatedness of things in space, must be more chaotic than the one a normal child gets, whose movements are better controlled and more economical. So a cerebral palsied child needs to be helped both to get experience, and to order it, and the sooner it gets help, the better.

It is worth spelling out these basic assumptions as to what the needs of cerebral palsied children are, because rigorous experimental proof that any one form of treatment is more beneficial than another, or than none at all, is not available. The complexities of assessment being what they are, and our techniques so feeble, is it likely to be provided in the near future. Meantime, brain damaged children are growing up.

Faced with these tragic results of some of nature's errors, we must act with informed faith, applying to their treatment carefully assessed general ideas about the way children develop, both normal, and handicapped.'

'The Theory Behind the Treatment' gives us the crux of the Basic Abilities Plan, as follows:

'It is clearly possible to improve perceptual skills in normals. There is a great quantity of evidence about progressive change in acuity, variability and accuracy of perception... It proves beyond a shadow of doubt that the notion of fixed thresholds for a certain set of innate sensory dimensions is over-simplified. Discrimination gets better with practice, both with and without knowledge of results. An example may be taken from the two-point threshold on the skin. The difficulty may well be in maintaining the gains that are made.

The treatment plan has now been in use for a number of years. The children who have received treatment are, on the whole, more ready for formal schooling than they were previously. Their scores on many visuo-motor and perceptual tests compare comparatively frequently with their overall estimates of intellectual ability. The reason for the improvement may be in the actual structuring of the treatment plan, it may lie in the overall effect of individual tuition at an early age, or it may lie in pitching tasks accurately at the appropriate level of difficulty. This is still unknown. The long term effect on intellectual development and on school success is also still unknown.'

Following that publication in 1972, Miss Brereton had published 'Learning Ability and Behaviour of Cerebral Palsy' and I think that the concluding paragraph in the book sums up her whole philosophy when she says:

'In the past we have thought of the cerebral palsied child as a child with a certain level of intelligence and a certain degree of physical handicap. We expected both these features to run a course more or less pre-determined by birth, the factors in the background being certain innate propensities and the presence of pathology of the motor control centre of the brain. Although the information available can be interpreted in this way, it is not conclusive. It is quite possible to consider that inability to learn occurs because the motor handicap distorts visual information or interferes with visuo-motor mechanisms. What might be considered abnormal behaviour, could then be seen as a resultant difficulty in interacting with the environment.'

Then Miss Brereton, with the assistance of Margaret Ironside and under the direction of Dr Corrie Reye, produced 'Interaction Games for the Severely Handicapped Cerebral Palsied Child Without Speech'. I think the introduction to the 'Games' is worth quoting in detail:

'It is usually difficult to establish any form of communication with young severely handicapped cerebral palsied children without speech. These children are often erroneously considered to be grossly mentally retarded. In some, because facial expression is alert and they have a ready smile, teachers and therapists feel intelligence is above this level but are unable to substantiate this. In some, behaviour is predominantly hostile to people outside their family circle, and they may at times have severe screaming tantrums, even at home. Others again are passive and expressionless, perhaps as the result of a withdrawal from situations they are unable to participate in.

The aims, in the past, have been to establish verbal communication in one way or another. First a yes/no response by nodding or smiling is introduced and later, by learning to spell, the use of some form of communication board or typewriter. Pitfalls in relation to the first of these, is that the response is often equivocal - the child both nodding and smiling in one order or the other, to a greater or lesser degree. The basic pitfall in relation to the second, is that little progress can be made until the child has the mental age necessary to learn to read and spell, spelling being considerably more difficult than reading. Many of these children have, in the past, never learnt to read or spell effectively.

The first principle in approaching through Interaction Games, is that the child is in difficulties in relation to the whole situation, not just in relation to the use of words or gestures. Physically, most children would be able to give some indication of a definite choice. One is, however, most unlikely to get a consistent indication of a definite choice. The child does not appear to look carefully and does not show any real interest in the task.

Actual linguistic development is not impeded merely by a lack of ability to articulate. The range of facial expression and gesture is also restricted. For example, facial expression may be used to smile at you, implying a degree of interaction, but the usual range of expressions indicating clear responses such as surprise, or doubt, or displeasure, or anger, are not always present. Similarly, the hands may be used to point but not used communicatively as in requesting something, indicating ownership, establishing contact or indicating direction. These children appear too divorced from their environment to need to communicate with, or about, it.

The second principle of Interaction Games is that the situation that can be made most obviously meaningful, is a non-verbal problem which has to be solved. The successful completion of such a problem can be the basis for communication between the person who sets the task and the person who completes it. Since the inadequate reaction of these children to their environment may result from their inability to participate, the problem set must be simple, so they are successful, and one in which active participation is possible.

The neurological approach to treatment challenges one, not merely to devise ways of bringing these children into effective contact with their environment, but also to start this treatment at the earliest possible age. The first tasks in the programme are, therefore, things that a normal baby can accomplish at nine to twelve months of age.

The successful treatment depends on an effective positioning of the child, so that a gross arm movement is possible, so that the child can get his eye, at least fleetingly, on the task; so his eye can be caught by the eye of the person who sets his task. The introduction of two people into the situation - one identifies herself with the child, facilitates his movements and gauges the child's attention in attempting movement. The other sets the task and acts as a sounding board, to respond to the child's success or failure and the introduction of varied media until one is found that catches the child's interest.

Prior to 1972, the conversation of children without speech depended on their ability to spell. This frequently left them without an effective means of communication until ten years of age or older, by which time the natural flow of language may have been inhibited. Sentences, if they emerged at all, tended to sound as if they were artificially put together. Some children never acquired enough words to be able to express themselves at all adequately.

The overall treatment plan involves a series of strategies. Emphasis is first placed on early interaction with people and objects. Communication is not merely a way of talking, but involves also a desire to make contact with people, dolls, animals or even things. It requires an interest in, and knowledge of, one's environment and of the verbal labels attached to the various items in it. Without the ability to communicate, severely handicapped children may withdraw into themselves, and, as a result, may have little interest in people and large gaps in their information.

Early communication is obtained from birth in the relationship between baby and mother, and it is strengthened by neuro-developmental physiotherapy.

Early expressive development is encouraged throughout the day, through the interpretation of gesture and body language. Frequently this commences with feeding therapy. The mother is shown not only how to feed the child more effectively, but also how to interpret and encourage his responses and indications of needs and gratification. Oral stimulation associated with feeding therapy encourages vocal play, by focusing attention on the mouth. This vocal play amuses the child and increases his interest in talking. The kind of talking at this stage from mother to child would be in simple, short statements about everything

they are doing. This provides information for the child, and the opportunity to respond by looking, reaching out, or showing in some way that he is participating in the communication.

If the opportunity is provided, the child will eventually indicate, in his own way, his choice between playing with a favourite toy or being taken for a walk. This skill can be expanded so that the child can choose what he would like to eat, by selecting one of two or three pictures pasted on the refrigerator door. In this way he learns to associate pictures with chosen items. His tabletop can then be decorated with pictures, drawings or photographs, to provide a wider experience. The pictures used for this decision-making should be of particular objects that really interest him, probably family members, games or toys, television, bath, car and foods.

The number of pictures from which to choose will gradually be built up from two or three as his ability to select and discriminate improves. As his ideas and ability develop, the display is arranged into groups representing areas of interest; for example, a picture of a number of toys, another of his family, and one of several things to eat. It is emphasised that these children need to be encouraged, to a point where they wish to tell about their experiences and delight in having their adventures recounted for them, to other adults or children.

An attempt is made from an early age to bring an interest in other things in the environment into the child's reach. In this, the therapist brings the objects in the programme into visual and hand contact in play by sitting behind the child, supporting him and facilitating his movements. Interest in other people is stimulated from about six months of age. At this stage, a therapist or parent positions the child and helps him to operate. Another therapist sets the child the problem, communicates with the child and watches for facial expression, hand clapping, or other forms of self-expression from him. The therapist, for her part, responds with both words and gestures.

These non-verbal problems include identifying categories into which shapes, colours, objects are sorted. As these games are designed to develop motivation and interaction, the child is never told where to put an item. The therapist just adds items till the child gets the idea. Once the child realises what the game is, the therapist reinforces his decision with verbal patten, such as "that's right, it's a red one and it goes there". More independent experience is developed at the same time by means of electronic toys, page-turners and attention getting devices.

A further step is the development of a reliable yes/no response. Interaction Games can be modified for this purpose. Instead of asking the child to make a choice, the therapist says, "Does this one go here?" or "Is this the one?" This is never as popular with the child as simply choosing, and needs to be approached carefully. In all yes/no training, it is important to use language you know the child understands, and situations to which you know he knows how to respond. As soon as one moves outside this type of question, the child needs to have a way of indicating "I don't know". If he has to resort to using his 'yes' or 'no' response for an answer he doesn't know, it will greatly reduce the strength of his yes/no response. As this response becomes more functional, the child reaches a position to be able to communicate with anyone who is practiced at building up a message by asking questions demanding a yes or no answer.

Thus, as a result of these programmes the child attains an interest in the environment and a desire to communicate, a definite yes/no response, a working level which one might expect of a child aged about 3½ years, the ability to sort into two or three categories, and to recognise that an item may be present which does not belong to either.

The therapist, teacher and the family together, must develop internal unvoiced language, even though the child cannot yet speak intelligibly. Language is a two-way communication, so they will use symbols, which the child can master easily. As they represent a whole category of objects, spelling is not required. Later, the symbols lead on to spelling and a more precise means of communication. When the child is able to spell, he will have an electric typewriter, because he is unable to use a pencil. Should he not be able to operate a keyboard, some other means of operating the typewriter will be found for him. Simple electronic controls, operated by a movement of some other part of his body, such as an intercepting light beam, or operating a special switch, can be fitted.

We, of course, have used symbols over the years, but were not satisfied with the results. The magazine articles on rehabilitation of the cerebral palsied children, particularly in Canada and the United Kingdom, had seemed to proliferate the symbols usage to astronomical heights, aided perhaps by the new minicomputer. It seemed to me that they were in the process of making a new written language like



An electronic pressure switch as an aid in controlling the pointer.



Chinese ideographs, but would still have to come back to basic English, ultimately. That is the reason why 'Sounds and Symbols' was created as a bridge between the symbols and standard English sentence construction.

The rationale of the 'Sounds and Symbols' system is based on a critical examination of a number of alternative means of communication. This indicated that it must have a reasonably extensive vocabulary - it must be easily understood - and it must be easily learnt.

As well as being planned so that it can operate at an early age, it is essential that a method of communication can support a vocabulary of at least twelve hundred words. An understanding of those words is normally attained before a child is 3½ years old. In terms of methods used in the past, this appears a large target, but it is considered an attainable one for many children who would formerly have been able to do so.

Even between intelligent adults, communication based on fluent and accurate words can be quite readily misunderstood. A less precise or makeshift form of communication will be more subject to misunderstanding on the part of the listener. It is essential that the method adopted leads to successful resolution of the problem of what the child has to say, frequently and relatively quickly, or the child will have little incentive to try again.

The clues used must be able to be learnt readily by all the people within the child's environment. In the long term, the child will have to communicate, not just with its mother or its teacher, but with a shifting population who have only a limited opportunity to learn the child's method.

'Sounds and Symbols' uses letters and symbols in a way which an adult can learn to interpret in a matter of minutes. It can be learnt at an earlier age than reading and spelling. It can, however, act as a bridge leading towards increased efficiency in these skills. It should also provide an impetus for increase in the number of words the child understands.

The symbols are diagrammatic drawings, which have a ready acceptance because of their similarity to an object. These are used not for one item only but for a number of items. CP children on the whole, have little difficulty in working with these global concepts.

In making symbols talk, emphasis should be placed on games or situations demanding expression. Which do you choose? Collect a batch of suitable booklets and present the child with an option. Questions involving 'or' are difficult, but if introduced very carefully, should be suitable, as they are normally in the repertoire of 3½ to 4 year olds. Initially, use questions to which we know the answer: How are you today? Who is the biggest person in your house? How did you come to school today?

Remember, although the child uses his array of symbols on his tabletop for everyday communication, varying the media and presentation by taking the child out of his chair in treatment, and working on the floor by dealing cards out, or throwing dice and so on, can make the treatment more fun.

Find pictures that have a lot of things in them, because at this stage one would expect enumeration. Get the child to talk to you about the picture, then take it back to the classroom, in the hope that he will spontaneously tell the teacher about it. Other games and activities to make symbols talk: planning a day at the beach. "What do we take with us?" Adding to or subtracting from a row of pictures or objects and asking the child "What's gone?" or "What's new?" Listing things: "What do we keep in a refrigerator?". The advantage of most of these is that you can anticipate the answer. Remember, it is easier for the child to talk about things he can see in the room.

The child may wish to tell some important or exciting news from home. Spontaneous output may also occur in letters home from children who board away from home. The advantage in this situation is that it is real expression, but the disadvantage is in the difficulty in interpretation. In situations where interpretation is obviously difficult, the child's anxiety or disillusionment can be prevented by the therapist assuming the responsibility for the breakdown in communication. "I'm just not watching very carefully today, am I?" Anything the child says spontaneously must be interpreted, if it is humanly possible to do so.

The "everyday dictionary" attempts to help the child to make a real use of symbols in everyday life. It should travel with him wherever he goes, to help people interpret. It includes not only a selection of frequently used words, but also the words that particular child is known to use.

A simple lecture to parents and another to bus drivers, aides, other teachers and so on can give them both interest and a degree of competence.'

Some years later this study was refined with the publication of "Further Stages of Sounds and Symbols", which stated in its introduction:

'This supplement to 'Sounds and Symbols' describes methods for increasing facility in communications, by using additional symbols and the letters of the alphabet in conjunction with the identification of initial sounds. It also describes development of a 'Larger Dictionary', the facilitation of more complete sentence construction, the development of displays, progress into spelling and the development to date of methods of dealing with children with additional problems.

It is emphasised that the dictionary includes the child's personal words, and words he is particularly prone to use. This means that any talking person who can read can interpret the child's utterance, even utterances that include words that have initially been discovered, with great difficulty, by someone else.

'Sounds and Symbols' has been developed in relation to semantic rather than syntactical principles, for developing verbal expression. The children for whom 'Sounds and Symbols' was primarily designed were children with at least the language comprehension of a 3½ year old. This is in fact listed as a prerequisite for starting. At that level a child can be expected to have a vocabulary of some twelve hundred words, a mean length of utterance of four words, and, although usage is predominantly functional or simple sentences, some conjunctions and many prepositions are already in use. One is not therefore, teaching language concepts or small sentence patterns, for these can be assumed to be present. Rather, one is teaching the child to use language concepts and sentence patterns that he is already familiar with in terms of understanding them when used by others. His difficulty in expressing, assuming he is not also dysphasic, is because it requires more patience, persistence and intellectual capacity to use an alternative means of communication than is needed for ordinary verbal expression. An utterance has to be held in mind longer to be encoded into symbols than to the spoken. Further, the use of symbols and even more so, the use of sounds, requires skills that are later maturing than language skills, even in normal children. The main words are likely to be produced at the expense of sentence structure, because this is the simplest way for the child to deal with a different situation.

A semantic approach implies that normal language patterns emerge, in the long run and predictably, from

a child's early clumsy and ungrammatical attempts to express his interaction with his environment. For example, even if a linguistic form used by a child appears to be a noun, it may be used in practice as a noun, verb or even a sentence, according to the child's connotation of the word at the time.

'Bikky' might imply an object, 'please give to me', or even 'I'm hungry'. The notion of language acquisition, as a process in which language is mapped onto the child's repertoire of basic cognitive concepts, is widely held. If this is true, the child's intent in making an utterance is more significant in facilitating his expression than the apparent grammar used.

Materials in 'Sounds and Symbols' have been designed therefore for teaching strategies based on real situations. These would appear most likely to provide opportunity to increase the child's capacity to use language meaningfully - to gain control over his environment, interact meaningfully with it, and develop satisfying inter-personal relationships. For example, the words selected for inclusion in the 'Everyday Dictionary' include: words that may assist the child to obtain what he wants, words that may imply the development of thoughts leading to utterance, for example, 'on the way to school we saw a fire engine', and words to do with personal relationships.

In treatment sessions, the semantic approach implies that it is important to plan situations in which the child learns through his own interaction. It is the nature of adults to "teach" children to perform tasks, rather than to put the child in a situation in which he has to learn. The latter is however an acceptable, if more difficult teaching strategy. It is particularly effective in relation to teaching language, because language is so much a reflection of the individual's own mind. Attention is drawn to the strategies used in the situational method of teaching English as a foreign language.

It is important to avoid imposing adult forms on a 3½ year old level of utterance. Our object is to elucidate what the child wants to say, whether it is grammatical or not. However, it would be acceptable, as with all children, to say his own sentence back to him conversationally, using the words and constructions we would use ourselves.

Similarly, it is important not to deprive words of their natural flexibility, by extensive use of formal exercises, for example, teaching "on" as a prepositional concept. Even in adult usage the same utterance can convey a different message if said in a different context.

It has always been, and will always be, difficult to classify word units for teaching in terms of function and contextual usage. Certain principles do however emerge. If a child is going to learn to communicate he must have a reason to talk; the rewards must be in terms of obtaining what he wanted, or attention to his information. In any type of structured situation, the significance of its design is its closeness to reality. If, for example, the response "mummy come" is obtained artificially, it should result in the mother coming, and not merely a verbal response "good boy". Real situations for communication probably occur more frequently at home than anywhere else, so that a good relationship with the parent is essential. Other useful areas include lunchtime and arrival and departure; communication demands mutual responsiveness between adult and child. A balance is necessary between the child talking to the adult and the adult talking to the child. Again, it is natural for adults to dominate the situation and difficult for them to restrict their own utterance adequately. The child is likely to obtain most opportunities for expanding his repertoire, not with his peers, who are at the same level as himself, but amongst children talking slightly above his level, or adults monitoring their language at such a level.

Analytical tests are of value in indicating the level to aim at, and in assisting the therapist to monitor her own language at a particular level. A child can often make himself understood if his noun vocabulary, contentive words, content words, concepts, is adequate, even if his syntax is wrong. No degree of accuracy of syntax will help if the content vocabulary is not available.

To encourage interaction, the development of this vocabulary should have priority. If adequate interaction is obtained, it is to be expected that syntax will emerge because the mechanisms that make it develop will start to operate. The capacity to evoke any communication should take precedence, initially over eliciting specific forms of utterances. If shaping is used later in relation to the child's utterances, the topic should be initiated by the child.

Technique of treatment is based at present, mainly on encouraging the child to converse and, when the conversation is completed in itself, going over the sentences used. The whole conversation gradually moves on to a higher plane and new sentence structures have emerged without training.

This does not of course mean that it is not possible to use "Sounds and Symbols" to teach concepts, or to develop formalised utterance, but the materials described in this and other publications are not designed for this purpose.

In summary, the following characteristics of "Sounds and Symbols" are to be noted: The symbols stand for categories of words, not just one word; early concepts are established empirically by sorting exercises; categories cover all the words in the dictionary so that there is the background for a total language; initial consonants are used systematically to establish individual word form; Symbol Word Dictionaries are available; it makes use of residual auditory skills, rather than using an entirely visual basis; it leads into spelling; it involves a minimum of items on the tray, so that quite handicapped children are able to point; unstructured utterances lead directly to formal sentence construction. There is no built-in difficulty developing syntax."

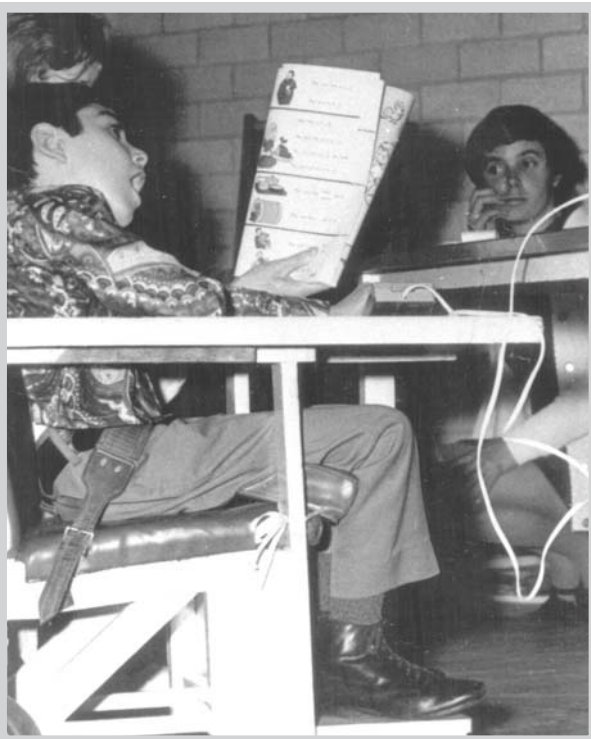
The system is not confined to the English language. It has recently been applied to the Japanese language.

During these impatient years, when developing intelligence out-marches the poor control of the tongue in speech, and of hands and fingers in manipulative skills, the CP child needs access to the world of electronic wizardry, which only now is being harnessed to his educational needs.

Speech technology will have a broad impact on all our daily lives, and small wonder. Synthetic speech, and its sister technology, speech recognition, represent a \$US3 billion market for industry three years from now. The oldest synthetic speech technique is called phoneme coding. Speech sounds or allophones and the rules for stringing those sounds together are stored in computer memory chips. Then, using a microprocessor, the sounds are combined to create speech that is intelligible.

The second approach, called linear predictive coding, involves storing the sounds also in a computer that mimics the process by which sounds are produced, including the motion of the lips, tongue and vocal tract. Finally, what is known as wave-form digitisation. The frequency of pitch and spoken words is broken down into digital pulses, compressed according to a complex mathematical formula and stored in memory for later reconstitution.

For the CP, the intelligibility of the spoken word is all important. The tonal quality, inflection, intonation, can come later. A study has been made on speech defects with athetoid CP translating speech patterns to identify consistent and repetitive errors. They are transcribed into a computer code and, by recognising errors when they subsequently occur, those parts of the original speech are replaced by synthetic speech. So the listener hears the CP speaker's normal voice.



Sounds and symbols associated with an initial letter of a word as a bridge to learning the alphabet.

