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AUTISM AND NON-SPEECH SYSTEMS

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INTRODUCTION TO AUTISM AND NON-SPEECH SYSTEMS

The last review of research concerned with the use of signed communication with autistic children revealed consistent findings that those who cannot apparently learn to speak successfully, can learn to sign with reasonable proficiency. Some children develop speech after they have participated in a signing programme; and it was suggested that there may be two distinct clinical groups - mute children, who may learn to sign, but not speak; and children who are able to vocally imitate, who may learn to speak. Two further questions then arise:

- (1) Is a total communication approach (T.C.) to be preferred over sign alone with the mute group?
- (2) Is total communication to be preferred over oral training with the vocally imitative group?

This debate has continued in papers published from 1980-1983. Results of comparisons between total communication, sign alone, and oral approaches in general, demonstrate a superiority for signed over purely oral approaches, for both receptive and expressive skills (see following summaries of papers 1, 2, 6 ,9), with the exception of a single case study (14) where no differences were found.

Use of Signing to Promote Speech

The effects of signing on the development of receptive and expressive speech have been explored by comparing the three training methods, and by the "stimulus control assessment", whereby after a total communication programme has been used, a test determines which aspect of the stimulus, spoken word or sign, controls the subject's responses. Konstanteras and Leibovitz (9) found a significant superiority for total

communication over oral and visual (signing + mouthing) approaches for receptive speech, and a trend in this direction in expressive speech and vocal imitation; however, the group were not adequately differentiated in terms of their ability to vocally imitate. Other studies have found that children with very poor vocal imitation do not seem to be able to make use of the spoken component, either receptively or expressively (4, 12); with one notable exception (1). Children with some ability to vocally imitate do seem to benefit from a total communication approach (1, 2, 4, 6, 12) and this ability seems to be a good predictor of the verbal potential of autistic children (4). Receptive speech abilities may also play a role (12).

Whether or not the signing component is critical to the emergence of speech still seems to be an open question for some researchers (3,4,7) who would prefer to see whether vocally imitative children could benefit from really well constructed oral programmes before introducing sign. There are arguments, from the mental handicap field as well as the autistic studies, which suggest that signing has a particular role in facilitating speech. Barrera & Sulzer-Azaroff (2) suggest that sign helps to enhance the understanding of words, but they offer no theoretical model of how this might generalise to expressive speech.

Konstanteras & Leibovitz (9) and Remington & Clarke (12) indeed seem to argue from the opposite premise that existing receptive speech abilities help in the learning of signs - which leaves the role of sign in the learning of speech somewhat ambiguous. Konstanteras & Leibovitz suggest that the neural overlap between gesture and speech may lead to a trigger effect of the one on the other.

There is a tendency in these studies to concentrate on the role of the visual channel in signing, and to disregard the motor component. The study by Ferrarese et al (6) suggests that the controlled movements involved in signing may aid in motor planning; a theory also supported by Barrera & Sulzer-Azaroff (2). Konstanteras et al (8) describe how kinaesthetic cues were maximised in teaching signs to a blind autistic child. A recent article by Griffith et al* discusses the importance of tactile feedback in establishing a 'motor trace' in the brain which aids the recall of information. As work by O'Connor & Hermelin suggests that there are similarities between blind and autistic children in some performance areas, it may be advantageous to focus on the tactile-kinaesthetic channel, as well as the visual, when exploring the relationship between signing and speech skills.

*Tactile iconicity : signs rated for use with deaf-blind children.
J. Ass. for Sev. Handicapped 8(2) 26-38
RNID

In summary, although it remains unproven that signing facilitates speech in autistic children, it seems likely that, in Kiernan's words, "speech and sign may potentiate one another" when a child has some ability to imitate sounds. However, if speech is the required goal, then it should be specifically trained alongside the signing, rather than depending on its spontaneous emergence.

Use of Total Communication with Mute Autistic Children

The arguments in favour of using a pure sign approach with mute autistic children arise from findings about information processing in this group. Autistic children in general show specific difficulties in handling auditory-vocal information, and do relatively better when it is presented through the visuo-motor channel. This may be related to the extent of left-hemisphere damage (7). Some children, as we have seen, will have better vocal and receptive speech skills than others, and they may be able to acquire expressive speech. Mute children, however, are unlikely to do so, though they may acquire signs, and it is hypothesised that this is because of an overselective response to multi-modal stimuli, which leads them to screen out sounds, and/or because of a stable modality preference for the visuo-motor channel. It is argued that these modality preferences should be taken into account when designing a communication programme (7) and that use of a multi-modal approach could be confusing (3, 4).

There are however, several points which need to be clarified before adopting this approach.

- (1) What is the definition of 'mute'? It appears that all the children who could be said to constitute this group of overselective responders, who failed to develop speech, did in fact have some ability to imitate sounds, however minimal. The paper by Carr & Dores suggests that we are talking about relative levels of ability, rather than an absolute distinction between vocal and mute records of pre-training scores on some standardised test of vocal imitation need to be provided in the future when investigating this area. This means that, in clinical terms, there is no way of determining from vocal behaviour alone which children should be assigned to pure sign, and which to a total communication programme.
- (2) The role of receptive speech needs to be further explored. Carr & Dores (4) suggest that poor verbal imitation goes hand in hand with poor verbal comprehension; however, in the Remington & Clarke study (12), the child who attended only to signs, and had poor vocal imitation, did in fact have a testable understanding of speech prior to training. These authors reject the concept of 'functional deafness' proposed by Carr & Dores.
- (3) The significance of modality preferences and overselective responses needs more clarification.

Tests for stimulus control could be included in baseline assessments, rather than post-training. Even having demonstrated that a child displays this behaviour, however, begs the question of how best to handle it. It is argued by some authors (2, 13 and Gersten 1980*) that a multi-modal approach may be successful in breaking down overselective attention.

There is as yet no evidence that a total communication approach interferes with the acquisition of signing by such children. Even those who do not apparently respond to the speech component, seem to do well under total communication conditions in acquiring signs receptively (4) and expressively (12). Although only 3 subjects are involved, these findings offer tentative support to the contentions of Barrera and his associates (1, 2) and Konstanteras & Leibovitz (9) that cue redundancy is not a hindrance.

In conclusion, there is as yet no strong evidence against the use of signed speech with children who may be unable to develop verbal understanding or expression; but equally none against the kind of approach adopted by Schaeffer (see RIS, I, 4) who trains sign and speech separately but concurrently. It looks as though vocal imitation is a good predictor of verbal potential; the roles of receptive speech, and of the tactile-kinaesthetic channel in facilitating motor planning, need investigation. Overselective behaviour, and modality preferences, whether auditory vocal or visual-motor, are clearly relevant in determining a child's response to a signed speech programme, but the clinical management of these tendencies is open to investigation.

Given the importance of choosing the right approach to helping autistic children to communicate, it is perhaps understandable that virtually all of the papers under discussion have focused on this one area of concern. However, it is disappointing to find so little attention being paid to other questions of equal significance. Training order for comprehension and expression is explored by Watters et al (14). Only one paper (10) considers the use of pictures, and one (11) symbols, which Kiernan suggests could be particularly useful in the teaching of grammatical rules. There has been no systematic recording of the semantic and pragmatic content of autistic children's communication (passing reference is made in 8), although the need for this was suggested in early papers on the subject (see RIS, I, 4). Nor has any attention been paid to the critical area of generalisation of communication skills.

* Gersten, R.M. In search of the cognitive deficit in autism beyond the stimulus overselectivity model
J. Special Ed. 14, 47-65 (1980) RNID

The overriding impression given by reviewing these studies is of an increasingly narrow field of reference. Very few papers relate their findings to the considerable body of work on non-speech communication with the mentally handicapped - all the more surprising, given that only a minority of autistic people are of average intelligence, and hence many of the problems will be common to both groups. It is to be hoped that future research with autistic people will be more far-ranging in its application.

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AUTISM AND NON-SPEECH SYSTEMS

1. # Barrera, R .D., Lobato-Barrera, D., & Sulzer-Azaroff, B. (1980)
A simultaneous treatment comparison of three expressive language training programs with a mute autistic child
J.A.D.D. 10, 1, 21—37 (1980)

This study compared the effectiveness of oral, sign alone, and total communication training with a 4- year old autistic boy who was functionally mute, though capable of vocal imitation. A list of 30 common nouns were selected, matched for difficulty of oral articulation and signing, and divided into groups of 5, paired with one of the three training models. Training involved alternating the three procedures each day, in a design similar to that of Brady & Smouse (1978) (see RIS, I, 4, 10-11) = however, only one teacher was used, and interaction effects between the procedures were minimised. This phase lasted 14 days. Results indicated the consistent superiority of the total communication approach. Four words were learnt in each of the other conditions, and ten with total communication. Although the child at first used gestures only, in the last few days of training he increasingly vocalised, and when assessed on the 14th day, 47% of his responses were vocalised and signed simultaneously. In a final 3 day phase of intensive total communication training, he learnt a further eleven words.

He was able to generalise successfully to a different teacher, and some use of signing in the natural environment was observed. With regard to the difficulty level of the words learnt, only simple monosyllables were spoken. The signed words showed no differences in terms of whether one or both hands were used, motor difficulty, etc., but signs made within the child's field of vision were learned more quickly than non-visible' signs.

The authors speculate that the multiple cues inherent in the total communication approach, the facility of physical prompting, and the child's relatively good motoric, as opposed to vocal, imitative ability, were factors contributing to the success of this programme.

Comments

1. Unfortunately, the child's prior comprehension of the training vocabulary was not assessed; it is just possible that he was more familiar with the words in the total communication condition than the others. See Remington & Clarke (this issue page 23) for a similar programme which controlled for this factor.
2. On the whole researchers have found that mute children do not develop speech through signed speech programmes (see Carr & Dores, this issue page 11), which makes this finding somewhat exceptional - however, without knowing more about his vocal imitation, modality preferences, and receptive speech, it is difficult to compare him with other experimental subjects.
3. Some researchers working with the mentally handicapped have suggested that ease of sign formation be used as a measure for the initial selection of teaching vocabulary. The finding that manuality, and motoric complexity did not apparently influence ease of learning is interesting; it conflicts with that of Konstanteras & Leibovitz (this issue, page 18).

The effect of visibility of the sign ties in with studies on sign acquisition by young deaf children, and could be of clinical significance. In future some kind of standardised scheme of 'response topography' would be helpful in determining the role played by sign formation in learning.

2. # Barrera, R.D., & Sulzer-Azar'off, B. (1983)
An alternating treatment comparison of oral and total communication training programs with echolalic autistic children
J.A.B.A. 16, 4, 379-394 (1983)

This study compared the effectiveness of oral and total communication training programmes for teaching spontaneous vocal labeling of 20 objects to 3 echolalic autistic children, with only 3-5 functional words. Results indicated that the total communication programme was the most successful approach; typically all the words presented in this way were learnt, whereas none of the words just orally presented were learnt.

The authors hypothesise that echolalia is related to a failure of understanding, and that provision of an extra cue - the sign - may enhance meaning. They also suggest that echolalia is an overselective response, which can be helped by the provision of multiple cues, as in total communication. Alternatively, the inclusion of an additional motor response may have served to increase the children's involvement with the task and facilitated learning.

Comments

1. Although the notions of overselective responding, and comprehension of verbal stimuli are central to the author's argument, there is no information, other than the fact that they were echolalic, to suggest that the children demonstrated overselective behaviour, nor is there any information about their receptive speech skills.
2. Carr and Dores have suggested that there is no evidence to date that simultaneous training can facilitate the acquisition of expressive, as opposed to receptive, speech. The results of this paper are in line with those from the mental handicap field which suggests that signs may function in some way as a mediating stimulus to facilitate process and recall of the spoken word (see Ferrarese et al, this issue, page 13).

See Wells (1981), Penner & Williams (1982), RIS, II, 4, for similar effects of total communication on vocal skills in mentally handicapped.

3. # Bonvillian, J.D., Nelson, K.E., & Rhyne, J.M. (1981)
Sign language and autism
J. Autism & Dev. Dis. 11,1, 125-137 (1981)

This paper reviews research findings and issues in teaching sign language to autistic children in relation to five areas: patterns of sign language acquisition; the factors influencing speech and sign development; teaching strategies; the role of discourse skills; and reasons for the rejection of sign programmes.

Data on over 100 children indicate that the initial content of autistic children's sign vocabularies, and their initial sign combinations, may be very similar to those of young children of normal intelligence learning to speak or sign. However, autistic children seem to need to acquire a 'set' - that objects and actions can be named in sign. Their early vocabularies do not expand as quickly, and their progress in combining signs is more limited, than normal children. More detailed records need to be kept in order to find out which semantic relations, and pragmatic functions, are expressed by these children.

Looking at speech acquisition subsequent to sign learning, some hypotheses are advanced for why simultaneous communication should lead to speech; the two modes provide redundant cues which aid recall of speech and sign; use of a visuo-motor system may help to by-pass specific auditory-vocal problems in the autistic child, and tap relatively undamaged areas of brain. Signs may help to distinguish words which sound alike, and to identify word boundaries.

Teaching strategies suggested include the use of sign teaching in context through the day, instead of isolated sessions; and the use of only one modality - sign - with children who demonstrate an abnormal response to speech.

The need to help autistic children to develop appropriate, contextually adjusted language skills is stressed, and techniques are suggested -especially allowing the child to observe fluent conversations in sign between adults. Finally, some common misconceptions about the effect of sign programmes are discussed.

Comments

There is a certain ambiguity in the author's attitude to simultaneous communication. On the one hand it is stated that there is no evidence to suggest that the autistic child is overloaded by the presentation of signs and speech, and that speech discrimination may be aided by the simultaneous use of sign. A few pages on, it is proposed that there is little evidence that simultaneous communication promotes the use of speech, and the use of one modality alone is advocated, for children who display an abnormal response to speech. This ambiguity may be due to the fact that the authors fail to differentiate between groups of students who do, and do not, learn to speak subsequent to learning signs. Much of the work on this area has been done since this paper was written; however, more discussion of the variables likely to influence speech acquisition would have been helpful in clarifying their position. See Introduction for a discussion of the use of sign alone with mute children.

4. # Carr, E.G. & Dores, P.A. (1981)
Patterns of language acquisition following simultaneous communication with autistic children
Analysis & Intervention in Developmental Disabilities, Vol.1, pp.347-361
(1981)

This experiment investigated some of the effects of simultaneous communication training on the language development of six autistic children with no functional speech, and receptive language limited to a few simple commands.

The children were pretrained to respond appropriately to commands which would be used in testing, and to touch objects on the table after the teacher had signed and spoken their names. A verbal imitation test, consisting of 50 CV* sounds was administered. In the experiment itself, receptive acquisition of six sets of four objects was trained using prompting, fading and stimulus rotation (see RIS, I, 4, p.13-14 for a description of this procedure). Immediately before and after each set was trained, a stimulus control assessment was carried out; the teacher either signing or speaking the object label across a number of trials, to determine which component of simultaneous communication was controlling the children's responses.

Results

Three questions were addressed in this experiment.

- (1) Can a reliable procedure be isolated to teach receptive language discrimination?
Results showed that, as for expressive language in an earlier study, the method used was sufficient to teach receptive discrimination.
- (2) Which components of the training controlled the responses? Two distinct subgroups were found. Two of the children responded to the signed component, rather than the speech component. The remaining four responded to both sign and speech.
- (3) What was the predictive value of the verbal imitation test? The children who were poorest at verbal imitation were those who failed to acquire speech discrimination as opposed to sign. The children with relatively good verbal imitation acquired receptive speech as well as receptive signing.

Verbal imitation seems therefore a good predictor of a child's ability to acquire receptive speech.

*CV Consonant-Vowel

In conclusion, Carr & Dores pose further questions for research:

- which language modality is ultimately most beneficial for the teaching of nonverbal children; whether or not non-imitative children can, as Schaeffer suggests, be taught verbal imitation skills which will enable them to go on to acquire speech, and whether children who fail to process speech stimuli will also fail to acquire expressive speech as might be expected.

Carr & Dores feel there is no evidence as yet to suggest that the use of total communication automatically facilitates the acquisition of either receptive or expressive speech. The children most likely to acquire speech have relatively good verbal imitation skills to begin with.

Comments

The authors call for studies to be done to determine whether or not simultaneous sign and speech facilitates speech acquisition, as compared with oral training. Many of the studies covered in this Issue do in fact explore this area (e.g. Konstanteras & Leibovitz, Barrera et al) - and work with the mentally handicapped does suggest that signs can mediate the learning of words (see papers covered in RIS, II, 5 - Penner & Williams 1982, Wells 1981, and the work by Reid quoted in Kiernan's review paper, this Issue).

5. * Cohen, M. (1981)

The development of language behaviour in an autistic child using Total Communication
Except. Child, 47, 5, 379-381, (1981)

Short account documenting a procedure using total communication (ASL Signs) and behaviour modification techniques to train appropriate labelling and telegraphic speech to a 4 year old autistic child with extremely echolalic speech, unintelligible vocalisations and poor eye contact and social interactions. Training took place 3 times per week in 26 x 20 minute sessions. Results showed that echolalia decreased dramatically, there was an increase in prompted, and then unprompted sign and vocal labelling and telegraphic phrases, and in unprompted vocal labelling alone.

Follow-up after 3 months, using the same setting and teacher showed that echolalic responses remained low (9% compared to 90% pre-training) and that sign was fading out : 83% of the child's responses were spoken, most of these being unprompted.

Follow-up after 9 months, with a different therapist and setting, showed echolalia at 26%, and unprompted vocal labeling at 52%, showing generalisation of the effects over time and across settings and therapists.

Comments

As this is a brief paper, lack of space precludes the author from giving much detail. However, several questions spring to mind:

- (1) There is no reference made to the current debate relating to the learning of signed speech by echolalic autistic children
- (2) There is no information to indicate whether or not systematic verbal training had been employed previously
- (3) How functional was the learning for the child? Did she continue to use appropriate speech in her living environment? How was training reinforced outside the teaching sessions?
- (4) Why did the child's performance deteriorate from one follow-up to the next? Was this the effect of a strange room and trainer, or was her performance generally poorer?

6. # Ferrarese, R., Norton, P. & Whitmont, S. (1982)
 Can signing improve the quality of autistic speech?
Except. Child. 29, 2, 117-125, July 1982

Description of a six month programme used with an autistic boy (IQ 75) with no functional speech (5 initial sounds), although a willingness to attempt speech, and some pre-speech babble.

A list of 79 target words was tape recorded at 3 points

- (1) prior to learning signs
- (2) after a 3 month training period in signs, during which the teachers used simultaneous communication, but only signs were required from the child, and
- (3) after 3 months training in which the child was required to sign and speak.

At points 2 and 3, the words were vocalised with and without accompanying signs; there were thus 5 separate recordings. These were mixed and rated blind by an independent speech pathologist. Comparisons were made between the best and the worst performance across time, giving an indication of the range of the child's performance. Results showed that overall, articulation improved significantly for the best articulation performance in Probe 3 when signs were used, but not if they were omitted. The poorest articulation performance improved between Probes 1 and 2, though not when signs were used. In Probe 3. the end of training, performance had improved, and vocalisation was significantly better with than without signs.

This suggests that signing had an effect on articulation, over and above maturation - since vocalisation without signs did not improve over the 6 month period, except for the poorest articulation in the first 3 months. The drop in performance when signing and vocalisation was required in Probe 2 is thought to be due to unfamiliarity with the task, since simultaneous responses had not previously been required.

The authors express some caution regarding the findings, given that the child was of near normal IQ, and articulation was tested only with elicited speech - i.e. a model provided - and not spontaneous. However, they suggest that inclusion of routine signing for verbal autistic children may be helpful if group studies support these results. They speculate that as Creedon* suggests, controlled motor movements in signing may improve motor planning and have spin-offs for articulation.

Comments

1. Carr has maintained that verbal imitation training has more to offer the verbal autistic child than sign or total communication. This study did not compare the effects of systematic verbal training and signed speech on articulation, and so cannot begin to resolve the argument; however, it appears that sign provision did have a facilitative effect on motor speech skills. Compare Wells 1981 (RIS, II, 5, page 33) for a similar finding with a mentally handicapped child.
2. This study suggests that as Schaeffer and others have maintained, it is important to demand vocalisation at some point, from the student if speech skills are to be developed, rather than relying on their spontaneous emergence. When vocalisation training should be introduced, particularly with students who have failed in verbal programmes, is an open question, however.

*Creedon, M.

See RIS, I, 4, 13 & 18-20

7. # Kiernan, C.C. (1983)

The use of non-vocal communication techniques with autistic individuals
JCPP, 24, 3, 339-375 (1983)

This is a comprehensive review of studies up to about 1981, from which the general conclusion is drawn that signs and symbols can be used in communication by severely handicapped people, and may mediate language development. Speech may develop within the context of signing programmes. However, there are some important qualifications.

Methodological inadequacies are common in the literature - the autistic characteristics of subjects are poorly described, and there is a failure to differentiate adequately between autism, mental handicap, and developmental dysphasia. Training methods are poorly documented, making it difficult to compare programmes. Information on understanding, actual usage, developments in behaviour and cognition is in general unsystematic and impressionistic.

Kiernan addresses in particular the questions of complexity in language, spontaneous generalisation, and the development of speech, and whether the effects described of sign or symbol programmes are over and above what would be expected from any structured programme.

It appears that signs may facilitate the acquisition of complex language performing a variety of communicative functions, and that symbols can be used to teach syntax within a controlled framework. Data on generalisation is very thin, but there is evidence that signs may be used spontaneously. These results have been obtained with subjects for whom prognosis is poor, and compare favourably with the progress reported in speech based programmes.

Looking at speech development in the context of sign programmes, Kiernan considers the hypotheses that:

- (1) autistic people have a problem with overselective responding which leads them to focus on one aspect to the exclusion of others in a complex display
- (2) that they may show consistent modality preferences either for auditory-vocal (words) or visual-kinaesthetic (signs).

Evidence is reviewed from studies comparing the effects of sign, oral and simultaneous programmes on the language development of autistic subjects. Findings of a superiority for the simultaneous approach appear to run counter to both the modality preference and stimulus overselectivity models. (However, Barrera et al suggest that training with multiple cues, such as provided by signed speech, can help to overcome a bias to overselective response.)

A consistent finding in more recent studies is of 2 sub-groups of children:

- (a) those who can respond to sign and speech and who will understand both modalities equally well and for whom signs can help speech to develop (here Kiernan quotes from the literature on Mental Handicap).
- (b) mute children, who are likely to have difficulties in understanding speech, will respond preferentially to sign, and will not develop expressive speech.

Kiernan cautions against assuming that providing total communication without an adequate exploration of individual characteristics, especially modality preferences, will uniformly help to develop communication.

His recommendations for future research include:

- comparing the effectiveness of signs and symbols in the teaching of syntax
- use of signs and symbols in combination, rather than as exclusive alternatives
- collection of adequate records of usage of sign communication
- investigation of the influence of sign learning on the understanding of spoken language, and cognitive and behavioural development
- investigation of the effects of structural characteristics of signs, particularly "response topography" (i.e. use of one/two hands, handshape, etc.); and the level of representation (pictorial-abstract) of symbols

Comments

This is the most useful review of the subject to date, and well worth reading, since it places current findings in the context of literature on the mentally handicapped.

8. # Konstanteras, M.M., Hunter, D. & Sloman, L. (1982)
Training a blind autistic child to communicate through signs
J. Autism & Dev. Dis. 12, 1, 1-11, 1982

Presents a case study of a 10 year old mute blind autistic child, who had failed to respond to verbal training. After 8 months of simultaneous communication training, during which she was required to sign but not speak, she acquired a functional sign vocabulary of 33 elicited and 19 spontaneous signs, mainly relating to clothing, food items and action words. A pragmatic analysis of communication using Halliday's mode (see RIS, II, 2/3) showed that she was restricted almost exclusively to regulatory (commands) and instrumental (requests) communicative functions. Acquiring signs had a beneficial effect on her general behaviour.

The authors highlight some of the differences in training blind, as opposed to sighted, autistic children. The tactile-kinaesthetic cues were maximised, with more use of moulding, and allowing the child to feel the objects she was required to discriminate, and to feel for spontaneous communication. Auditory cues were also emphasised, and spoken words were always used by the teachers to accompany or to elicit signs.

Comment

It is not clear whether the pragmatic restrictions on the child's use of language may have been due to training which emphasised these functions, or whether an attempt was made in teaching to expand her communications.

Compare, Mountain 1984, who describes in more detail techniques for using signs with deaf-blind children (Speech Therapy Bulletin).

9. * Konstanteras, M.M. & Leibovitz, S.F. (1981)
Early communication acquisition by autistic children signing and mouthing
versus signing and speaking
Sign Language Studies, 31, 135-154 Summer 1981

Compares the effectiveness of a totally visual to a combined visual-auditory approach in training imitative, receptive and expressive word acquisition with low functioning autistic children.

Evidence is reviewed that, because of difficulties in cross-modal processing, autistic children may be confused by a simultaneous speech + sign presentation, and would benefit more from a purely visual, sign alone approach. In support of the combined approach, evidence is quoted for a possible neural overlap between speech and manual activity, which suggests that the two systems function in an integrated way.

The subjects were 8 autistic children all "non-communicating" whose abilities ranged from > -2.0 to 4.3 years on the Leiter Scale, and 1.8 - 4.5 years on the Reynell Developmental Language Comprehension Scale. The children were matched in pairs and assigned to two groups. One group was trained using a visual and then a combined approach, this was reversed for the second group.

The stimuli were 10 nouns, 10 verbs and 10 adjectives. Using sign typography - handshape, orientation and movement, and number of fingers and location, signs were rated as 'easy' or 'difficult' to produce, and divided into 2 sets.

Signs and words for concrete referents of obvious functional relevance to the children were used.

Training was in the order imitative, receptive and expressive. Teaching and testing trials were interspersed. In the visual only condition the words were signed and mouthed, in order to include the visual component involved in speaking. In the combined condition, words were signed and spoken. Three assessments for receptive stimulus control were made to determine which stimulus controlled each child's performance in each condition. This compared sign alone, speaking or mouthing alone, sign + speech or sign + mouthing.

Results

Receptive scores were significantly better than expressive or imitative; and receptive training using the simultaneous approach was significantly better than all other categories. Overall, scores were higher for the simultaneous condition, but results did not reach significance for imitation and expression. Responses to therapists' use of sign alone were superior after simultaneous, rather than visual only training. Signs which were 'difficult' to produce were acquired less readily than signs which were 'easy'.

No clear cut differences were found in the acquisition of nouns, verbs and adjectives (compare an earlier study in 1978 which did find a significant result here, RIS, I, 4, 25).

In their discussion, the authors argue that these findings provide support for a simultaneous signed-speech approach with autistic children, and claim that "there is no basis for questioning the current clinical reliance on it."

They suggest that part of the reason for the success of the simultaneous approach lies in the familiarity of the words used, and hence the receptive speech ability of even low functioning children. They feel that receptive speech ability is the pre-requisite to expressive communication, both for children with the potential for speech and those without.

A second advantage for simultaneous communication is that it provides cue redundancy which helps children to receive and process the information. Finally, the authors feel that the novel effect of mouthing may have affected results in the visual condition, and suggest that a further study might compare sign alone to signing and mouthing.

Comments

1. Unfortunately, it is difficult to compare this paper to the relevant research findings provided by Carr & Dores (see above) since no information is provided on the verbal imitation skills of the children - does non-communicating' imply that they were entirely mute? Nor do the authors review any of the findings which suggest that echolalic and mute children may respond differently to simultaneous communication.

2. Curiously, there is no record of baseline assessment of the children's responses to the test items before training began. Hence there is no way of telling whether the high receptive scores are due to the children's prior knowledge of the task; the authors seem to suggest that familiarity with the vocabulary did play a significant role. If this was so, it is hardly surprising that receptive skills were in advance of expressive, and would not in itself provide evidence that training in comprehension should necessarily precede expression. See Watters et al, this Issue, who found that training expression prior to reception was more effective.

10. * Lancione, G.E. (1983)
Using pictorial representations as communication means with low functioning children
J.A.D.D. 13, 1, 87—105, (1983)

The aim of this study was to devise a pictorial system which would allow receptive and productive communication, yet require only limited discrimination and language skills.

Subjects were 3 severely mentally handicapped children, 2 of whom were autistic, aged between 8 and 12. All could imitate simple motor acts and match objects, but none had any "active communication". They had been taught 21-32 signs previously, but errors had increased as more signs were taught, and they could now respond to only 4-9, and a few verbal commands.

Procedure

Picture cards were used to train 7 target behaviours, from object discrimination, through body positions - e.g. arms up - body positions with objects (e.g. kneeling behind a bottle; holding a bottle) and simple activities - e.g. standing and dropping a ball into a container. The final three behaviours involved performing the activities with a normal child -taking either an active or a passive role, and selecting objects and assigning roles - by pointing to the active or passive child in the picture and then to the normal child.

Training was carried out 5 hours a day, 6 days per week, using a multiple baseline type schedule - after 5 successful probes on one behaviour, the next behaviour was trained. After training of all behaviours was completed, performance on each was assessed again.

Results

The three children consistently obtained zero scores (on all but object discrimination) on baseline, and training led to virtually 100% success on each probe.

The author suggests that the success of the programme was due primarily to the concrete nature of pictorial representation, and to the highly structured teaching which promoted errorless learning. He advocates the extension of the programme to promote “forms of active communication”.

Comments

1. A comparison is made between the experimental programme and previous sign teaching as though these were equivalent – however, it seems unlikely that signs were taught at such length and in such a structured way. The only details offered relating to the children’s learning of signs suggests that aspects of the teaching any have been inadequate, with too many signs being introduced too quickly. Hence there is no evidence within the study that pictures are learned more easily than signs – only that a highly systematic and time consuming programme succeeded where other unspecified procedures did not. The author hypothesises in his discussion that pictures will be more accessible than signs because the latter are transient and largely abstract; however, we know that a sign can be held static as a model, and that many of the signs initially taught to children are iconic – again since we are not told what signs the children learnt and how they were taught, the basis for such hypotheses is inadequate.
2. From the results as presented it is unclear what the children were actually learning. The 100% level of achievement in all tasks on all probes is taken as evidence for the success of the training. However, it could be that the children only had to learn how to approach the task presented on the picture card – rather than to discriminate and memorise actual concepts relating to object, body positions and activities. Information on error rates during the training phase would have been useful in clarifying this question.
3. Strong claims are made for the programme as a potential therapeutic tool, because of its perceived success. The final target behaviours involving other children are described as significant approaches to “primary forms of active communication”. The author does not offer any definition of communication, but it is difficult to interpret the children’s achievements as communicating in any real-world sense; the activities described involve a very mechanistic approach to the other child who is used purely as a means to acting out the situation on the card. The reader is left querying whether this massive

investment of time and energy (which would be impractical in a therapeutic context), could have been more economically directed to improving the children's abilities to communicate their needs and interests in real life. No mention is made of any carry over from the programme to other aspects of the child's behaviour.

11. Light, P. H., Remington, R.E. & Porter, D. (1981)
Substitutes for speech@ Non-vocal approaches to communication
In M. Beveridge (Ed) Thinking through language
London: Edward Arnold Ch.9, pp216-238 (1981)

This chapter begins with an overview of language intervention with autistic children, pointing out some of the methodological problems of previous studies, and considering the evidence for specific auditory-vocal perceptual deficits. Studies on symbol usage are reviewed in some detail. The authors conclude that, compared to sign training, symbol training offers a greater degree of control by the experimenter, and hence can lead to greater precision in the recording of what has been learnt. However, lack of information on verbal comprehension, and on generalisation to novel objects, makes it difficult to tell what associations have been learnt.

There follows a detailed description of a training study in which nouns and adjectives were taught by means of plastic symbols to one mentally handicapped and two autistic children. The study was used to explore the effects of teaching procedures, and resultant learning.. They concluded that the initial task – in this case noun-object matching, is very important because it provides a set, and the precondition for further training. The child has to learn on 2 levels – both the “rules of the game” and the specific correspondences of symbol and object. Failure at this stage can interfere actively with subsequent learning. Testing, and if necessary, training on matching skills are suggested as prior activities.

Generalisation tests showed that children can associate the symbol they have learned with objects of the same class, without specific training; however, they illustrate that the attributes which the child selects to form a conceptual class, may be quite idiosyncratic, and outside the control of the experimenter. Finally, the authors caution against inferring that associations between symbols and objects are equivalent to words. They stress that these kind of procedures teach language-related skills in relative isolation from the context of communication, and that “before we can confidently regard symbol use as an alternative to speech we shall need to see the child using the symbols referentially to pursue his own ends in a variety of social settings”.

Comments

- 1 This paper is particularly helpful in illustrating how careful recording of exactly what is taught and learnt can help us to understand the process whereby associations between symbols and objects are formed. The clear distinctions drawn between learning such skills and using them are to be welcomed.
- 2 It would have been helpful in interpreting the implications of some of the results if these had been related to normative studies of language development – were the idiosyncratic noun classes used by one child explicable in relation to normal conceptual development, for example?
12. # Remington, B. & Clarke, C. (1983)
Acquisition of expressive signing by autistic children : an evaluation of the relative effects of simultaneous communication and sign-alone training
J.A.B.A 16, 315-328 (1983)

Two methods of training expressive sign labels were compared in order to determine whether a simultaneous approach is more effective than sign alone, and whether simultaneous communication facilitated the acquisition of receptive speech.

Two children were the subjects; one was mute and severely mentally retarded, with a comprehension level of about 2 years (RDLS)*; the other could imitate words, had an average IQ, and a comprehension level of 3 years.

The procedure involved selecting items for training which were unfamiliar to the children. One group of words was trained using simultaneous communication, the other with signs alone, order of presentation being alternated. A new word was introduced when criterion was reached on the first word. The signs used were equated for iconicity and ease of formation.

*RDLS = Reynell Developmental Language Scales

After training, post-tests assessed both maintenance of signing, and which aspect of the stimulus – presentation of the card; spoken name, or mouthing, controlled the children's responses. Verbal comprehension was also directly tested by presenting all the pictures used in training and saying, but not signing, their names. (The procedure closely resembled that of Carr et al (1979) see RIS, I, 4, 13).

Results indicated that signs were acquired at about the same rate by both children, whether taught by a simultaneous or a sign alone method. Theoretical arguments, based on notions of overselective attention and poor cross modal association, in autistic children, might predict that sign alone would be more efficient. Other research (Barrera et al 1980) suggests that a simultaneous approach is preferred. However, Remington & Clarke point out that Barrera et al did not control for prior comprehension of words trained. Simultaneous communication may normally be more effective than sign alone, precisely because the children are able to make use of their existing receptive skills in learn signs.

Secondly, the results confirm that a simultaneous approach can facilitate the understanding of spoken language in children capable of vocal imitation, and with some receptive speech. The must child responded exclusively to the visual component, whereas the more able child succeeded in responding to words orally presented after training. The authors do not support the concept advanced by Carr and Dores that must children are "functionally deaf" since their mute subject was able to respond to some speech; they ascribe her performance to an overselective response to gesture.

Finally, they call for research to identify the precise conditions under which simultaneous communication is more effective than sign alone, and facilitates production and reception of speech.

Comments

Although data on only two subjects are presented, this is a valuable study in that factors normally omitted are taken account of in the design – e.g. prior comprehension of vocabulary, and structural characteristics of the signs themselves. It is also exceptionally well written; both rationale and procedures are clearly explained and easy to follow.

13. * Schuler, A.L. & Baldwin, M. (1981)
Nonspeech communication and childhood autism
LSHSIS 12 (4), 246—257 (1981)

Various non-oral approaches, and the rationale for their use, are reviewed and discussed in this article. The emphasis is on practical communication needs, related to experimental findings. Among other topics they discuss modality preference in autistic children, and the facilitation of speech through use of signs and symbols. It is suggested that the apparent preference for the visual, as opposed to the auditory modality, may be due to a problem in coding, rather than receiving or integrating, information which is temporal. Their own research (though it seems to have been with only one child) suggested that the ability to generate rules, necessary to language development, was evidenced only with fixed visuo-spatial stimuli. If this is so, symbol systems may be the easiest form of communication for autistic children, and can also serve as a support system, to clarify grammar through spatial cues. Signs, which may be more difficult to learn initially, being motorically more complex than the simple responses required with symbol systems, can help to overcome what the authors describes “the attentional trap of being tied to stationary spatial cues”.

Facilitation of speech is not yet well understood - the theory that a motoric response such as signing in some way mediates the acquisition of symbolic thought is undermined somewhat by accounts of speech developing as a byproduct of less active responses such as manipulation of symbols. Presentation of simultaneous signed speech is generally assumed to promote speech development because the signs act as a bridge to the learning of responses to speech (“transfer of stimulus control”) however, despite research comparing the effectiveness of various training methods, it is not clear how this occurs.

The authors point out that signing and other nonspeech systems, allow a much quicker entry into real communication than speech programmes which of necessity involve long periods of imitation training. Gains in communication may indirectly reduce behaviour deficits.

A list is drawn up of issues relating to students, systems, and contextual use to be considered in selecting an alternative communication programme.

Comment

A useful, practically oriented paper which makes clear links between experimental findings and clinical practice.

14. * Watters, R.G., Wheeler, L.J. & Watters, W.E. (1981)
The relative efficiency of two orders for training autistic children in the expressive and receptive use of manual signs
J. Common. Dis. 14, 273-285 (1981)

Using simultaneous communication, four nonverbal autistic children were taught receptive and expressive use of 8 signed words; 4 in the order expressive then receptive, and 4 in receptive then expressive. The purpose of the study was to determine the relative efficiency of the two orders of training, and to look for facilitative effects that training in one modality had on the other.

The subjects were aged from 11-16 years, with IQ's of "minus 10" - 88, and substantial sign vocabularies, receptive and expressive (32, 82, 150, 192). Each child was taught 8 words, which they had on a previous assessment been unable to name. Training took place in the classroom, over a period of 6-9 months.

Results

Showed that for every child, fewer trials were needed to teach expressive and receptive use when teaching was done in the order expressive then receptive. The teaching of expressive use facilitated the learning of receptive use, but the teaching of receptive use interfered with expressive learning.

This conflicts with some of the findings from normal developmental research which suggests that comprehension precedes expression. However, the authors point out that these children had well established sign vocabularies; hence the finding may not be applicable to the earliest stages of sign acquisition (see for a similar finding, Smeets & Striefel, 1976c, RIS, I, 3, 26-27).

The authors also tested receptive responses to sign alone, and spoken word alone. It appeared that sign alone controlled responses to a high degree; however, response to the spoken word did develop over the course of training - and this apparently was more likely in the order receptive-expressive.

Comments

1. More information about the subjects, and their prior experience of sign teaching would have been helpful.
 - all are said to be “nonverbal”, but were any of them able to vocally imitate, a skill which we know some researchers regard as of predictive significance
 - what precisely were their receptive abilities? This is particularly important in evaluating the results, since if the children had particularly poor comprehension of sign or speech, relative to expression, it might explain why they had more difficulty when receptive training preceded expressive
 - how was comprehension and expression of their existing sign vocabularies assessed?
 - the child whose IQ was assessed as “minus 10” had a functioning sign vocabulary of 150 words; an anomaly which calls for some explanation
2. There seems to have been no attempt to equate the words chosen for training, or the signs which represented them. Were any reinforced in the environment during the months of training?
3. No details are given of the children’s prior experience of sign teaching. If, for example, they had always been taught expressive signing before receptive, this again might explain the results.

See Konstanteras & Leibovitz, this Issue, page 18 for discussion of training order.

15. * Wherry, J.N. & Edwards, R.P. (1983)

A comparison of verbal, sign and simultaneous systems for the acquisition of receptive language by an autistic boy

J. Comm. Dis. 16, 201-216 (1983)

The effectiveness of verbal, sign alone, and simultaneous training for the acquisition of receptive language by an autistic boy was investigated. Three teachers were used, with the order of methods and teachers being counterbalanced daily. A 27 word vocabulary, of nouns, colours and verbs was used, and comprehension of single nouns, adjective noun, and verb adjective noun (e.g. tap red block) were trained. The procedure was very similar to that used by Brady & Smouse (1978) (see RIS, I, 4, 10-11). The subject was a 5 year old autistic boy, IQ untestable, noncommunicative "except for a few phrases".

Results indicated that there were no significant differences between the three methods, although more responses were consistently elicited in the sign alone condition. The authors suggest that a longer training period might have established a clear trend in this direction; further, that use of a highly structured programme reduces potential differences between the methods.

The sources of systematic errors which Brady & Smouse failed to control for - between teachers and sessions, were shown to be minimal in this study. Analysis of the child's behaviour outside the sessions suggested that he imitated more physical contact as a result of training. Eye contact remained very low - it is suggested that if eye contact had been specifically reinforced in training, this might have improved his scores in the two conditions where sign was used.

Comments

Once again, not enough information is given about the child's response to speech and sign, and vocal imitation, prior to training, which makes it difficult to place the study in context. The authors do not discuss the hypotheses of other researchers (notably Carr & Bonvillian) that use of sign alone may be preferred for children who have difficulty in making use of the auditory-vocal mode.

See Barrera et al (1980), this Issue, page 7, for a similar design, with differing conclusions.