Journal of Autism and Childhood Schizophrenia, Vol. 6, No. 1, 1976

Acquisition of American Sign Language by a Noncommunicating Autistic Child[1]

Robert L. Fulwiler[2] and Roger S. Fouts
University of Oklahoma

Experiments in the perception and language abilities of autistic children indicate that the children have auditory–visual association problems. These findings, combined with the findings that autistic communication is primarily gestural, led to the teaching of elements of American Sign Language to a 5-year-old nonverbal autistic boy. Results after 20 hours of training indicate that the child did acquire signs, that increasing signing led to increasing vocal speech, and that the child has rudimentary English syntax. The use of Ameslan signs spontaneously generalized to other situations and the training resulted in increased social interaction.

Hewett (1965) and Lovaas (1966) reported the establishment of verbal behavior in the repertoire of autistic children through the use of operant conditioning procedures. Though these and other studies since (e.g., Schell, Stark, & Giddan, 1967) have reported some success, many problems have become evident. First, the procedure is time-consuming and often relatively unproductive. A good example is the study by Hingtgen and Churchill (1969), who reported that the vocabularies of four children, after working with each one for 5 weeks at 6 hours per day, were 25, 60, and 16 words and one of nine "sounds." A second problem is the seeming lack of response generalization outside the therapy situation. Lovaas (1966) reported generalization, but Schell et al. (1967) reported that the increase in speech only occurred in the therapy situation. Sulzbacher and Costello (1970) and Hartung (1970) reported that the generalization of speech outside the therapy situation had to be specifically taught; it wasn't spontaneous.

[1]This work was partially supported by a grant from the Faculty Research Committee, University of Oklahoma and NIDA grant No. DA4RG012.
[2]Requests for reprints should be sent to Dr. Robert Fulwiler, Langley Porter Neuropsychiatric Institute, University of California, San Francisco, California 94143.

Hence, the operant procedures have not proven to be a panacea for language problems in autistic children.

There is a reasonable amount of data which indicates that autistic children have difficulty with auditory discrimination (Hingtgen & Coulter, 1967) and particular difficulty with visual–auditory crossmodal association (Gillies, 1965; Lovaas, 1966; Bryson, 1970, 1972). Bryson (1970) reported that performances on visual–auditory and visual–vocal tasks were poorer than on a visual–visual task. Davis (1970) reported that autistic children perform better on tasks that primarily require visual integration than on those involving auditory integration. These studies tend to indicate that the language deficiency of autistic children may be due to an inability to make specific crossmodal association and not just an inability to process the auditory or visual information per se.

Jakab (1972) reported that autistic children use meaningful nonverbal, not vocal, communication. Ruttenberg and Gordon (1967) concluded that communication with an autistic child is practically impossible if gestures and facial expressions are eliminated from the process. Pronovost, Wakstein, and Wakstein (1966) stated that autistic children responded to physical contact and gesture languages and if the gestures were deleted the autistic children no longer responded appropriately.

Since a number of previous studies have reported some shortcomings of existing language therapies, and a number of other studies have reported that autistic communication is mostly nonverbal and gestural, the next logical step is the employment of a manual language. A manual language would have the inherent advantage of utilizing the primary communication system of the autistic child while having other advantages. It should be noted here that "speech" therapy is not "language" therapy. Language involves more than just speech, i.e., syntax, semantics, and other factors. Hence, any treatment involving "language" training should include the other elements as well. The first advantage of a manual language is that since it is a visual language, it would avoid the crossmodal difficulty. Secondly, many authors (e.g., Lovaas, 1966; Senn & Solnit, 1968) have reported that autistic children respond readily to tactile stimulation. In the usual course of teaching a manual language, one provides much visual and tactile stimulation. The third area is of response generalization. Fouts (1973) reported that the use of American Sign Language (Ameslan) signs generalized spontaneously from the therapy situation to the outside environment. In addition, Fouts also reported that the use of Ameslan signs increased the attentiveness of the child to the therapist. Webster, McPherson, Sloman, Evans, and Kuchar (1973) reported on a 6-year-old mute autistic child who readily acquired a number of signs, and that not only did he learn to respond appropriately to commands given in sign

language, but also he spontaneously used the signs to give others commands such as "sit down." It is worthwhile to note that the sign language training was started after the standard behavior modification technique for language had been singularly unsuccessful. These authors also reported that they were "struck" by the way the child attended to their facial expressions. This seems to be one of the fortunate benefits of the use of sign language because much of the "emotional" component of the sign is conveyed through facial expression. Fant (1964), in discussing manual language, states, "The face is the focal point. Therefore, it carries most of the burden of enriching the meaning of signs and finger spelling." He further states, "Our voices rise and fall to add meanings to our words. The face functions for manual communication as inflections of the voice for words." As such, facial expressions are not just amusing and entertaining, they are vital to the communicative process. Hence, the child learns to attend to facial expressions and maintain "eye" contact. Miller and Miller (1973) in a study involving 19 autistic children reported that all acquired and used some signs appropriately to gain desired objects or goals. They also reported that one of the children made the transition from signed language to expressive spoken language while all children learned to respond to words which had been systematically paired with the relevant signs. Thus, it would seem that the use of a manual language would take advantage of the propensities of the autistic child while avoiding some of the problems associated with the teaching of vocal language only.

METHOD

Subject

The subject was a 5-year, 1-month-old male child who lived at home with his mother and no father. Mother reported extreme hyperactivity and bizarre behavior which included uncontrollable periods of laughter and crying, self-destructive behaviors, biting and scratching others, frequent running away, and unintelligible verbalizations.

The child had been seen by a family physician, a private neurologist, a pediatric neurologist and staff psychiatrist at a medical center, and a clinical psychologist at a private treatment center for children. Since age 3 he had attended a nursery school, a private Montessori school, and a private school for learning disordered and emotionally disturbed children. All of the schools had discontinued placement due to their inability to meet the needs of the child. The child had been denied placement in any public school class-

room. Psychiatric diagnosis was 295.8 (DSM-II) Schizophrenia, Childhood Type: Infantile Autism. The clinical psychologist's diagnosis was Infantile Autism. During initial observation the child engaged in spinning, darting, "wringing of hands," unintelligible vocalizations, and generally disorganized and unoriented behavior.

Apparatus and Materials

The training was conducted at the Timbergate Clinic, Oklahoma City. Training aids such as objects and puzzles were those available at the clinic. Items or stimuli to be used as reinforcers were those that were deemed effective and appropriate by the experimenters upon observation of the preferences and likes of the subject.

Procedure

The child was trained to use elements of Ameslan. The signs in Ameslan are analogous to the words in spoken English (Stokoe, Casterline, & Croneberg, 1965). Each sign consists of a particular hand configuration and movement, in addition to specific positions relative to the signer's body where the sign begins or ends. The signs to be taught were decided in vivo by the trainers as appropriate circumstances for particular signs presented themselves, or on a prearranged schedule. The method of training was the total communication method (Schlesinger & Meadow, 1972). The experimenter spoke the word while demonstrating, molding, or prompting the sign. Hence, while Ameslan signs were used, the syntactical relationships were those of signed English. The data recorded are the prompted and unprompted signs produced by the child, as well as more general behavioral observations (e.g., attentiveness, behavioral appropriateness, interpersonal interactions).

Training sessions were ½-hour periods twice a week.

RESULTS

After 20 hours of training, the child used several signs appropriately. Since the stress was on functional vocabulary rather than diversity, the signs were highly related in that they were amenable to combination among themselves. The most interesting result was that as the use of signed speech increased, the use of vocal speech increased in both amount and appropriateness. Signed words were emitted during the first hour, signed phrases were

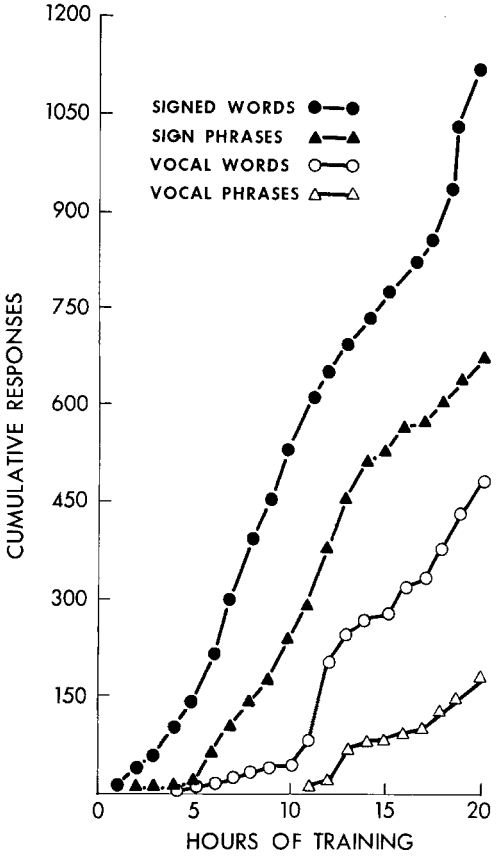

Fig. 1. Cumulative expressive signed and vocal words and phrases.

first emitted in the second hour, single vocal words were first used appropriately in the fourth hour, and vocal phrases were first emitted in the eleventh hour (Figure 1).

An analysis of both signed and vocal words reveals that the most frequent class of words used was nouns, followed by verbs, pronouns, and adverbs. The emitted sign phrases appeared in an expected order, namely, verb-object ([you] gimme key) or adverb-noun (more key). The sign "gimme" is an outstretched hand palm up, which is a natural request gesture, hence it is not an explicit "give me" verb-object phrase. The child then combined these two forms into verb-adverb-noun forms (gimme more drink or more gimme drink). The child then progressed to noun-verb-object forms (you gimme key). Hence, acquisition of individual words (signs),

Table I. Signed Expressive Words

Noun	Verb	Adverb	Pronoun
dog	tickle	more	you
drink	want		me
key	gimme		
hot (coffee)	open		
listen (wristwatch)	catch		
	thank you		
	look		
Roger	hug		
food	hurry		
nut	go		
comb	up (pick up)		
shoe			
smoke			
look (kaleidoscope)			

word class frequencies, and phrase structure parallels that of the normal language acquisition process (McNeill, 1970) (see Tables I–III).

DISCUSSION

The success in the acquisition and utilization of Ameslan signs supports the hypothesis that the use of a manual language would be appropriate for developing communication in an autistic child. The increased use of vocal speech is a pleasant and common occurrence reported by others who have also used this mode of training (Miller & Miller, 1973; Webster et al., 1973). One finding which is not shown in the results is the combination of the manual and vocal forms. These were of two forms: (1) The child

Table II. Vocal Expressive Words

Noun	Verb	Adverb	Adjective	Pronoun
key	up	more	big[a]	it
drink	help[a]	down	bad[a]	me
kitty[a]	tickle	here	my	you
cake[a]	go			
car	give			
tractor [a]	sit (down)			
ball				
comb				
shoe				
hug				

[a]Not used in training.

Table III. Time Sequence of Initial Appearance of Signed Phrases

Hours	Phrases	
1–5:	gimme key	
	more key	
	gimme drink	
6–10:	drink that	drink me
	want key	gimme more comb
	more gimme key	gimme food
	more drink	eat (feed) me
	that gimme drink	me drink
	Roger key	gimme more drink
	you gimme (key)	you eat
11–15:	more that	key gimme key
	gimme more key more	gimme key gimme
	thank you	key me
	gimme key more gimme	
	you gimme more key	
16–20:	my keys	gimme more that
	that shoe	want gimme key
	that gimme more	that gimme
	you drink	

signed and spoke the word simultaneously, and (2) combined the forms in a phrase such as "gimme" (signed) "key" (vocal). The first form (the word being simultaneously signed and spoken) appeared in the sixth hour of training and seemed to provide a transition from sign to vocal use since hours 6 to 10 was the period when vocal speech began to increase reliably. The second form first appeared in the seventh hour of training and seemed to form a similar transition at the level of phrases. These forms of combination were also reported by Musil, Schaeffer, Kollinzas, and McDowell (1975). Another interesting result not shown in the numerical results is that the child would express preferences among the items used as reinforcers. Often when given a particular reinforcer, he would refuse it and when asked, "What do you want?" would sign for an alternate item, usually with the noun sign (drink, key, tickle) but would often use a phrase such as "gimme that" ("gimme" sign and pointing to the desired object). Thus, he was not only asking for something, but a particular something. The child seemed to have acquired some vocal expressive vocabulary as evidenced by Table II. While the number of vocal words is not large, there were some words emitted which were not part of the training program. Indeed, there was no overt attempt per se to train vocal speech. Hence, the child has acquired some language and from the emitted vocal phrase structure must also have acquired at least the rudiments of English syntax. This is also

evidenced by the signed phrase construction which, while showing variation, did follow appropriate English syntactic order which would follow from the use of the total communication procedure.

The anecdotal reports of the use of signs outside the training situation is of great importance. The child's use of Ameslan signs (and increased vocal speech) were reported by both the child's "school" teacher and his family. This finding is in accord with Webster et al. (1973) and Miller and Miller (1973). It signifies that the autistic child is capable of using language when given the appropriate tools. It carries the implication that one of the main factors in autism may not be a cognitive malfunction, but a perceptual nonfunctioning in the crossmodal array.

The child's behavior (nonlanguage) also changed over the course of the investigation. When first seen, the child was nonattentive, highly distractible, and seemed to be lost in his own world—a common description of an autistic child. During the course of training, he became attentive, often sitting and working for 45 minutes at a time when extended sessions could be arranged. He would also initiate contact at the beginning of a session and would sign spontaneously to be "tickled" which involved tickling, wrestling, and general mayhem. He also, upon occasion, would mold the experimenter's hand into the tickle sign and "attack" to initiate the game. During hours 18 to 19 the child initiated a game by placing the keys in the experimenter's shirt pocket and then removing them while speaking phrases such as "find a key," "back a key," "gimme back key," "going out," and "back key going out."

At the end of a training session, other children would often enter the room where the training was conducted. During the first few sessions, the child would withdraw completely from contact, but later would actively (sometimes aggressively) seek the experimenter's attention. Toward the latter sessions, he would initiate contact with the other children, usually as an attempt to get a toy. In these attempts he would often use the "gimme" sign toward the other children. One of the children was fond of hugging everyone and the child would receive this "affection" and upon occasion would hug back. The family reported that the child anticipated and seemed to look forward to the sessions. The family also reported that the child toilet trained about midway in the investigation, and became more manageable at home. Similar occurrences were reported by his teacher. Hence, it would appear that the large amount of attention and social and physical contact, and the acquisition of effective, acceptable communication involved in manual language training had rewards beyond the mere acquisition of words.

In summary, while the scope of this investigation is admittedly limited, it demonstrates the potential usefulness of the technique and

demonstrates that autistic children will, when given the means, act as do other children; which, after all, is the goal.

REFERENCES

Bryson, C. Q. Systematic identification of perceptual disabilities in autistic children. *Perceptual and Motor Skills,* 1970, *31,* 239-246.

Bryson, C. Q. Short-term memory and crossmodal information processing in autistic children. *Journal of Learning Disabilities,* 1972, *5,* 81-91.

Davis, B. J. A clinical approach to the development of communication in young schizophrenic children. *Journal of Communication Disorders,* 1970, *3,* 211-222.

Fant, L. J. *Say it with hands.* Silver Spring, Maryland: National Association of the Deaf, 1964.

Fouts, R. S. Unpublished report. Department of Psychiatry Grand Rounds, University of Oklahoma Health Sciences Center, 1973.

Gillies, S. M. Some abilities of psychotic children and subnormal controls. *Journal of Mental Deficiency Research,* 1965, *9,* 89-101.

Hartung, J. R. A review of procedures to increase verbal imitation skills and functional speech in autistic children. *Journal of Speech and Hearing Disorders,* 1970, *35,* 203-217.

Hewett, F. Teaching speech to an autistic child through operant conditioning. *American Journal of Orthopsychiatry,* 1965, *35,* 927-936.

Hingtgen, J. N., & Churchill, D. W. Identification of perceptual limitations in mute autistic children: Identification by the use of behavior modification. *Archives of General Psychiatry,* 1969, *21,* 68-71.

Hingtgen, J. N., & Coulter, S. K. Auditory control of operant behavior in mute autistic children. *Journal of Perceptual and Motor Skills,* 1967, *25,* 561-565.

Jakab, I. The patient, the mother, and the therapist: An interactional triangle in the treatment of the autistic child. *Journal of Communication Disorders,* 1972, *5,* 154-182.

Lovaas, O. I. A program from the establishment of speech in psychotic children. In J. K. Wing (Ed.), *Early childhood autism: Clinical, educational and social aspects.* London: Pergamon Press, 1966.

McNeill, D. *The acquisition of language.* New York: Harper & Row, 1970.

Miller, A., & Miller, E. E. Cognative developmental training with elevated boards and sign language. *Journal of Autism and Childhood Schizophrenia,* 1973, *3,* 65-85.

Musil, A., Schaeffer, B., Kollinzas, R., & McDowell, P. *Signed speech: A new treatment for autism.* Paper presented at Southwestern Psychological Association, 1975.

Pronovost, W., Wakstein, P., & Wakstein, P. A longitudinal study of the speech behavior of fourteen children diagnosed as atypical or autistic. *Exceptional Children,* 1966, *33,* 19-26.

Ruttenberg, B. A., & Gordon, E. G. Evaluating the communication of the autistic child. *Journal of Speech and Hearing Disorders,* 1967, *32,* 314-324.

Schell, R. E., Stark, J., & Giddan, J. J. Development of language behavior in an autistic child, *Journal of Speech and Hearing Disorders,* 1967, *32,* 51-64.

Schlesinger, H. S., & Meadow, K. P. *Sound and sign.* Berkeley: University of California Press, 1972.

Senn, M. J. E., & Solnit, A. S. *Problems in child behavior and development.* Philadelphia: Lea & Febiger, 1968.

Stokoe, W. C., Casterline, D. C., & Croneberg, C. G. *A dictionary of American sign language on linguistic principles.* Washington, D.C.: Gallaudet College Press, 1965.

Sulzbacher, S. I., & Costello, J. M. A behavioral strategy for language training of a child with autistic behaviors. *Journal of Speech and Hearing Disorders,* 1970, *35,* 255-276.

Webster, C. D., McPherson, H., Sloman, L., Evans, M. A., & Kuchar, E. Communicating with an autistic boy by gestures. *Journal of Autism and Childhood Schizophrenia,* 1973, *3,* 337-346.