Psycholinguistic Abilities of Children with Clefts

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Historically, the literature on the subject of cleft palate has been concerned primarily with the adequacy of the speech endproduct as evaluated by listeners. A long list of studies has attempted to describe the speech output in terms of the defective elements which make it acoustically different from normal speech. Only recently have investigators directed their attention beyond the mechanics of speech to the fundamental language structures and behavior patterns which are basic to all forms of communication.

Morris (*6*) studied 107 cleft palate children between the ages of two and fifteen years. He reported that, as a group, the subjects demonstrated an over-all reduction on a number of measures of language skill. The children were less adequate than their controls on such measures as the Ammons Picture Vocabulary Test, the vocabulary subtest of the Wechsler Intelligence Scale for Children, mean length of response, structural complexity, variety of word selections, and articulation skills. The cleft palate children were also found to be significantly more variable in the length of their responses, and there was a tendency for them to use more one-word responses than did the normal children. These findings lead one to conclude that children with clefts are significantly retarded in communication skills and that the consequences of cleft lip and palate have implications to the communicative process that cannot be explained on the basis of an anatomical defect alone.

Earlier (*11*) we speculated that these evidences of expressive language problems might be related to what the child viewed as defective speech patterns which he was more or less reluctant to reveal. Results of the study indicated that children with clefts functioned less creatively on both verbal and nonverbal tasks than did their controls and that children with clefts were experiencing difficulty in several expressive modalities.

Shames and his associates (*10*) have created a language battery which

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has been administered to noncleft and cleft palate children from eighteen months to five years of age. Results thus far reported suggest that cleft palate children lag behind noncleft children in most aspects of verbal behavior during the early preschool years.

Little attention has been given to the over-all psycholinguistic functioning of cleft children. This study was designed to investigate factors such as receptive language ability, the manipulation of symbols internally, the retention and imitation of symbolic sequences and automatic habit chains, and a possible preferred channel or mode of language input and output. The basic hypothesis of this investigation was that cleft palate children would show a deficiency in the vocal and gestural expression of ideas relative to their level of performance in other psycholinguistic areas.

Method

SUBJECTS. The subjects for this study were selected from the files of the Cleft Palate Research Center at the University of Pittsburgh. The criterion used for selection of the subjects was that their chronological age fall within the upper and lower limits of the Illinois Test of Psycholinguistic Abilities. Of these children selected for study, 87% responded to the request to be evaluated. No systematic attempt was made to control intellectual ability nor socioeconomic status. Subjective observation, based on occupation of the father, suggested that these variables were probably evenly distributed within the sample.

A total of 136 cleft children, ranging in age from 3-0 to 8-11 years, were studied. There were 86 males and 50 females. Nineteen children had cleft lips only; 46, cleft palates only; and 71, clefts of both lip and palate. The distribution of males and females at various ages for the different cleft types appears in Table 1.

INSTRUMENTATION. The Illinois Test of Psycholinguistic Abilities (ITPA) was administered individually to each subject. This test allows

TABLE 1. Number of subjects with various types of cleft, at the six age levels.

age range	*cleft lip*		*cleft palate*		*cleft lip & palate*		*all groups*		*total*
	male	*female*	*male*	*female*	*male*	*female*	*male*	*female*	
3 to 3-11	1	2	4	1	0	2	5	5	10
4 to 4-11	3	0	4	10	11	3	18	13	31
5 to 5-11	7	0	2	6	10	5	19	11	30
6 to 6-11	2	0	6	3	15	5	23	8	31
7 to 7-11	1	1	2	6	9	4	12	11	23
8 to 8-11	1	1	2	0	6	1	9	2	11
totals	15	4	20	26	51	20	86	50	136

for the assessment of a child's strengths and weaknesses along several dimensions of language, shown in Table 2. Based on the theoretical models of Osgood (*9*) and Wepman (*12*), the instrument has been used with various types of exceptional children (*1, 2, 4, 7, 8*). Kirk and McCarthy (*3*) have described the instrument in detail and the diagnostic implications of its use. McCarthy and Olson (*5*) have studied the reliability and validity of the test in detail.

A description of the subtests comprising the battery follows:

Test 1: Auditory Decoding. This process is tapped by requiring "yes" or "no" answers to such questions as, "Do airplanes fly?" "Do bicycles drink?" Since decoding, and not encoding, is the process being measured, if the child cannot say "yes" or "no", a gesture response is accepted.

Test 2: Visual Decoding. In this subtest, the child is first presented with a stimulus picture which is then removed and the child is asked to point to one picture from among a set of four pictures. The correct choice is semantically identical to the stimulus picture but is not physically identical; e.g., a silver knife and a jack knife.

Test 3: Auditory-Vocal Association. In this subtest, the auditory perception and the vocal expression require minimal ability while the association process is tested by items of increasing difficulty. The analogies test is a "controlled association" test utilizing a sentence completion technique; for example, "Father is big, baby is - - - -."

Test 4: Visual-Motor Association. This process is tapped by a picture association test. The child is presented with a single stimulus picture and a set of four optional pictures, one of which is associated with the stimulus picture. The child is asked, "Which one of these (pointing to the set of optional pictures) goes with this (pointing to the stimulus picture)?" The child is to choose the one picture from among the set of choices which has a conceptual communality with the stimulus picture.

Test 5: Vocal Encoding. In this test, the child is shown a series of familiar objectives, such as a ball or a block and is asked to "Tell me all about this". The score is the number of discrete concepts enumerated.

Test 6: Motor Encoding. At the representational level, motor encoding is tapped by a gestural manipulation test. An object or picture is shown to the child and he is asked to "Show me what we should do with this". The subject is to supply the appropriate motion, such as drinking from a cup or playing a violin.

Test 7: Auditory-Vocal Automatic. This ability is assessed by a grammar test. The child is shown a picture of a hat and a picture of two hats as ancillary aids to the auditory-vocal task. The examiner says, "Here is a hat. Here are two - - - -." The child completes the sentence. The test increases in difficulty by requiring the correct use of increasingly less familiar English inflections.

Test 8: Auditory-Vocal Sequential. This dimension is assessed by a digit repetition test. The test differs from that of the Stanford-Binet in that the digits are presented at a rate of two per second and the child is allowed two trials with each sequence of digits before the task is failed.

Test 9: Visual-Motor Sequential. This factor is assessed by a test requiring visual sequential memory. This task requires the child to duplicate the order of a sequence of pictures or geometrical designs which has been presented by the examiner and then removed.

TABLE 2. Mean standard score (MSS) and standard deviation (SD) for six age levels on the Illinois Test of Psycholinguistic Abilities.

subtest	*age group*											
	3 to 3-11		*4 to 4-11*		*5 to 5-11*		*6 to 6-11*		*7 to 7-11*		*8 to 8-11*	
	MSS	*SD*	*MSS*	*SD*	*MSS*	*SD*	*MSS*	*SD*	*MSS*	*SD*	*MSS*	*SD*
1. auditory decoding.	.317	1.797	.234	.915	−.024	1.080	−.260	1.245	.277	1.260	.005	1.501
2. visual decoding...	.854	.945	.172	.649	−.150	.964	−.067	1.045	−.043	1.129	−.623	.980
3. auditory-vocal association.....	.087	1.097	.185	.825	−.294	1.156	−.176	1.186	−.107	1.007	−.065	1.357
4. visual-motor association.....	.026	1.327	−.226	.938	−.192	1.051	−.201	1.034	−.337	.938	−.558	1.189
5. vocal encoding....	−.680	.469	−.462	.963	−.537	1.043	−.695	.943	−.309	.997	−.683	1.701
6. motor encoding...	−.313	.831	−.274	.966	−.625	.967	−.639	.855	−.550	1.069	−1.099	1.593
7. auditory-vocal automatic.....	−.078	.951	−.383	.915	−.491	.973	−.370	.863	−.172	.851	−.894	1.478
8. auditory-vocal sequential.....	−.174	1.330	−.005	.953	−.004	1.005	.075	1.349	−.143	1.168	−.316	1.176
9. visual-motor sequential.....	−.585	.769	−.516	.913	−.720	1.036	−.500	1.018	−.772	1.051	−.907	1.226
ITPA Total.....	−.118	.659	−.139	1.067	−.513	1.264	−.546	1.379	−.419	1.182	−1.028	1.832

Results

Scores for each child on the nine subtests were compared with the standardization data at the appropriate age level and converted into standard scores. Mean standard scores and standard deviations for each of the six age levels are presented in Table 2; profiles for the six age groups are shown in Figures 1–6. In addition to describing the mean standard scores, these figures show the standard error for each subtest at the various age levels. Profiles were also described for all subjects exhibiting each of the three cleft-type groups (see Figures 7–9).

Figures 1–6 indicate that cleft palate subjects at all age levels tend to show a general depression in those areas of language sampled by the

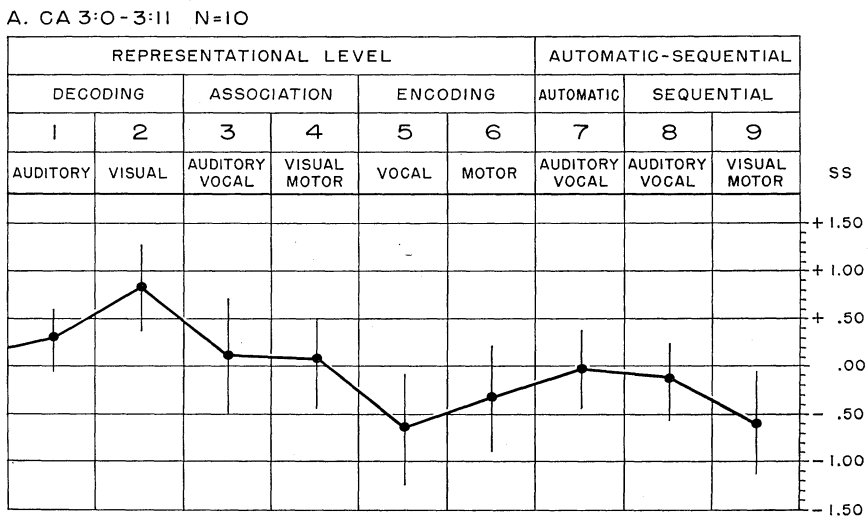

FIGURE 1. Mean ITPA profile for subjects aged 3-0 to 3-11.

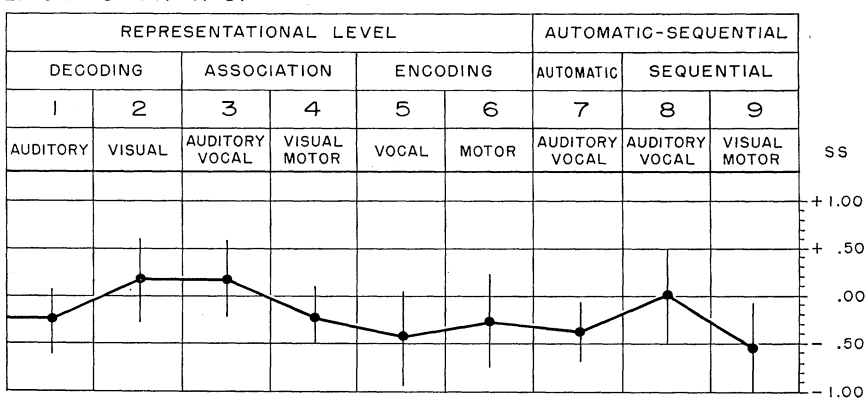

FIGURE 2. Mean ITPA profile for subjects aged 4-0 to 4-11.

C. CA 5:0-5:11 N=30

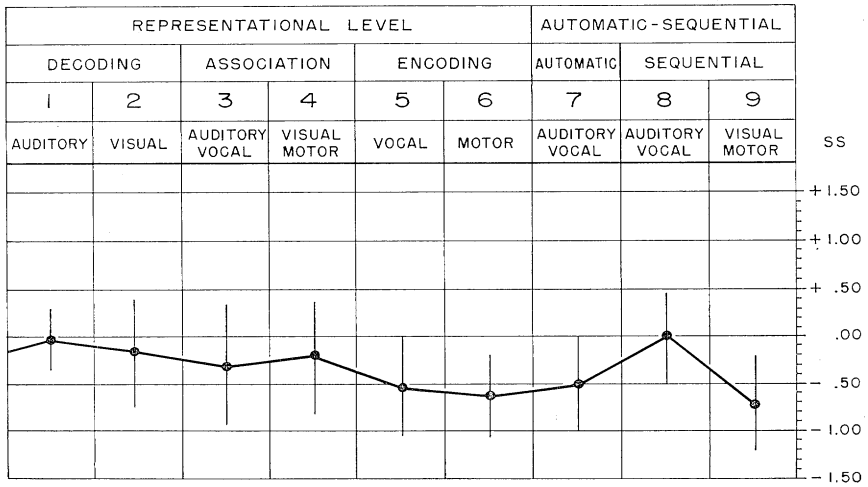

FIGURE 3. Mean ITPA profile for subjects aged 5-0 to 5-11.

ITPA. Moreover, relative to their performance in other areas, the subjects showed consistent weakness in both vocal and gestural expression (encoding) and in visual memory (visual-motor sequential). In most instances, the lower limits of the standard error for each of these subtests (represented by vertical line intersecting each mean) indicates a clinically significant disability. In auditory memory (auditory-vocal sequential) the subjects were consistently stronger at all age levels than in the visual-motor counterpart. The subjects did not appear to be either

A. CA 6:0-6:11 N=31

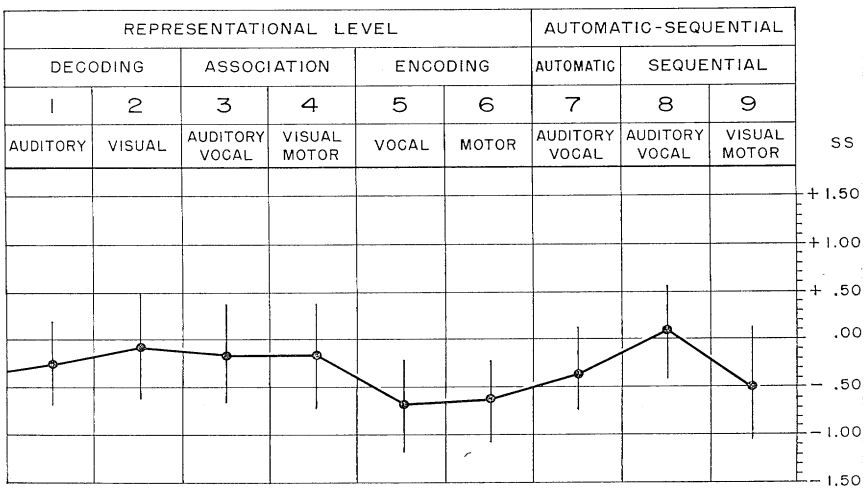

FIGURE 4. Mean ITPA profile for subjects aged 6-0 to 6-11.

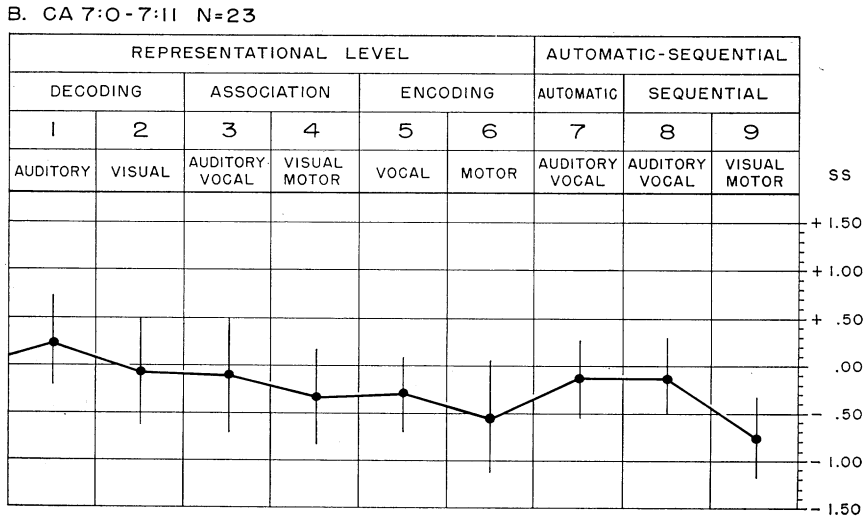

FIGURE 5. Mean ITPA profile for subjects aged 7-0 to 7-11.

relatively weak or strong in their use of the auditory or the visual channel of communication.

Male and female subjects with cleft lips alone showed relative weakness in motor expression and in visual memory (see Figure 7). Children with clefts of the palate alone (Figure 8) exhibited language disabilities in both areas of expression (tests 5 and 6) and in visual memory. A similar profile was manifested by subjects with clefts of the lip and palate (Figure 9), although their weaknesses were not as marked as were

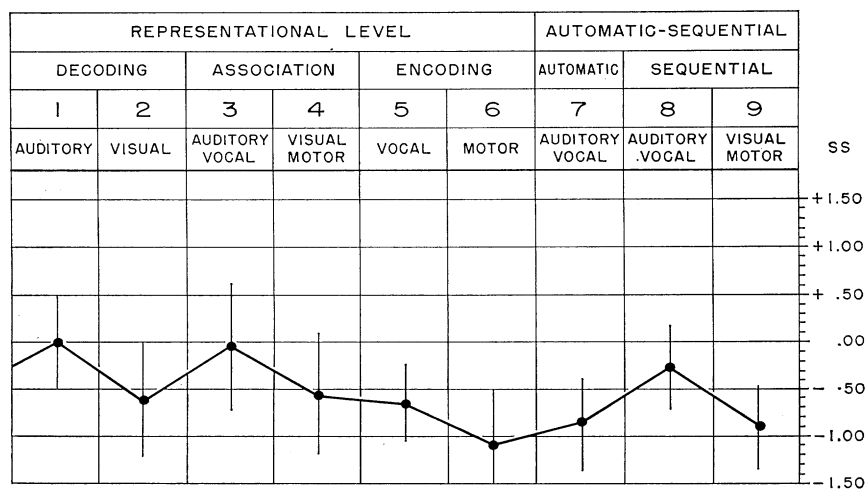

FIGURE 6. Mean ITPA profile for subjects aged 8-0 to 8-11.

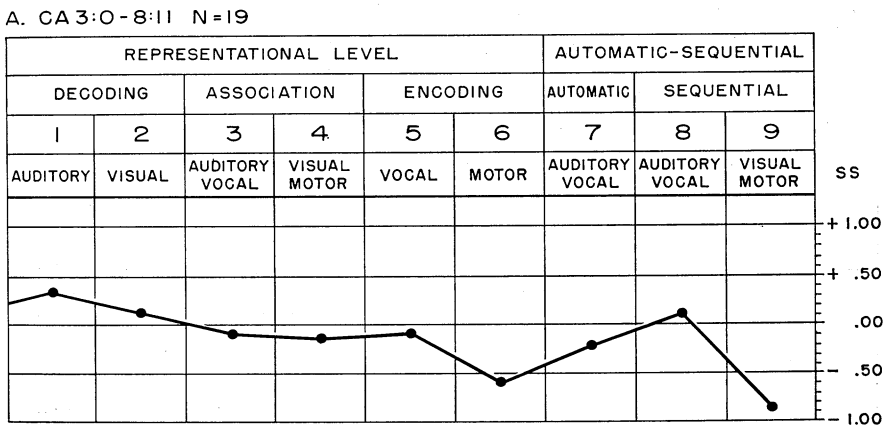

FIGURE 7. Mean ITPA profile for subjects with cleft lip only, sexes and ages combined.

those of the former group. In spite of these differences, the similarity in the profiles among these groups is noteworthy.

The mean standard scores for the subjects at the six age levels was profiled for each of the nine subtests and the total ITPA score. These profiles demonstrate a) comparisons among children of various age levels in each subtest, and b) those specific areas of linguistic functioning in which cleft children exhibit consistent strength or weakness. These data are presented in Figure 10. Caution should be exercised in interpreting these data because of the comparatively small number of subjects at several age levels.

Mean standard scores on the Auditory Decoding, Auditory-Vocal Association, and Auditory-Vocal Sequential tests were relatively stable

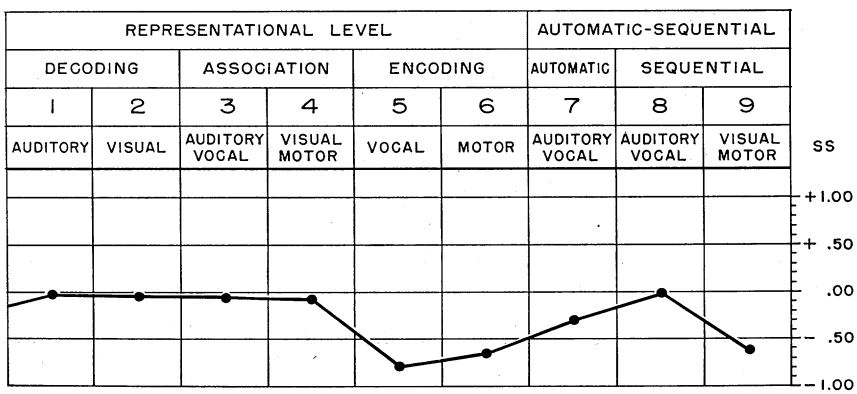

FIGURE 8. Mean ITPA profile for subjects with cleft palate only, sexes and ages combined.

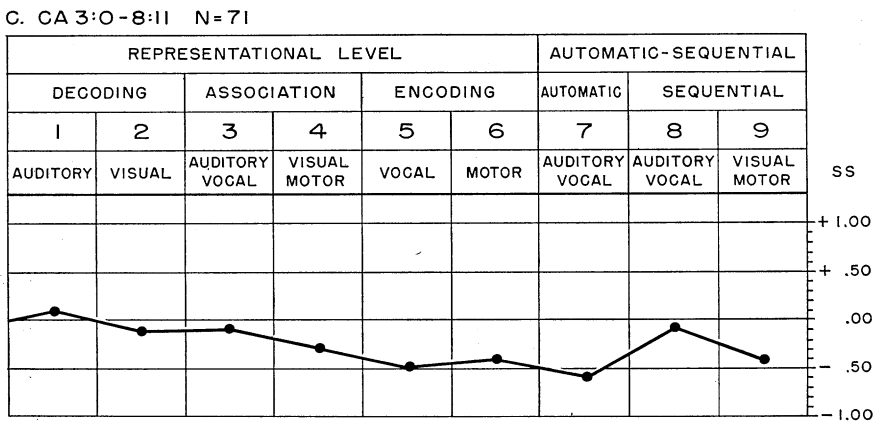

FIGURE 9. Mean ITPA profile for subjects with cleft lip and palate, sexes and ages combined.

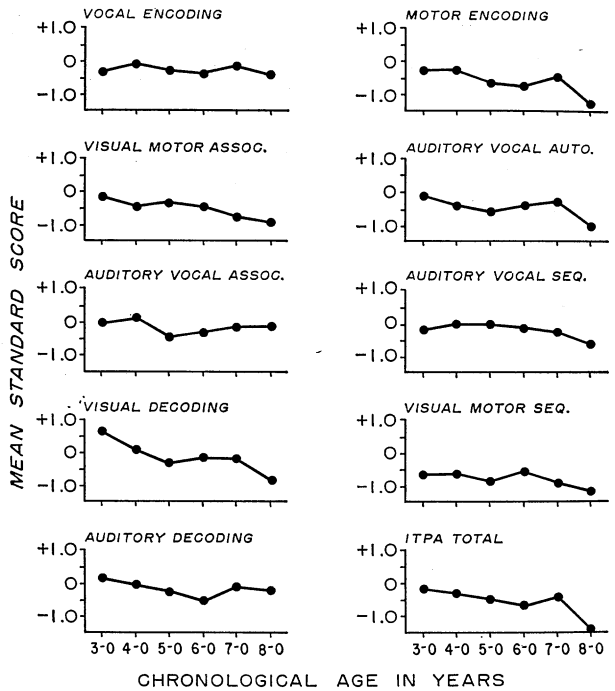

FIGURE 10. Summary profiles for all subjects, sexes and cleft types combined, according to subtest and age.

among the six age levels, with none of the groups exhibiting substantial weaknesses of any significance. Performance of the groups on the Vocal Encoding and Visual-Motor tests was stable among age groups but consistently low. On the other tests (Visual Decoding, Visual-Motor Asso-

ciation, Motor Encoding, and Auditory-Vocal Automatic) the subjects tended to exhibit a progressively poorer performance as age increased. This same pattern was observed among the groups on the total ITPA score.

Discussion

The fact that cleft palate children are relatively poor in vocal expression has been reported in earlier studies. The results of this investigation are consistent with those findings and are made all the more significant since consistent difficulty in this area was exhibited by subjects at each of the six age levels. Finding that the subjects were relatively stronger in tests of Auditory Decoding, Auditory-Vocal Association, and Auditory-Vocal Sequencing pinpoints the deprivation as being related to output rather than to input, association, or memory. A relatively normal and stable pattern of performance was observed in these areas for all age levels.

The group seemed somewhat deficient in the gestural expression of ideas and, in fact, at several age levels, were lower in this area than they were in vocal expression. The reasons for this could perhaps be traced to the early deprivation in motor development which must occur in association with sucking and deglutition activities. The physical restraints required during the many surgical procedures might also play a part. On the other hand, it is not unreasonable to associate reduction in gestural expression with the shyness, dependency, rigidity, inhibition, and lack of affect often attributed to cleft children. The possibility of a relationship to difficulty in vocal expression should not be overlooked. This finding emphasizes the need for a comprehensive investigation of the perceptual-motor capabilities of cleft children.

The substantial and consistent weakness of the cleft palate subjects in visual memory with a concomitant less pronounced weakness in auditory memory is an interesting, although somewhat perplexing, finding. This same profile was observed for both sexes, at all ages, and for each of the three types of cleft conditions. Moreover, on three of the four visual-motor tests the subjects showed a progressively weaker performance as age increased. It cannot be said that cleft children are more skilled in their use of the visual channel than they are of the auditory. The reverse seems to be true in this investigation. The hypothesis of possible perceptual-motor difficulties among these subjects is strengthened when it is recognized that there appears to be a general visual-motor deficit. On the other hand, poor auditory memory may be related at least partially to the unpredictable hearing patterns in young cleft children. The role of vision in the visual-perceptual area also requires further exploration; there has been almost no attempt made to study vision in children with various cleft conditions.

Clinical Implications. Other implications and questions emerge from

the results of this investigation. First, the heterogeneous nature of the profiles has demonstrated that the study of children with clefts should include an assessment of language in addition to the traditional speech analysis. Secondly, the possible long-term implications of early motor deprivation among cleft children should be given further attention and study. Child rearing practices and personality development must be explored as they relate to speech and language skills. Finally, the relationship between the characteristic language weaknesses observed in cleft palate children and later school achievement with and without intervention constitutes an important area for research concern.

It would appear logical to re-assess therapeutic practices with cleft children in an effort to provide treatment programs that would meet the unique requirements of these children. To stress speech to the exclusion of language may well develop a child capable of producing perfect consonant sounds, normal voice quality, and justifiable pride in the clinical team; but the child will not have been successfully habilitated if his expressive language and his willingness to communicate in socially demanding situations lags so far behind his physical mechanism that he is unable to achieve a reasonable place in society.

Summary

The Illinois Test of Psycholinguistic Abilities was administered to 136 children with clefts (86 males and 50 females). Scores from the nine subtests were compared with the standardization data at each of six age levels. The data revealed that cleft palate subjects manifest a general language depression with particular weakness in vocal expression, gestural output, and visual memory. Moreover, in the samples studied, there was a tendency for language weaknesses to become more marked as age increased.

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