

# Parents' Perceptual Preferences Between Compensatory Articulation and Nasal Escape of Air in Children with Cleft Palate

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**Two groups of parents (27 parents of children with cleft palate and 25 parents of normal children) listened to 14 pairs of tape-recorded words produced by two children with cleft palate. In each pair, one word was produced with compensatory articulation and the other with audible nasal escape of air. The parents indicated their preference by selecting from each pair the word that sounded better. Parents considered single words produced with compensatory articulation to be better than single words produced with nasal escape of air. Results are interpreted in terms of existing hypotheses and information concerning the acquisition of speech by children with cleft palate.**

Speech problems are often exhibited by children with cleft palate because of velopharyngeal insufficiency (Spriestersbach and Powers, 1959; Warren and Devereux, 1966; and Morris, 1979). Many children with cleft palate exhibit hypernasality and audible nasal escape of air in their speech (Hess and McDonald, 1960; Moll, 1968). Others substitute nonstandard phonemes such as pharyngeal and velar fricatives and glottal stops to replace the standard oral phonemes (Isshiki, et al, 1968; Bzoch, 1979; Morris, 1979; Trost, 1981).

Both Bzoch and Morris formulated hypotheses explaining the development of compensatory articulation patterns by children with cleft palate with insufficient velopharyngeal closure. Bzoch (1979) hypothesized that compensatory patterns were almost always learned and reinforced in infancy and early childhood. Morris (1979) hypothesized that individuals who develop compensatory productions consider them to be perceptually better than the alternative nasal escape of air.

Morris's hypothesis was the topic of a study by Paynter and Kinard (1979). They investigated three groups of eight children. Group I had velopharyngeal insufficiency and utilized compensatory articulation, group II had the same disorder without compensatory articulation, and group III had normal speech. The children listened to 14 pairs of tape-recorded words, with one word produced using compensatory articulation and the other with audible nasal escape of

air. In each pair, subjects indicated which words sounded better. Group II and group III preferred single words produced with compensatory articulation, and Group I showed no preferences. These results tend to negate Morris's (1979) hypothesis.

If parents prefer compensatory articulation patterns to nasal escape of air, they may reinforce those patterns in their children with cleft palate. Such findings would provide support for Bzoch's hypothesis (1979). The present study replicated the Paynter and Kinard (1979) methodology, but utilized parents of children with cleft palate and parents of normal children to determine their perceptual preferences regarding compensatory articulation and nasal escape of air. The purpose of this study was to determine the perceptual judgments of parents relative to the following questions: (1) Do parents of children with cleft palate exhibit a preference for single word productions produced with compensatory articulation or nasal escape of air? (2) Do parents of normal children exhibit a preference for single words produced with either of the two modes of speech? and (3) Are there any father-mother preference differences in either group of parents?

## METHOD

### Subjects

Forty-two subjects, 27 parents of children with cleft palate (18 mothers and 9 fathers) and 25 parents of normal children (15 mothers and 10 fathers) were included in the study. The parents of children with cleft palate were selected from the Crippled Children's Service Cleft Palate Clinic in Birmingham, Alabama and from the

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files of the Speech and Hearing Center of the University of Alabama, Tuscaloosa. The parents of normal children were from urban and rural areas of Alabama and were selected on the basis of their children having no history of cleft palate or other speech disorders.

Parental age criteria were not preestablished. Among parents of children with cleft palate, the mothers' mean age was 31 years (range 22 to 46 years), and the fathers' mean age was 33 years (range 27 to 44 years). The mean age of their children was 7 years, 8 months. Among parents of normal children, the mothers' mean age was 35 years (range 22 to 43 years), and the fathers' mean age was 38 years, (range 29 to 64 years). The mean age of their children was 8 years, 9 months.

### Construction of the Test Tape

Parallelism between the study reported here and the studies by Kinard (1977) and Paynter and Kinard (1979) was considered essential, since the present study was a replication utilizing parents as subjects instead of children. A copy of Paynter and Kinard's (1979) audio tape was made by the present investigators for use in the study from a tape borrowed from Paynter.

Paynter and Kinard (1979) used two children as speakers in constructing the test tape in their study. Two speech pathologists determined that compensatory articulation patterns were consistently used by one child and audible nasal escape of air was consistently used by the other child. The children's productions on the Templin-Darley Screening Test of Articulation (Templin-Darley 1969) and the Iowa Pressure Subtest of the Templin-Darley Tests of Articulation (Templin and Darley, 1969) were recorded on two audio tapes. Three speech pathologists listened to the taped words of the child who utilized compensatory articulation patterns and had to agree unanimously that the child was using compensatory articulation before any word was included in the test tape. The unanimous agreement criterion was applied to another group of three speech pathologists that listened to the taped words of the child who utilized audible nasal escape of air. The final tape consisted of 14 pairs of test words, 5 pairs of practice words, and instructions.

The taped instructions stated that the listener would hear two words, both sounding strange or different in some way. The listeners were to decide which word sounded better and indicate their preference by circling "1" or "2" on the form given to them. Each of the 14 words was produced twice, once with compensatory articulation and once with nasal escape of air. The

resulting word pairs were randomly arranged as to the order of production of compensatory articulation and nasal escape of air. The order of presentation and the 14 pairs of test words are in the Appendix.

### Test Tape Presentation

The test tape was presented to all subjects using a Sony solid state reel-to-reel tape recorder (model T-C 106A). Each parent was seated within approximately three feet of the recorder. The volume control was set at the mid-point (5), with all test words easily heard. The parent was directed to circle the number (1 or 2) corresponding to the preferred production.

### Test Item Consistency

In order to determine the internal consistency of the 14 word items, a reliability analysis was conducted using the Statistical Package for the Social Sciences (Hall and Nie, 1981). The purpose of the reliability analysis was to determine if the 14 words had much in common. The completed analysis resulted in an alpha coefficient of 0.42. The alpha coefficient is an index of item consistency with values ranging from 0.00 to 1.00, with the latter representing a maximum degree of consistency. The alpha coefficient of 0.42 appeared to be low, indicating the items did not have much in common (Nunnally, 1978). An additional feature of the SPSS reliability procedure was the inclusion of an analysis of variance (ANOVA) allowing inspection of the degree to which variation among the items occurred. A test of significance of the between-item variance produced an F ratio of 11.26 ( $p < 0.001$ ). Therefore, the degree to which the 14 items varied was significant, suggesting that the word items comprising the list had little in common and did not possess much internal consistency.

Further examination of the internal consistency analysis of word items was done by computing 14 separate alpha coefficients, each with a different word from the list deleted. The resulting alpha coefficients with a 13-word list were only slightly different from the 0.42 alpha coefficient obtained when all 14 words were included. When "onion" was the word deleted, the resulting alpha coefficient was 0.46, indicating parents were slightly more consistent in their responses to a 13-word list not containing "onion." If the list contained only words comprised of oral phonemes, the parents would have had to determine only whether the word sounded better produced with compensatory articulation or nasal escape of air. However, 10 of the 14 words on the tape contained nasal phonemes. The presence of nasal

phonemes may have added another factor to the parents' task and reduced their consistency of responding. The presence of nasal phonemes, however, did not alter the parents' task of deciding which production of each of the 14 words they preferred. Although revealing, this finding was considered not to have a crucial effect on the results of the study.

## RESULTS

Data resulting from the parental choices of preferred words were tabulated by computing total scores and percentages, followed by statistical analysis. The 52 parents of children with cleft palate and normal children produced 728 responses by selecting the preferred words from the 14 pairs of words. Words produced by compensatory articulation were preferred by parents 83.8 percent (610/728) of the time (Table 1). Similar results were evident when the parent groups were separated. Parents of children with cleft palate preferred compensatory articulation 86 percent of the time, and parents of normal children preferred that mode 83.7 percent of the time. Furthermore, analysis of the data by gender indicated that the mothers and fathers in each parental group overwhelmingly preferred compensatory articulation over nasal escape of air (Table 1).

Parents varied in their selection of preferred manner of word production. "Glasses" was preferred by all 52 parents when it was produced by compensatory articulation, but the nasal escape of air mode was preferred for "onion" 57.7 percent of the time. The remaining 12 items were all preferred in the compensatory articulation mode, varying from 57.7 percent to 98.1 percent. Thus, the percentage data were clearly indicative of a strong preference for compensatory articulation although the degree to which it was preferred for any given item varied considerably.

As in the Paynter and Kinard study (1979), the scores of parents were converted to overcome

the non-normal distribution characteristics. The percentages of words preferred by parents when produced in the compensatory articulation manner were submitted to an Arcsin Transformation (Kirk, 1982), to permit parametric statistical analysis of the data (Table 2). There were no significant differences ( $F=0.544$ ,  $p=0.464$ ) in the preferences for compensatory articulation between the parent groups (cleft palate vs. normal). Likewise, no significant difference was found between the male and female parents ( $F=0.075$ ,  $p=0.785$ ). Finally, no significant interaction between group (cleft palate vs. normal) and gender (female vs. male) was found ( $F=0.136$ ,  $p=0.714$ ).

A test of proportions for dichotomous data (Mendenhall and Ott, 1980) was used to determine if there were significant differences in the parents' choices for compensatory articulation or nasal escape of air (Table 3). All parents in each of the four groups preferred compensatory articulation (CA) over nasal escape of air (NA). The nonparametric analysis resulted in significant critical ratios for mothers of children with cleft palate, fathers of children with cleft palate, mothers of normal children, and fathers of normal children. These results confirmed that the subjects did not choose compensatory articulation by chance, but rather that there was a strong preference for it over audible nasal escape of air.

## DISCUSSION

Parents in this investigation preferred single word productions utilizing compensatory articulation over audible nasal escape of air. Because parents preferred compensatory articulation productions, they may reinforce those patterns in their children with cleft palate. The results support Bzoch's (1979) hypothesis that compensatory articulation patterns are used by children with cleft palate because they are learned and reinforced. Parental preference, however, does not guarantee reinforcement in children. Further-

**TABLE 1** Preferences of Parents of Children with Cleft Palate and Parents of Normal Children for Word Productions by Compensatory Articulation and Nasal Escape of Air

<i>Data Source*</i>	<i>N</i>	<i>Total Response</i>	<i>Parental Preference<sup>†</sup></i>			
			<i>CA</i>	<i>%</i>	<i>NA</i>	<i>%</i>
All Parents	52	728	610	83.8	118	16.2
CP Parents	27	378	325	86.0	53	14.0
N Parents	25	350	293	83.7	57	16.3
CP Mothers	18	252	216	85.7	36	14.3
CP Fathers	9	126	109	86.5	17	13.5
N Mothers	15	210	176	83.8	34	16.2
N Fathers	10	140	117	83.6	23	16.4

\* CP=parents of children with cleft palate, N=parents of normal children.

<sup>†</sup> CA=word production by compensatory articulation, NA=word production by nasal escape of air.

TABLE 2 Summary of Analysis of Variance Computed for Arcsin Transformation of Percentage of Subject Preferences for Compensatory Articulation

Source of Variation	Sum of Squares	DF	Mean Square	F	p Value
Main effects	0.064	2	0.032	0.325	0.724
Cleft palate vs. normal	0.053	1	0.053	0.544	0.464
Male vs. female	0.007	1	0.007	0.075	0.785
2-way interactions	0.013	1	0.013	0.136	0.714
Group by parents' sex	0.013	1	0.013	0.136	0.714
Explained	0.077	3	0.026	0.262	0.852
Residual	4.708	48	0.098		
Total	4.785	51	0.094		

more, after a child reaches the age of 18 to 24 months, most parent-child interactions involve multi-word utterances. This investigation utilized a test tape containing only single word pairs and therefore is limited in its overall application to parental reinforcement of children's speech.

Although this investigation produced evidence that parents of children with cleft palate preferred and perhaps reinforced the use of compensatory articulation by their children, other explanations underlying the development of this mode of production must also be considered. The intelligibility of a child's utterance may be a reinforcing factor because it determines whether or not the parent asks the child to repeat the utterance. Also, recent studies have demonstrated that children systematically change or simplify adult speech into forms appropriate to age-related, motor, perceptual, and conceptual capabilities. Such phonological processes may differ according to neuromuscular or structural variations in the vocal tracts of speakers. Therefore, children with cleft palate may display phonological processes characteristic of their congenital deformity, their age at palatal repair, or the presence of fistulas in the palate. It may be simplistic to assume that parental preference is the singular, or even the strongest, reinforcing element in determining the

use of compensatory articulations by children with cleft palate.

Additional research on the etiology of compensatory articulation could focus in four areas: (1) the relationship between parental preferences and their children's speech characteristics, (2) the manner by which parents reinforce the speech productions of their children, (3) the role of intelligibility in parental reinforcement, and (4) phonological processes peculiar to children with cleft palate.

Finally, the low internal consistency found among items was understandable and was attributed to the method by which Paynter and Kinard (1979) originally selected the 14 words. The words were selected on the basis that the child chosen for the tape recording used compensatory articulation or nasal escape of air, with the phonemic composition of the words not considered. Only four words contained all oral phonemes. Nine words contained one nasal phoneme, and one, "onion," contained two nasal phonemes. A method of word selection utilizing only oral phonemes would probably increase the internal consistency of the word items. Therefore, further study on children's or parental preferences or both, should use words controlled for phonemic content.

TABLE 3 Summary of Test of Proportions for Dichotomous Data

Groups	Proportions of CA* Preferred Over NA	Critical Ratio	P†
Mothers of children with cleft palate	18/18	4.36	< 0.005
Fathers of children with cleft palate	9/9	2.99	< 0.01
Mothers of normal children	15/15	3.88	< 0.005
Fathers of normal children	10/10	3.16	< 0.01

\* CA=compensatory articulation, NA=nasal escape of air  
† p value at 0.05 level or greater required

## APPENDIX

## Distribution of Test Words Produced by Compensatory Articulation and Nasal Escape of Air Utilized in the Tape Presentation\*

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1. Clown (N)*	2. Clown (C)†
1. Glasses (N)	2. Glasses (C)
1. Spoon (N)	2. Spoon (C)
1. Twins (N)	2. Twins (C)
1. String (C)	2. String (N)
1. Sun (C)	2. Sun (N)
1. Blocks (N)	2. Blocks (C)
1. Stopped (N)	2. Stopped (C)
1. Matches (C)	2. Matches (N)
1. Queen (N)	2. Queen (C)
1. Sleeping (C)	2. Sleeping (N)
1. Squirrel (C)	2. Squirrel (N)
1. Music (C)	2. Music (N)
1. Onion (C)	2. Onion (N)

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\* (N)=test words produced by nasal escape of air

† (C)=test words produced by compensatory articulation

## REFERENCES

- BZUCH KR. Communicative disorders related to cleft lip and palate. Boston: Little, Brown, 1979.
- HALL CH, NIE NH. Statistical package for the social sciences update 7-9. New York: McGraw-Hill, 1981.
- HESS DA, McDONALD ET. Consonant nasal pressure in cleft palate speakers. *J Speech Hear Res* 1960; 3:201-211.
- ISSHIKI N, HONJOW I, MORIMOTO M. Effects of velopharyngeal incompetence upon speech. *Cleft Palate J* 1968; 5:297-310.
- KINARD MW. Perceptual preferences between compensatory articulation and nasal escape of air in children with velopharyngeal incompetence. Master's Thesis, Texas Tech University, 1977.
- KIRK RE. Experimental design: Procedures for the behavioral sciences. Belmont, Ca: Brooks/Cole Publishing, 1982.
- MENDENHALL W, OTT L. Understanding statistics (3rd ed.). Boston: Duxbury Press, 1980.
- MOLL KL. Speech characteristics of individuals with cleft lip and palate. In: Spriestersbach DC, Sherman D, eds. *Cleft palate and communication*. New York: Academic Press, 1968.
- MORRIS HL. Abnormal articulation patterns. In: Bzoch KR, ed. *Communicative disorders related to cleft lip and palate*. Boston: Little, Brown, 1979.
- NUNNALLY J. Psychometric theory. 2nd ed. New York: McGraw-Hill, 1978.
- PAYNTER ET, KINARD MW. Perceptual preferences between compensatory articulation and nasal escape of air in children with velopharyngeal incompetence. *Cleft Palate J* 1979; 16:262-266.
- SPRIESTERSBACH DC, POWERS GR. Nasality in isolated vowels and connected speech of cleft palate speakers. *J Speech Hear Res* 1959; 2:40-45.
- TEMPLIN MC, DARLEY FL. *The Templin-Darley Tests of Articulation*. Iowa City: The University of Iowa, 1969.
- TROST JE. Articulation additions to the classical description of the speech of persons with cleft palate. *Cleft Palate J* 1981; 18:193.
- WARREN DW, DEVEREUX JL. An analog study of cleft palate speech. *Cleft Palate J* 1966; 3:103-114.