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Mothers of cleft and noncleft palate children (C- and non C-mothers) listened to a reading by a cleft palate child of a passage containing specified combinations of nasality and intelligibility. Groups were either uninstructed or instructed to listed to the content or the manner of speech; they assessed the nasality and intelligibility of the speaker and were given an information test on the material heard. Results were that mothers under content instructions scored higher on the content test than mothers under different instructions; however, non C-mothers scored significantly higher than C-mothers. The content score varied with the severity of the speech problem; the accuracy of rating nasality did not vary. C- and non C-mothers did not differ in accuracy of rating intelligibility and estimating the percentage of words in error, when both were under manner instructions; but C-mothers under manner instructions were more accurate on both intelligibility measures, than such mothers instructed to listen to content. (Author/JD)

FINAL REPORT

Project No. 6-2115

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EFFECTS OF LISTENING INSTRUCTIONS AND SEVERITY OF CLEFT PALATE SPEECH ON LISTENERS

September 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

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DIVISION OF RESEARCH

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TITLE: Effects of Listening Instructions and Severity of Cleft Palate Speech on Listeners

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RECOMMENDATION: Approval

SUMMARY OF REVIEWS

After extensive review by the Division Staff and appropriate field readers. Approval and submission to ERIC have been recommended.

It is rated high in terms of it having been carried out in line with the approved original proposal and therefore meets the requirements of the project. It does reflect very consistently what was intended.

In respect to the technical soundness of the study, the reporting appears to the quite sufficient. A more thorough analysis of the data is recommended as it was felt that little information was presented concerning the exact nature of the correlational techniques used and the precise variables which were correlated.

The reporting is satisfactory. The authors have reviewed the research in the principal area and related ones as well.

The nonsignificant results of the study are primarily the reason for little to be said in regard to the educational significance of this particular piece of research. Some questions might feasibly be raised for different approaches getting at this particular problem not tied specifically to this study. There seems to be little, if any, relevant information from this

study which will be reasonable in the clinical process.

The report is technically high in quality. It is well prepared in the sense of spelling, grammar and structure. Some reorganization and simplification might improve its reability.

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SUMMARY

Groups of mothers of cleft and non-cleft palate children listened to a reading of a passage by a cleft palate child. The speech sample for each group contained specified combinations of nasality and intelligibility. Each group was either uninstructed, or instructed to listen to the content or the manner of speech. The mothers assessed the nasality and intelligibility of the speaker and were given an information test on the material heard.

Mothers of cleft and non-cleft children under content instructions scored higher on the content test than mothers under different instructions. However, the mothers of non-cleft children scored significantly higher than the mothers of cleft children. The content score varied with the severity of the speech problem. The accuracy of rating nasality did not vary with the intelligibility or nasality of the speaker, the listening instructions, or the background of the listener. There were no significant differences between the mothers of cleft and non-cleft children in accuracy of rating intelligibility and estimating the percentage of words in error, when both were under manner instructions. Mothers of cleft children under manner instructions were more accurate on both intelligibility measures, than such mothers instructed to listen to content.

Chapter 1

Introduction

The general concern of this project has been the study of variables which may influence the way in which listeners attend to a defective speaker. It has dealt specifically with the ways in which mothers may respond to a cleft palate speaker, since this type of speech problem could interfere with the normal communication system operating between mother and child.

In this study attention has been given to the interactions among the types and levels of severity found in cleft palate speech problems, the listeners' prior experience with these speech patterns and specific experimental instructions to attend to content or manner of speech. Incidental clinical observations suggest that parents of cleft palate children tend to over-emphasize the manner of their child's speech and to de-emphasize the content of the message. Under such conditions the process of communication may break down and feelings of fear, frustration, anger and shame may result in both parents and child.

When the speaker is a child one of his most important listeners is likely to be his mother. Because of the special nature of the mother-child relationship, a mother's response to her child's communication attempts may exert a very strong influence on his response to himself. Her response may influence her child's self-image and his subsequent social behavior, as well as influencing the frequency and nature of his speech behavior. When the child is a defective speaker, because he may be limited in the range of comprehending listeners available to him, the importance of his mother's listening role is increased. Thus, her potential for influence, as a listener-respondent, may be even greater than that of the normal child's mother.

It has been speculated that those parents who attend to the manner of their child's speech do not find this a rewarding activity and that, as a result, they may tend to communicate less with their child. Such a poor communication environment could result in the cleft palate child not receiving appropriate verbal stimulation and, as a corollary, not being provided with adequate speech and language models. These factors could account for many of the speech and language problems found among cleft palate children. In contrast, parents who attend primarily to the content of their cleft palate child's speech may be better able to provide an environment which fosters their child's speech and language development, through opportunities for productive verbal interactions.

The extent to which speech associated with cleft palate may interfere with the child's communication with his parents, teachers and peers has immediate educational and therapeutic implications. The results of a study, which could determine relationships among the amount and nature of the information retained by a listener and the types and severity of communication problems of a speaker, would directly influence the direction and focus of speech therapy, the content of parent counseling, the training of teachers and the role of peer groups in the overall preventative and rehabilitative process.

The purpose of this study has been to determine the relative effects of:

1. The severity of the speech problem;
2. The listener's previous experience with the speech problem;
3. Specific instructions to listeners, directing their attention either to the content or to the manner of cleft palate speech samples;

on the listener's retention of content material and their judgements concerning the intelligibility and nasality of the speakers heard.

Related Research

Research on the speech of cleft palate children has concentrated primarily on describing various patterns of articulatory and linguistic behavior. Such research has been preoccupied with describing the speaker and with developing valid and reliable instruments for measuring and describing speech associated with cleft palate. Attention has not been given to the total speech and language interaction which involves the listener as well as the speaker. This interaction is a complex one that is not clearly understood, during which the speaker and listener influence each other.

Research on the amount and nature of the influence that may be exerted on a speaker by the response of his listener has so far been concentrated mainly in the area of stuttering. (Bloodstein et al. (2), Johnson et al. (17, 18), Van Riper (40). This research has indicated that listeners make judgements about the speakers that they hear; that these judgements influence the response that they make to the speaker and hence, by means of feedback influence the speaker's response to his own performance. The work of Giolas and Williams indicates that these responses have a measure of reliability and validity (10).

Research on the problem considered in this study has been partially done in the area of stuttering. Sander (30, 31) studied the effects of instructions given to housewives to listen to the content or to the manner of a stutterer's speech. He found that listeners' attention varied with the instruction presented. Bar (1) did a similar study but with differing results. Bar concluded that instructions to attend to manner or content of a stutterer's speech had minimal influence on his listeners. He felt that the difference in the results of the two studies was the result of differences in research methodology. Neither of these studies systematically varied the severity of the speech problem, Sanders using a mild stutterer and Bar using a severe stutterer. The present study attempts to vary this factor in addition to varying instructions to the listener. This is essential because, until it has been determined how the severity of the speech problem directs the attention of the listener to either the content or manner of speech, the effects of instructions to attend to either of these facets of the speech cannot be finally determined.

Chapter 2

Research Procedures

Part I. General Procedures

Small groups of mothers of cleft palate and non-cleft palate children were asked to listen to a single reading of a paragraph by a cleft palate child. The speech sample presented to each group contained a specified combination of nasality and intelligibility. Also, each group was given a particular set of listening instructions. Following the listening the mothers were asked to assess the intelligibility and nasality of the speaker and were given an information test on the content of the material they heard.

Part II. Preparation of Materials

A. Speaker Selection

The original research design called for the use of male clinic patients from the University of Pittsburgh Cleft Palate Research Center. Nine boys, aged eight to eleven years, with repaired cleft palates were to be used as the speakers. Each speaker was to represent a different level of severity of a speech problem, based on combinations of high, medium and low nasality with high, medium and low intelligibility. Thus nine levels of severity of a speech problem would be represented, ranging from essentially normal to very deviant. (See Table I.)

Table I

Combinations of Speech Characteristics of Cleft Palate Speakers

NASALITY			
	Speaker 7 High Nasality High Intelligibility	Speaker 8 High Nasality Moderate Intelligibility	Speaker 9 High Nasality Low Intelligibility
	Speaker 4 Moderate Nasality High Intelligibility	Speaker 5 Moderate Nasality Moderate Intelligibility	Speaker 6 Moderate Nasality Low Intelligibility
	Speaker 1 Low Nasality High Intelligibility	Speaker 2 Low Nasality Moderate Intelligibility	Speaker 3 Low Nasality Low Intelligibility

INTELLIGIBILITY

The advantage of using clinic patients from the Cleft Palate Research Center was that measures of intelligibility and nasality had already been derived on this population in connection with other research studies. Nasality and intelligibility had been rated on a seven point scale, by a team of speech pathologists, audiologists, dentists, physicians and plastic surgeons. However, considerable time had elapsed since these initial ratings had been made by the clinical team. A number of variables had intervened making these initial ratings inappropriate for the present study. Many of the children had received further surgery or speech therapy and in some cases spontaneous changes in speech had occurred. In addition, the clinical team had rated the child's natural speech, while in the current experiment recorded speech was to be used.

In view of this it was decided to make recordings of all available children with repaired cleft palates, male and female, between the ages of eight and eleven years, living in the Pittsburgh area. Those children living further away, who returned to the Cleft Palate Research Center for re-evaluation were also recorded. Ten judges made ratings of nasality and intelligibility from the recordings. Forty-five cleft palate children were screened before a change was made in the research design.

1. Nasality

The first serious attempt to scale the variable of nasality was the application of the method of equal-appearing intervals by Hixon (14). Following Hixon's study a number of investigations employed this method and have reported that valid and reliable measures were obtained (9, 13, 39). In the method of equal-appearing intervals along some continuum each point is represented by a given stimulus. The stimulus is presented to a large number of judges whose responses, it is assumed, will be distributed in a normal fashion about some interval, of which the stimulus is most representative. By the determination of the median and semi-interquartile range of each stimulus, it is possible to identify stimuli which are most efficient in representing the several intervals of increase or decrease along the continuum. In a study by Shames, Matthews and Lutz (33), instead of computing medians and semi-interquartile ranges for the distribution of ratings for each stimulus, means and standard deviations were determined since the number of judges available for rating nasal voice quality was limited. The scale evolving from the Shames' evaluation study consisted of the two extremes of the continuum of

nasality, (normal voice quality and very excessive nasal voice quality) and the scaled mid-point between them. It was thus a three-point scale, and is the nasality scale used in this study for the initial selection of speakers. Another finding from Shames' study, of importance to the present study, is that of the three techniques for measuring nasality (words, sentences, or paragraphs), the measure of nasality based on paragraphs had a much higher reliability than either word or sentence-based measures.

2. Intelligibility

One requirement of the experimental design was the use of speakers with varying degrees of intelligibility. On a three-point scale there are nine possible combinations of high, medium and low intelligibility with high, medium and low nasality. (See Table I.) As a result of the initial testing of speakers, the male speakers filled four of these nine categories, the female speakers completed five categories. For both of these groups no speakers were placed in the categories of low intelligibility with low, moderate and high nasality. (See Table I.) Since these critical categories remained unfilled, it was decided to construct the different intelligibility levels. This experimental procedure required a detailed review of previous research on speech intelligibility to insure an appropriate manipulation of this variable in this project. Hudgins (16) found a high correlation, when working with deaf children, between the number of speech errors and the number of "auditor" errors. Penningroth (28) concluded that defective articulation did interfere with the efficiency of communication. Dietze (5) noted a proportional decrease in the intelligibility of speech as the number of articulation errors increased. Both Miller (25) working with young cerebral palsied children, and McWilliams (24), working with cleft palate adults, concluded that there is a clear relationship between the number and type of articulation errors made by the speaker and the speech intelligibility rating made by the listener. In view of the results of these studies, the experimenters decided that speech intelligibility could be manipulated by inducing articulation errors in the speech of the cleft palate speaker subjects. Thus, the number of articulation errors was increased as it was necessary to proportionately decrease speech intelligibility for a given sample of speech. The errors written into the passage were selected on the basis of their being frequently linked with speech associated with a cleft palate (23) or their being highly related to low speech intelligibility (32). The utilization of passages with

contrived articulation errors provided the experimenter greater control over the stimulus variable and completed the cleft palate speaker categories. (See Appendix X.)

3. Reading Speeds

McDermott (22) found that as the play-back speed of a recording increased, ratings of nasality increased. Other studies (6, 8) have shown a significant relationship between play-back speed and intelligibility of speech. A pilot study was done to acquire information concerning reading rate. Fourteen normal children were used to record their voices reading the selected passages. There were eight girls and six boys. The average age for the boys was ten years, eleven months. The average age for the girls was nine years, two months. An initial reading enabled the speakers to become familiar with the material. After this reading, one boy and two girls were eliminated as poor readers. After the passage had been read aloud, and the errors corrected, each child recorded the passage twice. For the boys, the range of reading time was from one minute, twenty-three seconds to one minute, forty-six seconds. The mean reading time was one minute, thirty-three seconds. The standard deviation was eight and six-tenths seconds. The range of reading time for the girls was from one minute, nine seconds to one minute, thirty-one seconds. The average reading time was one minute, twenty seconds. The standard deviation was seven and three-tenths seconds. Combining both groups, $\pm$ 2 SD's indicated that reading the passages in less time than one minute, six seconds would be too fast and more than one minute, forty-six seconds would be too slow. (Instructions for Recording. Appendix I)

After recording the voices of normal children reading the selected passage, four children with repaired cleft palates were recorded. The same procedure was followed, an initial reading for familiarization, then two recording sessions. The average reading for the boys on the first recording was two minutes, forty seconds; and for the second recording two minutes, thirty-six seconds. The average reading time for the girls on the first recording was one minute, twenty-seven seconds; for the second recording one minute, thirteen seconds. The second reading was faster for both groups, however, not significantly so for the boys. On the second reading, there was also a decrease in reading errors. The reading rate differed significantly between the boys with repaired cleft palates and the girls with repaired cleft palates. A significant difference was found between the boys with normal palates and boys with repaired cleft palates but not between the

two groups of girls. As the decision had been made to use a contrived error-passage to obtain the various degrees of intelligibility, the speakers had to be able to read the passage easily, and at the same time sound natural. Because there was less variation between the two groups of girls and because observation during the pilot studies indicated that the girls were better readers, the girls were selected as speakers for the study. Another reason that the girls were selected was the availability within the female population of speech samples of normal, moderate and high nasality. The change in the sex of the speakers should not affect the data since, as originally planned, only speakers of one sex were used.

On the basis of the factors of nasality and intelligibility characteristics, reading skills and availability for recording, three girls were chosen to fill the nine speech categories. The speech of each of these girls was rated as very intelligible. However, each girl had a different rating of nasality, from very nasal to normal.

B. Speech Stimulus Materials

A number of factors have been shown to affect the amount of material retained, these being intrinsic aspects of the material presented. Meaningful material is more easily retained than something which is non-meaningful, while pleasant material is more readily retained than something which is unpleasant. Hovland (15) reports these factors and cites some studies to illustrate his point. Watson and Hartmann (41) in 1933 found that retention was significantly greater for material that was compatible with the attitudes of the subjects than for material that was incompatible. Hovland also states that when material of different length is learned to the same criterion, retention at a later time is greater for the longer material. However, one considerable difference between most of the research on learning and the present study relates to the subjects' exposure to the material to be retained. It has been observed that the higher the degree of learning, the greater the retention. Our subjects (listener mothers) are given only one aural exposure to the material on which they will be questioned. However, Nichols (26), in a discussion of the components of effective listening, also mentions variables associated with the material heard. He mentions previous experience with difficult material and interest in the topic at hand. The passage used in this study does not appear to contain difficult material and is

likely to be equally unfamiliar to most listeners. The passage was also chosen for its interest value.

The following criteria were used to develop and select the reading material employed:

1. It contained unfamiliar factual information
2. Its content would be of general interest to the listeners (mothers)
3. It contained simple language
4. It contained discrete points of information which could be quantified
5. Its emotional content was neutral, rather than pleasant or unpleasant

Based on these criteria, four possible speech samples were developed from material contained in the World Book Encyclopedia (42). (See Appendix II.) A pilot study was designed to lead to the final selection. The four passages were recorded with the research assistant as the reader. "Kite Customs" contained 188 words and lasted 70 seconds; "Rainfall" contained 160 words and lasted 62 seconds; "Whales" contained 161 words and lasted 61 seconds; "Hurricanes" contained 149 words and lasted 58 seconds. Graduate students in Speech Pathology at the University of Pittsburgh volunteered to listen to the recordings and to answer questions about the material heard. After listening to the recording the volunteer listeners wrote down all that they could recall. Then they were asked to answer questions concerning the material heard. This procedure was followed for each recorded passage. The following table gives the range in percentages of correct responses for direct recall and for recall as a response to questions:

TABLE II

Ranges of Content Information Scores*

Passage	Direct Recall	Recall, Response to Questions
Kite Customs	24% - 68%	66% - 86%
Rain Fall	25% - 63%	64% - 82%
Hurricanes	32% - 64%	55% - 76%
Whales	32% - 64%	55% - 76%

*From pilot study

The above chart indicates that the passages were not so difficult that no material was recalled, nor so easy that all the material was recalled. It also indicates that subjects made higher response scores when the question and answer technique, rather than direct recall, was used.

A sound analysis (See Appendix III) for the stop plosives in all positions and nasals in the medial and final positions was made. All passages contained a fairly equal distribution of sound types and combinations. The deciding factor in the selection of the passage used in the study was the answer to each of three questions asked of the pilot study listeners. The questions were: 1) Which passage was the most interesting? 2) Which passage was the easiest to remember? 3) Which passage contained the newest material? Because "Kite Customs" was chosen more often than any of the other three passages, it was selected as the passage to be recorded by the cleft palate speakers.

C. Recording the Speech Sample

On completion of the pilot studies, three girls with repaired cleft palate were selected as speakers for the project. They were chosen from the many recordings previously made in the initial attempt to fill the nine speech categories derived from combinations of intelligibility and nasality on a three-point scale. In the selection process all the girls who had been previously judged to have normal intelligibility and varying degrees of nasality were requested to return to the University Speech and Hearing Center or to the Cleft Palate Research Center to record the error-contrived passages. At least one speaker was found at each nasality level, i.e., normal, moderate and high. The girl speaker whose recorded voice was initially rated as having normal intelligibility with high nasality had a cold and was without her usual nasal voice at the time of the second recording session. Since the other speakers in this category were either poor readers or sounded unnatural, this speaker's initial recording was retained to fill the category of normal intelligibility and high nasality. Another speaker judged to have moderate intelligibility with high nasality read the error-contrived passage and filled the categories of moderate intelligibility with high nasality and low intelligibility with high nasality.

During all recording sessions which were held either at the University Speech and Hearing Center or at the Cleft Palate Research Center, the mother accompanied the child into the recording room. The experimenters trained each of the speakers to read the error passages before any recordings were made. Each child then made a

minimum of three recordings for each passage -- normal, moderate and high error. The experimenters selected the recording in each category which sounded "natural" or less artificial. (Instructions for Recording. Appendix I)

D. Listener Population

In the present study we have been dealing in part with listening ability, which may also be called "auding," as defined by Caffey (4). This skill involves "the process of hearing, listening to, recognizing, and interpreting or comprehending spoken language." Nichols (26) cites ten components of effective listening two of which have been referred to earlier, since they concern intrinsic aspects of the material presented to the listener. The third component cited by Nichols is the listeners' adjustment to the speaker. In a sense this is one of the independent variables in the present study, as is the listeners' adjustment to the abnormal listening situation, another of Nichols' factors. The two factors dealing with emotion, reaction of the listeners to emotion-arousing points or words, need not be of concern to the present study, since the passage appears to be neutral in tone. The listeners' willingness to expend energy and their ability to recognize the central ideas in the material are also in a sense independent variables, although the listening instructions given may have some influence on the former factor. Finally Nichols mentions the relationship between the speed of speech and the speed of the listeners' thought. We have attempted to control this by using speakers who read the material at an average pace, for children in their age range, as determined by a pilot study.

The experimental conditions of the study required two major groups of listeners: 1) a group of 135 mothers who had children with a repaired cleft palate between the ages of eight and eleven; 2) a group of 135 mothers who had normal-speaking children without cleft lip or cleft palate between the ages of eight and eleven. Each major listening group was divided into 27 sub-groups (total of 54 sub-groups), in accordance with the experimental design of various speaker characteristics and listening instructions. (See Table III.)

The criteria for selecting listener subjects were that they should have normal intelligence and normal speech and hearing. The criterion for normal intelligence was taken to be graduation from high school. The investigators determined the normality of the listeners' speech patterns in initial interviews with mothers. The presence or absence of hearing problems was determined by the subjects' responses to questions on the identification sheet concerned with past and present hearing status. It was assumed on the basis of these criteria that there would be some equivalence between the two groups of mothers.

Stroud and Schoer (37) obtained data indicating that significant differences in retention may exist among subjects who have attained a common trials-to-learn criterion, therefore, individual inter-subject differences may be expected. Kramar (19) found a correlation between intelligence and listening comprehension. Since meaningful material is better retained, it may be anticipated that those subjects with a higher intelligence will comprehend more and hence retain more. Kramar also found a correlation between intelligence and general listener ability, as did Stark (35). Other studies (6, 20, 36) have shown that distortion of the auditory signal, such as would result from a hearing loss, decreases auding or listening ability. It can be assumed that the presence of a speech problem in a listener will give rise to a different experiential background in relation to defective speech. Since this is one of the independent variables of the study the importance of either controlling or analyzing such experience is self-evident.

The listener subjects who were mothers of cleft palate children were obtained from the files of the Clinic at the University of Pittsburgh Cleft Palate Research Center. The mothers of children with repaired cleft palates who had served as potential speakers were not eligible for inclusion in the study as listener subjects, since they had been exposed to the material during the recording sessions made with their children. The mothers of normal children who volunteered as listener subjects were contacted through the Parent-Teacher Associations of Pittsburgh, women's civic groups and church congregations. Original plans called for mother-listener group sessions of five persons to be held in the Speech Center at the University, in the Cleft Palate Research Center or in the Speech Clinic of the Children's Hospital of Pittsburgh. However, many of the mothers of cleft palate children came from places other than Pittsburgh and its environs. To fill the requirements of the study, it was necessary to draw on subjects from places scattered throughout the tri-state area, served by the Clinic of the Cleft Palate Research Center. The distance that some subjects had to travel made group scheduling not feasible. For this reason individual sessions were organized in addition to group sessions. Some mothers were seen when they brought their children to the Cleft Palate Clinic for re-evaluation. However, there were other mothers, whose children were not scheduled at the Clinic. Many of these found it impossible to make a special trip to any of the Pittsburgh Centers for the experimental listening sessions. In view of this, operations were extended to the field and home visits were instituted. Many of the mothers of normal children were seen in groups at the churches of whose congregations they were members.

It was hoped by the experimenters that the standardized instructions to listeners and the standardization of experimental procedures, within the various listening situations, would reduce the possibility of error arising from group versus individual and clinic versus field administration of the experiment.

E. Listening Instructions

After general instructions had been given, each individual or group of listeners heard the tape recording of one speaker under one of the following specific conditions:

1. Instructions to listen to the content of the speech
2. Instructions to listen to the manner of the speech
3. Instructions to listen to the speech sample (See Appendix IV)

After hearing the recorded speech samples, the listeners were tested in the following ways:

1. The group of listeners instructed to listen to the manner of speech was first asked to rate the degree of intelligibility and nasality of the speech sample on a three-point scale. They were also asked to make an estimate of the percentage of words that had errors. They were then given a test on the content of the material they heard.

2. The group of listeners instructed to attend to the content of the speech sample received the same tests as the first group, but in a reversed order (content first, manner second).

3. The individual or group instructed merely to listen to the speech sample were administered the same tests. Half of this population subgroup was given the content information test first and the other half rated intelligibility and nasality first.

The following table illustrates the procedural arrangements of speakers, listening groups and instructions.

TABLE III

Arrangement of Speakers, Listeners, and Instructions

			INSTRUCTIONS TO ATTEND						
			CONTENT		MANNER CONTROL				
SPEAKER	INTELLI-GIBILITY	NAS-ALITY	CP*	NCP#	CP	NCP	CP	NCP	TOTAL
1	H**	L	5+	5	5	5	5	5	30+
2	M***	L	5	5	5	5	5	5	30
3	L****	L	5	5	5	5	5	5	30
4	H	M	5	5	5	5	5	5	30
5	M	M	5	5	5	5	5	5	30
6	L	M	5	5	5	5	5	5	30
7	H	H	5	5	5	5	5	5	30
8	M	H	5	5	5	5	5	5	30
9	L	H	5	5	5	5	5	5	30
	TOTAL:		45+	45	45	45	45	45	270+

*CP refers to parents of children with cleft palate.
#NCP refers to parents of children without cleft palate.
**H refers to high degree.
***M refers to moderate degree.
****L refers to low degree.
+ refers to number of people in each cell, with row, column and overall totals.

Part III. Nasality Testing

A. The Nasality Testing Procedure Employed

Nasal voice quality is generally considered a product of the resonance characteristics contributed by the nasal cavities; however, it has been observed that nasal

voice quality is judged as more severely defective when the articulation of consonant sounds is faulty (23).

For the measurement of nasality, tape recordings of paragraph-length samples of speech were used. The speech samples were with and without contrived articulation errors. The speakers were children between the ages of eight and eleven years with repaired cleft palates. The listener-judges were mothers of children with repaired cleft palates and mothers of children who had no cleft lip or cleft palate.

The judging of nasality by listeners took place in both individual settings and in groups of up to five persons. Rating sessions were held in the University Speech and Hearing Center, in the Cleft Palate Research Center, in the Speech Clinic, Children's Hospital in Pittsburgh, in the Glenshaw and Beulah Presbyterian Churches and in the homes of volunteer listeners. The listener-judges were instructed according to one of three conditions of listening, to listen to one of the nine recorded speech samples. The listener-judge was seated in front of a Wollensak model T-15 tape recorder with the tone indicator on "Treble" and the volume selector on "Five." A pre-testing play-back of other materials enabled the experimenter to increase or decrease the volume to the listener's most comfortable loudness level (29). When a group was used, they were seated around a table with the tape recorder in the middle of the table. The volume of the recorder was increased or decreased to a loudness level suitable to the group. The task of the listener-judges, oriented by instructions, was to listen to the recorded speech and after hearing it, indicate on a prepared form whether the speaker had low or normal nasality, moderate nasality or high nasality. A copy of the scale is shown in Appendix V.

B. Reliability of the Nasality Measure

Two types of judges were used in the selection and rating of the speakers used in this study. There were the experimenters or expert judges and the experienced judges. The experts were trained by listening to the tapes used to develop the audible scales for measuring nasal voice quality evolved by Shames and others (33) and making judgements using these scales. As Spriestersbach (34) had previously demonstrated that backwards-played speech provided a satisfactory method for evaluating nasality in the speech of speakers with cleft palate, the recorded samples of cleft palate speech used in the formation of these scales were played forward and backward until the expert judges agreed 100 per cent of the time to the degree of nasality on a three-point scale. Then the expert judges listened to all the available recordings of the population of children with repaired cleft palates who might be included

as speakers in this study. Again using the criterion of 100 per cent agreement, the expert judges selected three girl speakers, one rated normal or high intelligibility -- normal or low nasality, one rated high intelligibility-moderate nasality and one rated high intelligibility-high nasality. A fourth girl speaker with moderate intelligibility-high nasality was included when the girl speaker rated high intelligibility-high nasality could not be used to record the error passages. However, she was retained as the speaker to fill the category of normal intelligibility-high nasality. After being selected, the speakers recorded the passage without the contrived errors, then recorded the passage with contrived moderate errors, and finally recorded the contrived high error passage. These samples of recorded speech with varying degrees of intelligibility and nasality were rated by expert judges until 100 per cent agreement was achieved in placing each recording in one of nine categories. These nine categorized samples of recorded speech, along with ten other samples of recorded speech of girls obtained in the initial attempt to find speakers for the study, were presented to a panel of ten experienced judges, graduate students in speech pathology. The mean of the ratings of the experienced judges for each speaker agreed with the ratings of the expert judges in all instances but one as to the degree of nasality of the nine samples of speech. The mean percentage of agreement among the experienced judges for nasality ratings for each of the nine speech samples ranged from 60 per cent to 90 per cent. For three of the nine speech samples 90 per cent of the judges agreed on the categorization of the speech samples. It was concluded that the method of assessing nasality was reliable and could be used with confidence.

Part IV. Intelligibility Testing

A. The Intelligibility Testing Procedure Employed

Intelligibility of speech is considered the extent to which a listener is able to understand what a speaker says. This concept of intelligibility refers to the identification by the listener of acoustic signals which are produced by a speaker and which conform to a code known by the listener.

As only one testing session was held for any one subject or group of subjects, all the listener-judges' responses--rating of nasality, rating of intelligibility and content retention examination--were completed after listening to the one recording. Therefore, in the measurement of intelligibility the same speakers, the same recorded speech samples, the procedures discussed in Part II, Nasal Voice Quality Testing Procedures Employed, were

employed. After listening to the recorded speech sample, the listener-judges indicated on a prepared form whether the speaker had normal or high intelligibility, moderate intelligibility, or was unintelligible. A copy of the rating scale will be found in Appendix VI.

B. Reliability of the Intelligibility Measure

The expert judges listened to recorded samples of speech of varying degrees of intelligibility until they reached 100 per cent agreement in their judgement ratings of normal or high intelligibility, moderate intelligibility, and unintelligible or low intelligibility. The previously-mentioned team of experienced judges also rated the speakers' intelligibility. The mean of the judges' ratings for each speaker agreed with the rating of the expert judges, in placing the speakers according to three levels of intelligibility. The inter-experienced judge agreement ranged from 60 per cent to 100 per cent, with 100 per cent agreement for one speech category and 90 per cent agreement in another. It was concluded that the method of assessing intelligibility was reliable and could be used with confidence and that utilization of passages with contrived articulation errors provide the experimenter greater control over the speech stimulus variable.

Part V. Content Testing

A. Content Testing Procedure Employed

Since this study deals in part with the amount of material retained by a listener, it is relevant to examine briefly the most usual methods of measuring retention. There are five methods which have been used; the recognition method, the recall method, the reconstruction method, the unaided reproduction method, and the saving score method (15). Most studies on memory and retention have dealt with learned material, presented visually, rather than with one-trial aural learning (15). Hovland (15) comments that the extent of retention observed in subjects is affected by the method of measurement used in the observation. Luh (21) used the recognition method, the reconstruction method and two types of recall method, anticipation and written reproduction. He found an initial rapid drop in all retention curves, except perhaps for recognition, followed by a more gradual fall in all curves thereafter. English et al. (7) found more retention of "substance" memories than of "verbatim" memories, while Briggs and Reed (3) noted that subjects have more memory for ideas, which Hovland defines as "a concept that cannot be derived from a single sentence in the text." (15) The present experimenters decided to use the recall method, through written

questions and answers, presented with little or no delay following the hearing of the material. A pilot study showed that subjects scored more on this measurement of retention than when tested by the unaided reproduction method. (See Table II)

In the measurement of content the speakers' recorded speech samples and procedures are the same as those discussed in Part II and Part III. After listening to one recording, the listener subject indicated on a prepared form the answers to questions formulated to measure retention. A copy of the content examination is found in Appendix VII.

B. Reliability of the Content Measure

The content examination was derived from the selected passage which contained 188 words, 12 sentences arranged into three paragraphs. Twenty-two thought units were abstracted for the purpose of devising the test of content. Fourteen questions were developed. Eight questions had one thought unit each; four questions, two thought units each; two questions, three thought units each. To get a measure of internal consistency, the questions were divided into odd and even, yielding 11 thought units in each half with an equal distribution of one, two and three thought unit questions in each half. The computation of the reliability coefficient of internal consistency resulted in a correlation coefficient of .726. Application of the Spearman-Brown prophecy formula, to correct for the reduction in length of the original test, increased the coefficient to .84.

It was concluded that the content examination devised for this study could be used with confidence.

Part VI. Analysis of Data

The two ratings of intelligibility, the rating of nasality and content score of each listener, in combination with listening instructions and the listener's experience with the problem were used to determine the relative influence of speaker characteristics, listening instructions and listener experience on the scores obtained by each listener. Each individual score was converted into an "accuracy score" as follows:

1. Content accuracy reception score =

$$\frac{\text{Number of points of information retained}}{\text{Total number of points of information in the passage.}}$$

2. Intelligibility accuracy differences reception score =

The judges' rating of intelligibility minus the listeners' rating of intelligibility.

3. Intelligibility accuracy deviation reception score =

The percentage of error words in the passage minus the listeners' estimate of the percentage of error words.

4. Nasality accuracy differences reception score =

The judges' rating of nasality minus the listeners' rating of nasality.

Mean accuracy scores were computed for each of the 54 listening subgroups. Differences between the means of the subgroups were determined and appropriate tests for the significance of these differences were employed (12). A sign test was also employed in determining the significance of the consistency of the direction in which the groups varied one from another (41).

Chapter 3

Results and Findings

I. Research Population

A requirement of the study was that the two main population groups should differ significantly in only one respect; the presence or absence of a cleft palate child among their children. Since the test performance of one group was to be compared with that of the other, it was planned that no inter-population group difference should arise on any factor which might influence test performance. The nominal variables which the experimenters desired to control were age, educational level, occupation of the spouse, and hearing level. These variables could be related to performance in that they give an indication of the intelligence, background and socio-economic status of the subjects. The populations sampled from clinics, schools, and church groups in the city of Pittsburgh and neighboring communities, covered a wide socio-economic and cultural spectrum. However, subject availability, in view of the specificity of the study's needs, undoubtedly influenced random sampling procedures.

In order to find out whether the two population groups differed on these nominal variables, each subject completed an identification sheet with questions concerning subject characteristics. (See Appendix VIII) Frequency distributions for the raw data have been tabled in Appendix IX.

To determine the significance of the differences which emerged between the population groups a series of 't' tests were run. (See Table IV)

TABLE IV

*Significance of Differences between Mothers of Cleft Palate and Non-Cleft Palate Children on Nominal Variables

NOMINAL VARIABLE	t	p
Age of Listener	.27	---
Educational Level of Listener	9.22	< .01
Listener Occupation	.01	---
Spouse Occupation	27.65	< .01
Number of Children in Listeners' Family	3.95	< .01
History of Hearing Problem	.17	---
Present Hearing Status	.04	---
Self Rating as Listener	.11	---

*Formula used: $t = \frac{M1 - M2}{\sqrt{V1/N1 + V2/N2}}$

As can be seen in the above table there were significant differences between the two population groups on three of these nominal variables; education of the subject, occupation of the spouse and the number of children in the family.

Approximately 30 per cent of the mothers of cleft palate children did not complete high school, while only one mother of a non-cleft palate child left school before the 12th grade. Only six per cent of the mothers of cleft palate children had attended or completed college, while 61 per cent of the mothers of non-cleft palate children had done so. Because of difficulties in obtaining subjects in the cleft palate group it was not possible to achieve a balance between the groups on this variable. Since the difference between groups proved to be significant, correlations were run for this nominal variable with the four dependent variables. No significant correlations were found; therefore, we may conclude that the difference between the groups, in terms of education, did not significantly affect the results of the study. (See Table V)

The difference between the groups related to the occupation of the spouse indicated that the fathers of non-cleft palate children held jobs related to higher socio-economic status than did the fathers of cleft palate children. Fifty-six per cent of the first group were professional men while only seven per cent of the second group were so employed. Among the fathers of non-cleft palate children 19 per cent were business men, in contrast with only one per cent of the fathers of cleft palate children. Of the latter group 47 per cent were skilled laborers while only seven per cent of the fathers of non-cleft palate children could be so classified. No father of a non-cleft palate child was an unskilled laborer, while 17 per cent of the fathers of the cleft palate children earned their living in this way. However, no significant correlations were found between this occupational nominal variable and the four dependent variables. (See Table V)

The third significant difference between the groups was related to the number of children in the family. The families of the non-cleft palate children tended to be smaller than those of the cleft palate children. Seventy-three per cent of the mothers of non-cleft palate children had no more than three children, while only 53 per cent of the mothers of cleft palate children had such small families. Twenty-seven per cent of the mothers of the non-cleft palate children had between four and six children, whereas, 38 per cent of the families of the cleft palate

children were this large. No non-cleft palate child came from a family of more than six children, but ten per cent of the mothers of cleft palate children had families of between seven and twelve children. This nominal variable was also correlated with the four dependent variables and all correlations were found to be non-significant. (See Table V)

TABLE V

Correlations between Nominal Variables, on which the Population Groups Differed Significantly, and the Four Dependent Variables.

NOMINAL VARIABLES	DEPENDENT VARIABLES			
	A	B	C	D
1	.176	.020	.049	.104
2	.171	.044	.072	.109
3	.104	.048	.006	.052

*Correlation significant at the .01 level of confidence with 200 d.f. = .283.

Nominal Variables

1. Subject Education
2. Spouse Occupation
3. Number of Children in Family

Dependent Variables

A. Content Information Test Score
B. Intelligibility Rating Score
C. Nasality Rating Score
D. Intelligibility Percentage Score

We may, therefore, conclude that despite the significant differences between the two groups of mothers, on what appeared to be important nominal variables, the results of the study were not affected. In view of population limitations it would have been very difficult to balance the groups precisely on all nominal variables except the presence or absence of a cleft palate child in the family.

II. Reliability

A. Nasality Ratings

In order to have an estimate of the reliability of the Nasality 3 point-Scale for the subject mothers, the following procedure was employed. The scores of each group of five listeners were inspected for a measure of intra-group agreement. The highest number of mothers in exact agreement, within each group, was recorded for all of the 54 listener groups. The numbers of listeners in exact agreement in each listening group were summed and a grand mean derived. Submeans were also derived for the mothers of non-cleft palate and cleft palate children, considered as separate populations. (See Table VI)

TABLE VI

Reliability of the Nasality Scale

Populations	Mean No. of Mothers in Agreement in Each of 54 Listening Groups*
Mothers of Non-Cleft Palate Children	3.37
Mothers of Cleft Palate Children	3.70
Grand Mean-All Mothers	3.53

*Maximum possible agreement was five mothers for each group.

It can be seen that an average of 67 per cent of the mothers of non-cleft palate children agreed with the other mothers within each listening group on their judgements of nasality. The mothers of cleft palate children showed rather higher intra-group accord, 74 per cent of this population agreeing with one another within each listening group. For all mothers the intra-group agreement was a little under 71 per cent, indicating that the subjects' use of the Nasality Rating Scale was fairly reliable.

B. Intelligibility Ratings

In obtaining an estimate of the reliability of the three point Intelligibility Rating Scale when used by listener mothers the same methods were employed, as were used in estimating the reliability of the Nasality Rating Scale. As before, a grand mean for all mothers and sub-means for each population sub-group were obtained. (See Table VII)

TABLE VII

Reliability of the Intelligibility Scale

Populations	Mean No. of Mothers in Agreement in Each of 54 Listening Groups*
Mothers of Non-Cleft Palate Children	4.40
Mothers of Cleft Palate Children	4.03
Grand Mean-All Mothers	4.22

*Maximum possible agreement was five mothers for each group.

In contrast to the means obtained for Nasality, there was a higher measure of intra-group agreement for rating intelligibility among the mothers of non-cleft palate children. On the average 88 per cent of the mothers of non-cleft palate children agreed among themselves within each of the 27 listening groups of five listeners each. Approximately 81 per cent of the mothers of cleft palate children showed such intra-group agreement. Considering all 270 mother listeners together, an average of slightly over 84 per cent within each listening group agreed among themselves, in their use of the Intelligibility Rating Scale, indicating that the instrument was reliable with this population.

Similar procedures were employed in obtaining a measure of the reliability of the listener's estimate of the percentage of words in error. This measure required the listener to estimate the percentage of words in error. As such, the actual listener scores could have ranged from zero to 100 per cent. These scores in turn were

converted into deviation accuracy scores to the extent that they deviated from the actual percentage of words deliberately arranged by the experimenters, as spoken by the various speakers. These deviation scores could range from zero per cent to 100 per cent. Because of the broad range of this scale, the number of mothers, within each of the 54 listening groups, who obtained deviation scores within ten per cent of one another was determined. These numbers were summed, and again three means were derived; a mean for mothers of cleft palate children; a mean for mothers of non-cleft palate children and a grand mean for all mothers. (See Table VIII)

TABLE VIII

Reliability of the Estimate of Percentage of Words in Error

Populations	Mean No. of Mothers Agreeing within 10 per cent in Each of 54 Listening Groups*
Mothers of Non-Cleft Palate Children	3.25
Mothers of Cleft Palate Children	3.62
Grand Mean-All Mothers	3.44

*Maximum possible agreement was five mothers for each group.

For this measure of intelligibility there was a higher measure of agreement among mothers of cleft palate children than among mothers of non-cleft palate children. An average of 72 per cent of the mothers of cleft palate children obtained deviation scores for the estimate of the percentage of words in error within ten percentage points of one another, within each listening group. The percentage of agreement among mothers of non-cleft palate children was 65 per cent. The mean for overall agreement shows that 69 per cent of all mothers obtained deviation scores within 10 per cent of one another within listening groups. These percentages of agreement among mothers within listening groups are lower than those obtained for the three-point rating scales used to assess nasality and intelligibility. However, since these percentages represent a measure of agreement on a longer scale, with a greater potential for variation among listeners, the agreement is nonetheless fairly high.

In general it would appear that both of the three-point rating scales and the estimate of the percentage of words in error were all reliable instruments, even for unsophisticated listeners such as the subject mothers. Of the three, the most reliable instrument would appear to be the Intelligibility Rating Scale.

III. Correlations among Dependent Variables

Statistically significant correlations were found among several of the Dependent Variables. The highest correlation was obtained between the listeners' rating of intelligibility and their estimates of the percentage of words in error. This correlation was .82.

The listeners' Content Information Test scores were significantly correlated with their ratings of Intelligibility as well as with their estimates of the percentage of words in error. However, these correlations were not high. (See Table IX)

None of the Dependent Variables was significantly correlated with the ratings of Nasality.

TABLE IX

Correlations among Dependent Variables

	1	2	3	4
1		-.39*	-.13	-.36*
2			.20	.82*
3				.20
4				

*Correlations significant at the .01 level of confidence with 200 d.f. = .234

1. Content Information Test Scores
2. Intelligibility Rating Scale Scores
3. Nasality Rating Scale Scores
4. Listeners' Estimates of the Percentage of Words in Error

IV. Analysis of Content Information Scores

A. Effects of Listening Instructions

The first major question which we may attempt to answer related to the effect of instructions to listen to content on the content scores of listeners. For mothers

of children without cleft palates these instructions proved to be effective in increasing their retention of content information relative to the retention of listeners under other instructions. Listeners in this population under content instructions scored more than others under different instructions at all levels of severity of speech problem, except for that representing Moderate Nasality and Moderate Intelligibility where the Control Group score equalled that of the Content Group, and at the level of High Nasality and Low Intelligibility where the score of the Manner Group equalled the Content Group score. However, at no severity level did listeners in the non-cleft population under Manner or Control Instructions score more than the listeners under Content Instructions. (See Table X)

Eighteen inter-group comparisons can be made for this population, Content with Manner Groups and Content with Control Groups for all nine speakers. For 16 of these comparisons the Content Instruction Groups achieved a higher score on content retention. A sign test for the statistical significance of this trend indicates that the probability that this difference in scores could arise by chance is less than .001. (Walker and Lev. 41.) Of these 18 comparisons for differences in group mean content scores five were individually significant at .05 or better. For the speaker representing Low Nasality with Moderate Intelligibility the difference between the Content and Control Groups was significant at the .05 level, while for the speaker with Low Nasality and Low Intelligibility these same instruction groups differed at the .01 level of significance. For the speaker with Moderate Nasality and High Intelligibility there was a difference on mean content score significant at the .01 level between the Content and Manner Instruction Groups. The content and manner listeners to the speaker representing High Nasality with High Intelligibility differed on content score at the .01 significance level. For the speaker with High Nasality and Low Intelligibility the listeners under content instructions differed from those under control instructions at the .01 significance level. (See Table XI)

The data for the mothers of cleft palate children revealed a similar trend. With one exception the listeners under content instructions scored more than listeners under other instructions. This difference occurred 17 times in the 18 comparisons made between Content and Manner and Content and Control Groups for all nine speakers. A sign test of statistical significance indicates that the probability that this difference could occur by chance is less than .001. The exception arose with listeners to the speaker representing Low Nasality with High Intelligibility, where the Control Group scored slightly higher than the Content Group on information. (See Table XII)

TABLE X

Content Information Test Scores of Mothers of Non-Cleft Palate Children

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	34.17	34.41	25.83	14.85	17.50	5.43
2	1	Moderate Intelblty. & Low Nasality	31.67	14.91	20.83	12.84	14.17	3.73
3	1	Low Intelblty. & Low Nasality	15.83	3.48	11.67	5.43	7.50	3.48
1	2	High Intelblty. & Moderate Nasality	55.83	16.82	18.33	9.13	38.33	20.28
2	2	Moderate Intelblty & Moderate Nasality	28.33	11.93	10.83	12.70	28.33	18.72
3	2	Low Intelblty. & Moderate Nasality	12.50	2.95	10.00	8.12	11.67	5.43
1	3	High Intelblty. & High Nasality	25.83	6.85	13.33	3.47	15.00	12.36
2	3	Moderate Intelblty. & High Nasality	29.17	11.41	23.33	14.61	26.67	14.31
3	3	Low Intelblty. & High Nasality	10.00	2.82	10.00	3.73	5.00	1.86

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Intelblty. = Intelligibility

TABLE XI

Significant Differences Between Instruction Groups on Content Information Test Scores

Speakers	Mothers of Cleft Palate Children		Mothers of Non-Cleft Palate Children	
	Instruction Groups	Significance Level	Instruction Groups	Significance Level
1. High **Intelblty. Low Nasality	*Content v Manner	.01		
2. Moderate Intelblty. Low Nasality			*Content v Control	.05
3. Low Intelblty. Low Nasality			*Content v Control	.05
4. High Intelblty. Moderate Nasality	*Contnet v Manner	.01	*Content v Manner	.01
5. Moderate Intelblty. Moderate Nasality				
6. Low Intelblty. Moderate Nasality				
7. High Intelblty. High Nasality			*Content v Manner	.01
8. Moderate Intelblty. High Nasality	*Content v Manner & Control	.05 .05		
9. Low Intelblty. High Nasality			*Content v Control	.01

*Indicates the group with the higher score
**Intelblty. = Intelligibility

TABLE XII

Content Information Test Scores of Mothers of Cleft Palate Children

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	33.33	8.84	12.50	2.95	39.17	19.68
2	1	Moderate Intelblty. & Low Nasality	25.00	14.73	13.33	8.01	18.33	12.00
3	1	Low Intelblty. & Low Nasality	15.00	4.75	10.00	5.59	10.00	4.75
1	2	High Intelblty. & Moderate Nasality	37.50	16.40	8.33	.001	24.17	18.01
2	2	Moderate Intelblty. & Moderate Nasality	11.67	5.43	8.33	4.17	7.50	3.49
3	2	Low Intelblty. & Moderate Nasality	12.50	5.10	8.33	5.10	10.83	4.75
1	3	High Intelblty. & High Nasality	17.50	8.01	12.50	7.79	10.83	8.64
2	3	Moderate Intelblty. & High Nasality	24.17	10.78	10.00	5.59	8.33	4.17
3	3	Low Intelblty. & High Nasality	10.83	4.75	8.33	2.95	10.00	6.32

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations

*Intelblty. = Intelligibility

Of the 18 comparisons four were individually significant at the .05 level or better. For the speaker with Low Nasality and High Intelligibility the Content Instruction Group differed at the .01 level from the Manner Instruction Group on mean content score. The same instruction groups also differed at the .01 level for the speaker representing Moderate Nasality with High Intelligibility. For the speaker with High Nasality and Moderate Intelligibility the listeners under content instructions differed from those under manner instructions at the .05 level of significance, and at the same significance level from listeners under control instructions. (See Table XI)

The overall conclusion which may be drawn from these data in answer to the question raised is that listeners under instructions to listen to the content of a message do recall more of this content information when subsequently tested, than do listeners under specific instructions to listen to the manner of the speech or listeners under no specific instructions, i.e. the Control Group. Thus content instructions would appear to be effective at all levels of severity of the speech problem and regardless of the past experience of the listener with the speech problem. However, two further questions should now be raised, one concerned with the relative efficacy of content instructions at different problem severity levels, and the other with the relative efficacy of content instructions on the two population groups employed in this study.

The first of these questions may be formulated in this way. Do the content scores of groups under instructions to listen to content decrease as the level of severity of the speech problem increases? Since the severity level increases on the two dimensions of nasality and intelligibility changes in content score should be examined with respect to their variation as each of the problem dimensions vary separately and together. Comparisons should be made for each level of nasality with variations in intelligibility, for each level of intelligibility with variations in nasality, and across the three speakers where both dimensions are varying together from Normal to Most Deviant speech.

B. Effects of Variations in Intelligibility and Nasality

For listeners, who are mothers of children without cleft palate, nine comparisons can be made between groups under content instruction, when content scores related to variation in intelligibility level at each of three levels of nasality are analyzed. At the Low Nasality level those mothers listening to the most intelligible speaker scored more than those listening to the speaker with Moderate Intelligibility. This latter group scored more than those

mothers who listened to the least intelligible speaker. (See Table X) There is a difference significant at the .05 level between the group under content instructions listening to the moderately intelligible speakers and the same instruction group listening to the least intelligible speaker. (See Table XIII) For mothers of non-cleft palate children listening to speakers with Moderate Nasality and varying degrees of intelligibility the directional trend of the differences was the same. There was a difference at the .05 level of significance between the content scores of mothers listening to the speaker with High Intelligibility and Moderate Nasality and those listening to the speaker with Moderate Intelligibility and Nasality. (See Table XIII) When mothers listening to the most intelligible speaker at this nasality level were compared with mothers listening to the least intelligible speaker at the same nasality level the significance of the difference on content score reached the .001 level. (See Table XIII) When listeners to the moderately intelligible speaker were compared with those listening to the speaker with Low Intelligibility the difference was significant at the .05 level. (See Table XIII) In each case all listeners were under instruction to listen for content and those listening to the more intelligible speaker scored higher. (See Table X) There was a slight change in this trend when the content scores of mothers of non-cleft palate children listening to speakers with High Nasality and varying degrees of intelligibility were analyzed. Those listening to the speak r with High Nasality and High Intelligibility scored more than those listening to the speaker with Low Intelligibility at the same nasality level. However, those mothers who listened to the speaker with High Nasality and Moderate Intelligibility scored more than either of the other groups. (See Table X) The difference for content scores between this group and that listening to the least intelligible speaker was significant at the .01 level. There was also a difference significant at the .01 level between those mothers listening to the most intelligible speaker and those listening to the least intelligible speaker. (See Table XIII) A statistical sign test run for the probability of these differences occurring by chance alone shows that this probability is .02.

TABLE XIII

Significant Differences between Content Instruction Groups on Content Information Test Scores, when Intelligibility Varies Across Each Nasality Level

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
Low Nasality		
High v. Moderate Intelligibility		
*High v. Low Intelligibility	.01	
*Moderate v. Low Intelligibility		.05
Moderate Nasality		
*High v. Moderate Intelligibility	.05	.05
*High v. Low Intelligibility	.05	.001
*Moderate v. Low Intelligibility		.05
High Nasality		
High v. Moderate Intelligibility		
*High v. Low Intelligibility		.01
*Moderate v. Low Intelligibility	.05	.01

*Indicates the group with the higher score: i.e. the group listening to the speaker with the stated characteristics.

The same comparisons, of content scores for groups listening under content instructions to speakers with varying degrees of intelligibility of each of the three levels of nasality, can be made for the listeners who were mothers of cleft palate children. When scores were analyzed for mothers listening to speakers with Low Nasality, those listening to the speaker with High Intelligibility scored most, those listening to the moderately intelligible speaker ranked second and those listening to the speaker with Low Intelligibility scored least. (See Table XII) The difference between the mothers listening to the highly intelligible speaker and those listening to the least intelligible speaker was significant at the .01 level. (See Table XIII) At the moderate level of nasality those subjects listening to the most intelligible speaker scored the most on the content test, and there were differences significant at the .05 level between this

group and the two groups listening to the less intelligible speakers. (See Table XIII) Of these two groups, that which listened to the speaker with Low Intelligibility scored very slightly higher than those listening to the moderately intelligible speaker but the extent of the difference between the group means is less than one percentage point. (See Table XII) When content scores were examined at the level of High Nasality with varying intelligibility the mothers of cleft palate children listening to the moderately intelligible speaker scored the most. Those listening to the speaker with High Intelligibility scored slightly less, and the mothers who listened to the speaker with Low Intelligibility scored the least. (See Table XII) There was a difference significant at the .05 level between this group and the group which scored most. (See Table XIII) A statistical sign test shows that the probability of these differences occurring by chance for the cleft group is .09.

From the foregoing analysis it is evident that variations in content score do occur as the intelligibility of the speaker varies. As intelligibility decreased at each level of nasality the content scores also tended to decrease. This trend was more clearly apparent within the population of mothers of non-cleft children as shown by the difference in distributional probabilities emerging from the sign test. A similar analysis can now be performed when nasality is allowed to vary at each of three levels of intelligibility.

For mothers of non-cleft palate children, when scores of those listening to speakers with High Intelligibility and varying degrees of nasality were scrutinized, those mothers who listened to the speaker with Moderate Nasality scored most on content. Those listening to the speaker with Low Nasality scored less, although the difference was not significant. (See Table X) There was a difference significant at the .01 level between the group scoring the most and those who scored the least; i.e. listeners to the speaker with High Nasality. (See Table XIV) At the level of Moderate Intelligibility with varying degrees of nasality the differences between the groups were very slight. The group listening to the speaker with Low Nasality scored the most while those listening to the speaker with Moderate Nasality scored the least. The total extent of the difference between their group means was only just over three percentage points, with the score of the middle group, those listening to the highly nasal speaker, falling less than one percentage point away from the lowest group. (See Table X) At the Low Intelligibility Level the group listening to the speaker with Low Nasality scored most, those listening

to the moderately nasal speaker scored slightly less while those listening to the speaker with High Nasality scored the least. (See Table X) The difference on content score between the group scoring the most, listeners to a speaker with Low Nasality and the group scoring the least, those listening to a highly nasal speaker was significant at the .05 level. (See Table XIV) Thus, those groups of mothers of non-cleft palate children listening to a less nasal speaker tended to score higher on the Content Information Test. The probability of this distribution of scores occurring by chance alone is .09 according to the sign test.

TABLE XIV

Significant Differences between Content Instruction Groups on Content Information Test Scores, when Nasality Varies Across Each Intelligibility Level

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
High Intelligibility		
Low v. Moderate Nasality		
*Low v. High Nasality	.05	
*Moderate v. High Nasality	.05	.01
Moderate Intelligibility		
Low v. Moderate Nasality		
Low v. High Nasality		
Moderate v. High Nasality		
Low Intelligibility		
Low v. Moderate Nasality		
*Low v. High Nasality		.05
Moderate v. High Nasality		

*Indicates the group with the higher scores: i.e. the group listening to the speaker with the stated characteristics.

For the mothers of cleft palate children the scores on content information did not follow such a consistent pattern. When content scores were examined for those listening to speakers with normal intelligibility and varying degrees of nasality, the listeners who scored the

most were those who heard the speaker with High Intelligibility and Moderate Nasality. Listeners who heard the speaker with Low Nasality ranked second on content score, and the group listening to the highly nasal speaker scored least. (See Table XII) There were differences significant at the .05 level between this latter group and both of the groups with higher scores. (See Table XIV) At the level of Moderate Intelligibility the group listening to the speaker with Low Nasality scored the most, but those listening to the speaker with High Nasality had a group mean content score less than one percentage point below the group with the highest score. Those mothers who listened to the speaker with Moderate Nasality scored the least, but none of the individual differences between groups were significant. (See Table XII) At the Low Intelligibility level the group listening to the speaker with Low Nasality scored most, listeners to the moderately nasal speaker ranked second and those listening to the highly nasal speaker scored least. (See Table XII) A sign test indicates that the probability of this distribution of scores occurring by chance alone is .09.

In general it would appear that instructions to listen to content did become less effective as the severity of the speech problem increased. At each level of nasality, as intelligibility decreased subjects tended to score less, and at each level of intelligibility, as nasality increased subjects tended to score less. This effect was particularly apparent at the levels of High Nasality and Low Intelligibility, when scores decreased steadily as the varying dimension of the problem became more deviant. At these extreme levels there was also an overall drop in scores, relative to the normal and moderate levels of both dimensions.

To determine the effect on content scores on Content Instruction Groups when both dimensions of the speech problem were becoming more deviant simultaneously we can examine the scores of listeners to speakers 1, 5 and 9. These represent the categories of Low Nasality and High Intelligibility, Moderate Nasality and Moderate Intelligibility, and High Nasality and Low Intelligibility respectively.

For listeners who were mothers of non-cleft palate children, content scores decreased steadily as the speech problem became more severe. There was a difference significant at the .01 level between the scores of those listening to the speakers representing the moderately severe and the severe levels of the speech problem. (See Table XV) For the mothers of cleft palate children the same trend was present, with differences at the .01 significance level between the content scores of listeners to the most normal speaker and both of the other groups. (See Table XV)

TABLE XV

Significant Differences Between Content Instruction Groups on Content Information Test Scores, When the Level of Severity of the Speech Problem Varies from Low to Severe on Both Nasality and Intelligibility

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
*Low Nasality / High Intelblty.** v. Moderate Nasality / Intelblty.	.01	
*Low Nasality / High Intelblty. v. High Nasality / Low Intelblty.	.01	
*Moderate Nasality / Intelblty. v. High Nasality / Low Intelblty.		.01

*Indicates the group with the higher score: i.e. the group listening to the speaker with the stated characteristics.

**Intelblty. = Intelligibility

Thus, we may infer that the severity of the speech problem did modify the effect of instructions to a listener to attend to content. As the severity of the problem increased content instructions became less effective. However, a comparison needs to be made between the content scores of mothers of cleft palate children and mothers of non-cleft palate children. It may be that instructions affected these two groups in differing ways at different levels of severity of the speech problem, even though the overall trends were similar for both groups.

C. Effects of the Presence of a Cleft Palate Child in the Family

This analysis indicated that for all but two speakers the mothers of non-cleft palate children scored higher on the content test than did the mothers of cleft palate children. The two exceptions were for mothers listening to the speaker with Moderate Nasality and Low Intelligibility, where both

groups scored the same, and for mothers listening to the speaker with High Nasality and Low Intelligibility. In this case the group mean of the mothers of cleft palate children was less than one percentage point higher than the mean of the other group. The probability of this distribution occurring by chance alone is .03 according to a statistical sign test.

There was a significant difference between two of these groups of mothers of cleft palate children and non-cleft palate children on the content variable. The mothers of the non-cleft palate children scored significantly more than the mothers of cleft palate children, when listening to the speaker with Moderate Nasality and Intelligibility. The difference was statistically significant at the .05 level.

V. Analysis of the Accuracy of Nasality Ratings

An analysis similar to that just performed for the content scores can also be done for the accuracy of the manner ratings for different groups. Differences between the ratings of listeners under different listening instructions can be examined. The variations in accuracy of rating across listeners hearing speakers representing different levels of severity of the speech problem can be determined, as can variations between the two major population groups. A statistical sign test can be employed in this context also. The analysis will be done for the nasality rating first.

A. Effects of Listening Instructions

The first question to be answered is whether listeners under instructions to listen to manner of speech make a more accurate manner rating than listeners under a different instruction. The accuracy is determined by the extent of the deviation of the group mean rating from the mean rating of the experienced judges and the rating of the expert judges. These two criteria are in 100 per cent agreement with one another, so each listener group mean has been assigned one deviation score. In the case of the nasality rating, the scale was from one to three, so the maximum possible deviation score is 2.0. Examination of the data for listeners who are mothers of non-cleft palate children indicates that when the listeners under manner instruction are compared with those under content instruction, across all speakers, the listeners under content instructions tended to make more accurate ratings of nasality. Of the nine possible comparisons, in five cases the ratings of the content group were more accurate, in two cases the different groups deviated the same amount from the criterion,

and in only two cases were the listeners under manner instructions more accurate in their rating of nasality. (See Table XVI) The probability of this distribution occurring by chance alone is .23. In only two instances were the differences between any two groups individually statistically significant. (See Table XVII) There was a difference significant at the .05 level between the nasality ratings of the content and manner listeners to the speaker with Moderate Nasality and Moderate Intelligibility. The difference was in favor of the manner listeners whose mean rating was totally accurate. This was the only deviation score of .00 for nasality rating which occurred in the non-cleft population. The manner listeners were also more accurate in their rating of the speaker with High Nasality and High Intelligibility, and the difference between the groups was statistically significant at the .05 level. (See Table XVII)

When mothers of non-cleft palate children under instructions to listen to manner were compared with those under Control Instructions, just to listen to the speaker, it was harder to find a trend. Of the nine comparisons, in four cases the Control Groups rated nasality more accurately, in two cases the deviation scores were the same and in three cases the ratings of the Manner Groups were more accurate. (See Table XVI) The probability of this distribution occurring by chance is .50, and none of the individual differences between groups was statistically significant.

When the scores of the mothers of cleft palate children were examined it became apparent that these listeners did tend to rate nasality more accurately when they were instructed to listen to manner of speech. When comparisons were made between content and manner listeners in only two cases out of nine were the content listeners more accurate in their nasality ratings. In four cases the manner listeners were more accurate and in the remaining three cases the groups deviated the same amount from the criterion. (See Table XVIII) The probability of this distribution occurring by chance alone, however, is .34 according to the sign test. For listeners to the speaker with Low Nasality and Low Intelligibility there was a difference between the content and manner groups significant at the .05 level in favor of the manner group. (See Table XVII) Four groups achieved a mean deviation score of .00, content and manner listeners to the speaker with Moderate Nasality and High Intelligibility, the content listeners to the speaker with Moderate Nasality and Moderate Intelligibility, and the control listeners to the speaker with High Nasality and Low Intelligibility. (See Table XVIII)

TABLE XVI

Nasality Deviation Scores of Mothers of Non-Cleft Palate Children, on a Three Point Rating Scale

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	.20	.45	.40	.55	.40	.55
2	1	Moderate Intelblty. & Low Nasality	.60	.55	1.0	.70	.80	.45
3	1	Low Intelblty. & Low Nasality	.60	.55	1.0	.70	.40	.55
1	2	High Intelblty. & Moderate Nasality	.60	.55	.60	.55	.60	.55
2	2	Moderate Intelblty. & Moderate Nasality	.60	.55	.00	.00	.20	.45
3	2	Low Intelblty. & Moderate Nasality	.20	.45	.40	.55	.20	.45
1	3	High Intelblty. & High Nasality	1.40	.55	.60	.55	.80	.45
2	3	Moderate Intelblty. & High Nasality	.80	.45	.80	.45	.60	.55
3	3	Low Intelblty. & High Nasality	.40	.55	.60	.55	1.0	.70

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Intelblty. = Intelligibility

TABLE XVII

Significant Differences Between Instruction Groups on Nasality Deviation Scores

Speakers	Mothers of Cleft Palate Children		Mothers of Non-Cleft Palate Children	
	Instruction Groups	Significance Level	Instruction Groups	Significance Level
1. High **Intelblty. Low Nasality				
2. Moderate Intelblty. Low Nasality				
3. Low Intelblty. Low Nasality	Content v *Manner	.05		
4. High Intelblty. Moderate Nasality				
5. Moderate Intelblty. Moderate Nasality			Content v *Manner	.05
6. Low Intelblty. Moderate Nasality				
7. High Intelblty. High Nasality			Content v *Manner	.05
8. Moderate Intelblty. High Nasality				
9. Low Intelblty. High Nasality				

*Indicates the group with the more accurate rating.
**Intelblty. = Intelligibility

TABLE XVIII

Nasality Deviation Scores of Mothers of Cleft Palate Children, on a Three-point Rating Scale

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	.40	.55	.40	.55	.80	.45
2	1	Moderate Intelblty. & Low Nasality	.60	.55	1.20	.45	1.0	.00
3	1	Low Intelblty. & Low Nasality	1.00	.00	.40	.55	.60	.55
1	2	High Intelblty. & Moderate Nasality	.00	.00	.00	.00	.40	.55
2	2	Moderate Intelblty. & Moderate Nasality	.00	.00	.20	.45	.60	.55
3	2	Low Intelblty. & Moderate Nasality	.40	.55	.40	.55	.60	.55
1	3	High Intelblty. & High Nasality	.80	.45	.40	.55	.40	.55
2	3	Moderate Intelblty. & High Nasality	.60	.55	.20	.45	.60	.55
3	3	Low Intelblty. & High Nasality	.80	.45	.20	.45	.00	.00

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Intelblty. = Intelligibility

When manner and control listeners were compared the tendency for listeners under manner instructions to make more accurate nasality ratings was clearer. In six out of nine cases the listeners instructed to listen to manner had a lower mean deviation score, and in one case the two groups scored the same. In only two cases did the control listeners make more accurate ratings. (See Table XVIII) The probability of this distribution occurring by chance alone is .14. However, none of the individual differences between groups were statistically significant.

Thus, in general it would seem that instructions to listen to the manner of speech had more effect on the accuracy of the nasality ratings of the mothers of cleft palate children. The mothers of non-cleft palate children did not seem to be influenced in any significant way by such instructions. If anything the instructions to listen to manner seemed to detract from the accuracy of their nasality ratings, since the ratings of listeners under content instructions tended to be somewhat more accurate.

B. Effects of Variations in Intelligibility and Nasality

The next question concerns the variation in accuracy of nasality ratings as the severity of the speech problem increases. As with the analysis of the content scores, this variation will be examined in three ways; as nasality increases with intelligibility held constant at each of three levels, as intelligibility decreases with nasality held constant at each of three levels, and as both these dimensions of the problem vary from normal to severe simultaneously. For this analysis only the deviation scores of listeners under instructions to listen to manner of speech will be considered.

Mothers of non-cleft palate children did not show any very consistent trend in the variation of the deviation scores as intelligibility was allowed to vary with nasality held constant at each of three levels. When nasality was low, a decrease in intelligibility, from high to moderate, did reduce the accuracy of the nasality rating. However, the difference between the groups was not significant and further reduction of intelligibility to low did not further reduce the accuracy of the nasality rating. (See Table XVI) When nasality was moderate and intelligibility was high, the listeners' group mean deviation score was the highest for this level of nasality. Those who listened to the moderately nasal speaker with Low Intelligibility were more accurate than the first group in their rating of nasality. The listener group rating the moderately nasal, moderately intelligible speaker obtained a deviation score

of .00; thus their mean rating was completely accurate according to the criterion rating. (See Table XVI) There was a difference, statistically significant at the .05 level between the most accurate and the least accurate groups at this level of nasality. (See Table XIX) When nasality was high the moderately intelligible speaker received the least accurate nasality rating. Listeners to the speakers with High Intelligibility and Low Intelligibility at this level of nasality both obtained the same mean deviation score. (See Table XVI) There were no significant differences between groups. The statistical probability of this distribution occurring by chance alone is .50 according to the sign test.

TABLE XIX

Significant Differences Between Manner Instruction Groups on Nasality Deviation Scores, When Intelligibility Varies Across Each Nasality Level

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
Low Nasality		
*High v. Moderate Intelblty.**	.05	
High v. Low Intelblty.		
Moderate v. *Low Intelblty.	.05	
Moderate Nasality		
High v. *Moderate Intelblty.		.05
High v. Low Intelblty.		
Moderate v. Low Intelblty.		
High Nasality		
High v. Moderate Intelblty.		
High v. Low Intelblty.		
Moderate v. Low Intelblty.		

*Indicates the group with the more accurate rating: i.e. the group listening to the speaker with the stated characteristics.

**Intelblty. = Intelligibility

It would appear from these data that when nasality was low some variation in intelligibility did decrease the accuracy of listeners' nasality ratings, when listeners were mothers of non-cleft palate children. However, at higher nasality levels this effect was not apparent. At the moderate level of nasality, High Intelligibility appeared to decrease the accuracy of the nasality ratings, while at the High Nasality level the least accurate ratings occurred when intelligibility was moderate. However, because of the high probability of this distribution of scores occurring by chance alone, the validity of any such generalizations is questionable.

When the patterns of deviation scores, of mothers of non-cleft palate children, were analyzed for variations in nasality with intelligibility held constant, at each of three levels, consistent trends were equally hard to find. At the level of High Intelligibility the listeners' most accurate mean nasality rating was for the least nasal speaker. The accuracy of the nasality rating decreased as the level of nasality rose to moderate, but did not further decrease when the speaker to be rated was highly nasal. (See Table XVI) At the level of Moderate Intelligibility, the speaker rated most accurately was moderately nasal. The highly nasal speaker received the second most accurate rating, while the speaker with Low Nasality received the least accurate nasality rating. (See Table XVI) There was a difference, statistically significant at the .05 level, between the mean deviation score of the group listening to the speaker with low nasality and the mean deviation score of the group listening to the moderately nasal speaker, in favor of the latter group. (See Table XX) The difference between this group and the group listening to the highly nasal speaker was significant at the .01 level, also in favor of the group listening to the speaker with Moderate Nasality. (See Table XX) This group obtained a completely accurate mean deviation score in relation to the criterion rating of Nasality.

At the level of Low Intelligibility with varying degrees of nasality the pattern of scores was similar to those obtained on the level of Moderate Intelligibility. The group making the most accurate nasality rating listened to the moderately nasal speaker. The second most accurate rating was obtained for the highly nasal speaker, while the least accurate rating was made by the group who listened to the speaker with Low Nasality. (See Table XVI) There were no statistically significant differences between groups at the level of Low Intelligibility. The probability of the total deviation score distribution for this analysis occurring by chance alone is .64 according to the sign test.

TABLE XX

Significant Differences Between Manner Instruction Groups on Nasality Deviation Scores, When Nasality Varies Across Each Intelligibility Level

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
High Intelligibility		
Low v. Moderate Nasality		
Low v. High Nasality		
Moderate v. High Nasality		
Moderate Intelligibility		
Low v. *Moderate Nasality	.01	.05
Low v. *High Nasality	.01	
*Moderate v. High Nasality		.01
Low Intelligibility		
Low v. Moderate Nasality		
Low v. High Nasality		
Moderate v. High Nasality		

*Indicates the group with the most accurate rating: i.e. the group listening to the speaker with the stated characteristics.

Deviation scores, of mothers of non-cleft palate children for nasality ratings, can also be examined across the three speaker cells where both nasality and intelligibility are varying from normal to severe. The most accurate nasality rating was obtained by the group listening to the speaker with Moderate Nasality and Intelligibilitty, this being the group with a deviation score of .00. The group deviating the most from the criterion rating of nasality was that which listened to the speaker with the most severe speech problem, characterized by High Nasality and Low Intelligibility. (See Table XVI) There was a difference between these two groups significant at the .05 level. (See Table XXI) The group listening to the most normal speaker obtained a mean deviation score, falling between the first two groups, nearer to the higher deviation score. This middle group did not differ significantly from either of the others.

TABLE XXI

Significant Differences Between Manner Instruction Groups on Nasality Deviation Scores, When the Level of Severity of the Speech Problem Varies from Low to Severe on Both Nasality and Intelligibility

Speaker Characteristics	Mothers of Cleft Palate Children	Mothers of Non-Cleft Palate Children
Low Nasality / High Intelblty.** v. Moderate Nasality / Intelblty.		
Low Nasality / High Intelblty. v. High Nasality / Low Intelblty.		
*Moderate Nasality / Intelblty. v. High Nasality / Low Intelblty.	.05	

*Indicates the group with the more accurate rating: i.e. the group listening to the speaker with the stated characteristics.

**Intelblty. = Intelligibility

The above analysis has dealt with the pattern of nasality rating deviation scores obtained by mothers of non-cleft palate children under instructions to listen to manner of speech. The same analysis can also be made for the nasality rating deviation scores of mothers of cleft palate children under the same instructions. Their scores will first be analyzed for variations in intelligibility at each of three levels of nasality.

When nasality was low the most accurate ratings of nasality were made by the groups listening to the speakers with High Intelligibility and Low Intelligibility, both groups obtaining the same mean deviation score. The group listening to the moderately intelligible speaker deviated considerably from the criterion rating of nasality. (See Table XIV) This group differed at the .05 significance level from both the other groups. (See Table XIX) At the level of Moderate Nasality the effects of a decrease in

intelligibility seemed to produce a pattern of steadily decreasing accuracy in the nasality ratings of mothers of cleft palate children. (See Table XVIII) However, there were no statistically significant differences between groups. At the level of High Nasality the least accurate nasality rating was obtained for the speaker with High Intelligibility. The groups listening to the speakers with Moderate and Low Intelligibility both obtained the same deviation score and were more accurate in their rating of nasality. (See Table XVIII) There were no statistically significant differences between these three groups. The probability of this total distribution occurring by chance alone is .50, according to the sign test.

When the scores of mothers of cleft palate children were analyzed for variations in nasality, at each of three levels of intelligibility, there was some tendency for the ratings of nasality to become more accurate as nasality increases. This was less apparent, however, when intelligibility was high. At this level the most accurate rating was obtained for the moderately nasal speaker, the group having a mean deviation score of .00. The groups listening to the speakers with Low and High Nasality, at this level of intelligibility, both obtained the same mean deviation score. (See Table XVIII) There were no statistically significant differences between groups. At the level of Moderate Intelligibility the least accurate rating of nasality was obtained for the speaker with Low Nasality. The groups listening to the speakers with Moderate and High Nasality achieved the same low deviation score. (See Table XVIII) These latter groups both differed at the .01 level of significance from the least accurate group. (See Table XX) When intelligibility was low the most accurate nasality rating was obtained for the highly nasal speaker. The groups listening to the least nasal speaker and the speaker with Moderate Nasality both achieved the same deviation score. (See Table XVIII) There were no significant differences between groups. The overall probability of this distribution occurring by chance alone is .11 according to the sign test.

When deviation scores of mothers of cleft palate children were analyzed for the three speaker cells, where both nasality and intelligibility are varying from normal to severe, the same tendency was found. The least accurate nasality rating was obtained for the most normal speaker. The other two groups, listening to a speaker with a moderate speech problem and one with a severe speech problem both obtained the same lower deviation score. However, there were no significant differences between these groups.

C. Effects of the Presence of A Cleft Palate Child in the Family

The final analysis to be made of nasality deviation scores concerns the relative accuracy of the ratings of mothers of non-cleft palate children and mothers of cleft palate children, when both were under instructions to listen to manner of speech. In only two cases, out of the nine possible comparisons, did the mothers of cleft palate children obtain higher deviation scores than the mothers of non-cleft palate children. They were less accurate in rating the speaker with Low Nasality and Moderate Intelligibility and the speaker with Moderate Nasality and Intelligibility. In both cases the difference in mean deviation score was only .20. In two further cases out of the total nine, both groups obtained the same deviation score; for the speaker with Low Nasality and High Intelligibility and for the speaker with Moderate Nasality and Low Intelligibility. In the other five cases the mothers of cleft palate children were more accurate in their ratings of nasality than the mothers of non-cleft palate children. (See Tables XVI, XVIII) The probability of this distribution occurring by chance is .23 according to the sign test. There was one significant difference between individual groups. The mothers of cleft palate children differed at the .05 level on their rating of nasality, from the mothers of non-cleft palate children, when listening to the speaker with Moderate Nasality and High Intelligibility. The difference was in favor of the mothers of cleft palate children.

VI. Analysis of the Accuracy of Intelligibility Ratings

Two further dependent variables remain to be analyzed, both related to the accuracy with which the listeners under instructions to listen to manner of speech rated the intelligibility of the speaker. Two scales were used for the rating of intelligibility; one a rating scale running from one to three and one an estimate of the percentage of words mis-spoken by the speaker. The scores obtained by the listeners were deviation scores, as with the nasality rating. The deviation score for the rating scale from one to three is similar to that obtained for nasality; it is measured in terms of a criterion rating. The deviation score for the percentages of error estimate is related to a count of the error words for each speaker, which was converted into a percentage. As before, scores are analyzed in terms of different instruction groups, for variation, between manner groups, as the level of severity of the problem changes and for the variation between the two population groups, when both are under instructions to listen to manner of speech. Since the two dependent variables are related they will be analyzed together.

A. Effects of Listening Instructions

For listeners who were mothers of non-cleft palate children there seemed to be no consistent trend related to the relative accuracy of those instructed to listen to Content and those instructed to listen to manner, when deviation scores for the rating scale were examined. Nine comparisons can be made and in four cases out of nine the two deviation scores were the same. In three of these cases the deviation score for both groups was .00. Of the five remaining comparisons, in three cases the Manner Groups were more accurate, obtaining a deviation score of .00 in one further instance. The content groups were more accurate in the remaining two cases, in one of which they also obtained another deviation score of .00 (See Table XXII) There was a difference between the Content and Manner Groups who listened to the speaker with Moderate Nasality and Intelligibility which was statistically significant at the .01 level, in favor of the Manner Group. (See Table XXIV) However, the overall probability of this distribution occurring by chance alone is .50, according to the sign test.

The difference between these two instruction groups was much more clearly defined when deviation scores for the percentage measure were analyzed. In only two cases, out of the total of nine, were the groups instructed to listen to content more accurate in their percentage of error estimate. In one of these cases the range of difference was 1.20 per cent and in the other only one per cent. In the remaining seven comparisons the groups instructed to listen to manner deviated less from the actual percentage of error words. (See Table XXIII) There was also a difference, statistically significant at the .01 level, between the Content and Manner Groups listening to the moderately nasal and moderately intelligible speaker. (See Table XXIV) These two groups differed on the Intelligibility rating measure and, as before, the difference was in favor of the Manner Group. The probability of the distribution of scores for all nine comparisons occurring by chance alone is .09, according to the sign test.

When the deviation scores for intelligibility of mothers of non-cleft palate children under manner or control listening instructions were compared, the Control Groups tended to be more accurate in their ratings, on both measures. In four cases out of a total of nine comparisons the two groups had the same deviation score on the Intelligibility Rating Scale. In three of these cases both groups obtained a deviation score of .00. However, in four of the remaining five comparisons, the Control Groups rated Intelligibility more accurately, obtaining three further deviation scores

TABLE XXII

Intelligibility Deviation Scores of Mothers of Non-Cleft Palate Children, on a Three-point Rating Scale

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	.80	.45	.60	.55	.00	.00
2	1	Moderate Intelblty. & Low Nasality	.00	.00	.00	.00	.00	.00
3	1	Low Intelblty. & Low Nasality	.00	.00	.00	.00	.40	.55
1	2	High Intelblty. & Moderate Nasality	.20	.45	.20	.45	.20	.45
2	2	Moderate Intelblty. & Moderate Nasality	1.00	.00	.20	.45	.00	.00
3	2	Low Intelblty. & Moderate Nasality	.00	.00	.40	.55	.00	.00
1	3	High Intelblty. & High Nasality	1.20	.45	1.40	.55	1.00	.00
2	3	Moderate Intelblty. & High Nasality	.40	.55	.00	.00	.00	.00
3	3	Low Intelblty. & High Nasality	.00	.00	.00	.00	.00	.00

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Intelblty. = Intelligibility

TABLE XXIII

Intelligibility Deviation Scores of Mothers of Non-Cleft Palate Children, on Percentage Estimate of Words in Error

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	10.00	13.50	17.00	8.23	11.00	4.47
2	1	Moderate Intelblty. & Low Nasality	18.00	9.08	13.00	9.08	11.00	13.42
3	1	Low Intelblty. & Low Nasality	14.00	8.94	7.60	3.58	28.20	16.19
1	2	High Intelblty. & Moderate Nasality	21.00	16.58	14.00	18.57	20.40	19.35
2	2	Moderate Intelblty. & Moderate Nasality	35.00	8.21	9.20	10.80	15.40	11.39
3	2	Low Intelblty. & Moderate Nasality	17.00	8.66	15.60	5.77	11.20	8.70
1	3	High Intelblty. & High Nasality	51.00	18.37	31.00	28.28	21.00	12.25
2	3	Moderate Intelblty. & High Nasality	23.40	17.66	20.00	13.50	12.40	7.60
3	3	Low Intelblty. & High Nasality	18.00	4.18	19.20	11.26	11.20	7.46

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Int.lblty. = Intelligibility

TABLE XXIV

Significant Differences Between Instruction Groups on Intelligibility Rating Scores and Percentage Estimate of Words in Error

Speakers	Mothers of Cleft Palate Children			Mothers of Non-Cleft Palate Children		
	Instruction Groups	Significance Levels		Instruction Groups	Significance Levels	
		Rating	%		Rating	%
1. High **Intelblty. Low Nasality				Manner v *Control	.05	
2. Moderate Intelblty. Low Nasality						
3. Low Intelblty. Low Nasality						
4. High Intelblty. Moderate Nasality	*Manner v Control		.05			
5. Moderate Intelblty. Moderate Nasality				Content v *Manner	.01	.01
6. Low Intelblty. Moderate Nasality						
7. High Intelblty. High Nasality						
8. Moderate Intelblty. High Nasality						
9. Low Intelblty. High Nasality						

*Indicates the group with the more accurate rating.
**Intelblty. = Intelligibility

of .00. Only for the speaker with Low Nasality and Low Intelligibility were the Manner Group more accurate, having a deviation score of .00. (See Table XXII) The Manner and Control Groups listening to the speaker with Low Nasality and High Intelligibility differed statistically at the .05 level of significance, the difference being in favor of the Control Group. (See Table XXIV) The probability of the total score distribution occurring by chance alone is .19 according to the sign test.

This same trend appeared when deviation scores for the percentage measure were analyzed. In six of nine comparisons the Control Group means deviated less from the actual percentage of error, while in the remaining three comparisons the Manner Groups were more accurate. (See Table XXIII) There were no statistically significant differences between groups. According to the sign test, the probability of this distribution of scores occurring by chance alone is .25.

When the deviation scores of mothers of cleft palate children were analyzed, for variations between different instruction groups, some fairly clear trends appeared. On the Intelligibility Rating Scale listeners under instructions to listen to manner of speech tended to have lower deviation scores than did listeners under content instructions. In four of the nine comparisons the two instruction groups had the same deviation score, but for the five remaining comparisons the Manner Group were more accurate. The Content Groups obtained no .00 deviation scores and the Manner Groups only two. (See Table XXV) There were no significant differences between groups, and the probability of the score distributions occurring by chance alone is only .03, according to the sign test.

The same trend appeared in the analysis of deviation scores for the percentage measure of intelligibility. The two groups obtained the same deviation score for one speaker and in the one case the Content Group had a lower deviation score. However, in seven out of the total nine comparisons the Manner Groups estimated the percentage of words in error more accurately. (See Table XXVI) The probability of this occurring by chance alone is .03 according to the sign test. However, there were no statistically significant differences between the sub-groups.

The differences between listeners under manner and control instructions were less clearly marked. However, as with the mothers of non-cleft palate children, there was a tendency for the ratings of the Control Groups to be more accurate on both measures of intelligibility.

TABLE XXV

Intelligibility Deviation Scores of Mothers of Cleft Palate Children, on a Three-Point Rating Scale

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	.40	.55	.00	.00	.40	.55
2	1	Moderate Intelblty. & Low Nasality	.40	.55	.20	.45	.00	.00
3	1	Low Intelblty. & Low Nasality	.20	.45	.20	.45	.00	.00
1	2	High Intelblty. & Moderate Nasality	.40	.55	.40	.55	.00	.00
2	2	Moderate Intelblty. & Moderate Nasality	.20	.45	.20	.45	.20	.45
3	2	Low Intelblty. & Moderate Nasality	.40	.55	.20	.45	.20	.45
1	3	High Intelblty. & High Nasality	1.00	.00	.80	.45	1.00	.71
2	3	Moderate Intelblty. & High Nasality	.20	.45	.20	.45	.00	.00
3	3	Low Intelblty. & High Nasality	.20	.45	.00	.00	.00	.00

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

*Intelblty. = Intelligibility

TABLE XXVI

Intelligibility Deviation Scores of Mothers of Cleft Palate Children, on Percentage Estimate of Words in Error

Speakers			Listening Instruction Groups					
Criterion Manner Ratings		Manner Characteristics	Content Mean	SD	Manner Mean	SD	Control Mean	SD
1	1	High Intelblty* & Low Nasality	18.20	20.51	5.20	5.21	20.00	17.10
2	1	Moderate Intelblty. & Low Nasality	19.00	12.45	10.00	3.54	17.00	8.37
3	1	Low Intelblty. & Low Nasality	15.60	2.88	8.40	7.86	7.60	7.09
1	2	High Intelblty. & Moderate Nasality	18.00	17.17	6.40	4.56	15.00	4.18
2	2	Moderate Intelblty. & Moderate Nasality	18.00	13.96	12.60	12.26	10.00	5.83
3	2	Low Intelblty. & Moderate Nasality	12.20	9.76	12.20	10.26	10.40	9.60
1	3	High Intelblty. & High Nasality	44.00	21.68	36.00	18.71	27.00	23.02
2	3	Moderate Intelblty. & High Nasality	5.40	4.45	10.40	13.31	6.60	4.39
3	3	Low Intelblty. & High Nasality	17.00	9.89	12.20	9.23	8.20	6.30

When the divisor went to .000, in order to complete the division .001 was substituted in the calculations.

Intelblty. = Intelligibility

On the Intelligibility Rating Scale the two groups agreed in three of the nine possible comparisons. For one of these both groups had a deviation score of .00. Of the remaining six comparisons the Control Groups were more accurate four times, with deviation scores of .00 in all four cases. (See Table XXV) The probability of this distribution of scores occurring by chance alone is .34, according to the sign test. There were no statistically significant differences between groups.

The same trend emerged in the analysis of the deviation scores related to the percentage of error estimate and was more clearly marked in this context. In only three out of the total of nine available comparisons did the Manner Groups estimate the percentage of words in error more accurately. In the remaining six cases the Control Groups were more accurate, the probability of this occurring by chance being .25. (See Table XXVI) The Manner and Control Groups listening to the speaker with Moderate Nasality and High Intelligibility differed statistically at the .05 level of significance. This difference favored the Manner Group, who were more accurate in this instance. (See Table XXIV)

B. Effects of Variations in Intelligibility and Nasality

The next analysis is concerned with the variation in the accuracy of listeners' intelligibility ratings, as the severity of the speech problem varies. Only the scores of listeners under instructions to listen to manner of speech will be considered.

Among listeners who were mothers of non-cleft palate children, when nasality was low the ratings of intelligibility increased in accuracy as the intelligibility of the speaker decreased from high to moderate and low. On the rating scale measure the groups listening to the moderately intelligible speaker and the speaker with Low Intelligibility both had deviation scores of .00. The accuracy of the percentage rating increased progressively across all three speakers. (See Table XXII) There were statistically significant differences between the group listening to the most intelligible speaker and both of the other groups on the short rating scale measures. These differences were at the .05 level of significance, and favored the latter groups. (See Table XXVII) There was also a difference, statistically significant at the .05 level on the percentage measure, between the group listening to the most intelligible speaker and the group listening to the speaker with Moderate Intelligibility. This difference favored the second group. (See Table XXVII)

TABLE XXVII

Significant Differences Between Manner Instruction Groups on Intelligibility Rating Deviation Scores and Percentage Estimate of Words in Error Deviation Scores when Intelligibility Varies Across Each Nasality Level

Speaker Characteristics	Mothers of Cleft Palate Children		Mothers of Non-Cleft Palate Children	
	Rating Dev.	% Dev.	Rating Dev.	% Dev.
Low Nasality				
High v. *Moderate Intell.			.05	.05
High v. *Low Intell.			.05	
Moderate v. Low Intell.				
Moderate Nasality				
High v. Moderate Intell.				
High v. Low Intell.				
Moderate v. Low Intell.				
High Nasality				
High v. *Moderate Intell.		.05	.001	
High v. *Low Intell.	.01	.05	.001	
Moderate v. Low Intell.				

*Indicates the group with the more accurate rating: i.e. the group listening to the speaker with the stated characteristics

When nasality was moderate the most accurate intelligibility ratings on the short scale were made by the groups listening to the speakers with High and Moderate Intelligibility. (See Table XXII) Both groups obtained the same deviation score on this measure, however, the group listening to the moderately intelligible speaker estimated the percentage of error words more accurately. (See Table XXIII) The least accurate ratings on both scales were obtained for the speaker with Low Intelligibility, a reversal of the trend at the Lower Nasality level. There were no statistically significant differences between groups.

When nasality was high, however, the scores followed the same pattern that was found when nasality was low. The least accurate ratings on both measures were obtained for the highly intelligible speaker. The groups listening to the speakers with Moderate and Low Intelligibility both obtained a .00 deviation score on the short rating scale. (See Table XXII) The estimate of error percentage increased in accuracy as intelligibility decreased from high to moderate, and increased again very slightly as intelligibility decreased to low. (See Table XXIII) There were differences between the group with the highest deviation score on the rating scale and the other two groups, both having a deviation score of .00. Both of these differences between groups were statistically significant at the .001 level. (See Table XXVII) The probability of the total deviation score distribution for the rating scale occurring by chance alone is .34. The probability of the score distribution on the percentage measure occurring by chance is .09. Both probabilities were obtained by application of the sign test.

When the intelligibility deviation scores of mothers of non-cleft palate children were analyzed for variations in nasality at each of three levels of intelligibility a different trend emerged. When intelligibility was high the most accurate intelligibility ratings on both measures were obtained for the moderately nasal speaker. The group listening to the speaker with High Nasality were least accurate in both ratings of intelligibility, while the group listening to the least nasal speaker fell in between, considerably nearer to the most accurate group. (See Tables XXII and XXIII). The least accurate group differed statistically from both other groups on the rating scale measure at the .01 significance level from the most accurate group and at the .05 significance level from the middle group. (See Table XXVIII)

When intelligibility was moderate the score pattern was very inconsistent. On the rating scale measure the groups listening to the least nasal speaker and the most nasal speaker both had deviation scores of .00. The group listening to the speaker with Moderate Nasality was less accurate, but also had a low deviation score. (See Table XXII) However, on the percentage measure this group obtained the lowest deviation score. The group listening to the speaker with High Nasality had the highest deviation score, while the group listening to the least nasal speaker fell in between, nearer the most accurate group. (See Table XXIII) There were no significant differences between groups.

TABLE XXVIII

Significant Differences Between Manner Instruction Groups on Intelligibility Rating Deviation Scores and Percentage Estimate of Words in Error Deviation Scores When Nasality Varies Across Each Intelligibility Level

Speaker Characteristics	Mothers of Cleft Palate Children		Mothers of Non-Cleft Palate Children	
	Rating	%	Rating	%
High Intelligibility				
Low v. Moderate Nasality				
*Low v. High Nasality	.01	.01	.05	
*Moderate v. High Nasality		.01	.01	
Moderate Intelligibility				
Low v. Moderate Nasality				
Low v. High Nasality				
Moderate v. High Nasality				
Low Intelligibility				
*Low v. Moderate Nasality				.05
Low v. High Nasality				
Moderate v. High Nasality				

*Indicates the group with the most accurate rating: i.e. the group listening to the speaker with the stated characteristics.

When intelligibility was low the most accurate ratings on the short scale were again obtained for the speakers with Low and High Nasality. Both groups had a deviation score of .00, while the group listening to the moderately nasal speaker were somewhat less accurate. (See Table XXII) On the percentage measure the most accurate score was obtained for the least nasal speaker. The group who listened to the speaker with High Nasality were the least accurate in their estimate of the percentage of error words, while the group listening to the moderately nasal speaker were not slightly more accurate. (See Table XXIII) There was a statistically significant difference at the .05 level between the most accurate and

the least accurate groups. (See Table XXVI) According to the sign test the probability of the total distribution of rating scale scores occurring by chance is .50. However, the probability of the distribution of the percentage scores occurring by chance alone is only .09. For this measure, at both of the lower levels of intelligibility, as nasality increased the accuracy of the estimate of the percentage of words in error decreases, when listeners were mothers of non-cleft palate children.

When deviation scores for intelligibility were examined across the three speakers where both nasality and intelligibility were varying from normal to severe, tne two measures yielded different results. As the level of the speech problem increased, mothers of non-cleft palate children made more accurate intelligibility ratings on the short scale. The greatest increase in accuracy occurred between the normal speech and the moderately severe problem. (See Table XXII) There is a difference between the most and least accurate groups statistically significant at the .05 level. (See Table XXIX) However, when percentage deviation scores were examined the most accurate estimate was obtained for the moderately severe speaker. The least accurate estimate was obtained for the speaker with a severe speech problem, for whom a rating scale deviation score of .00 was obtained. The group listening to the most normal speaker was only slightly more accurate, in their estimate of the percentage of words in error, than the least accurate group. (See Table XXIII)

TABLE XXIX

Significant Differences Between Manner Instruction Groups on Intelligibility Rating Deviation Scores and Percentage Estimate of Words in Error Deviation Scores, When the Level of Severity of the Speech Problem Varies from Low to Severe on Both Nasality and Intelligibility

Speaker Characteristics	Mothers of Cleft Palate Children		Mothers of Non-Cleft Palate Children	
	Rating	%	Rating	%
High Intelligibility / Low Nasality v. Moderate Intelligibility & Nasality				
High Intelligibility / Low Nasality v. *Low Intelligibility / High Nasality				.05
Moderate Intelligibility & Nasality v. Low Intelligibility / High Nasality				

*Indicates the group with the most accurate rating: i.e. the group listening to the speaker with the stated characteristics.

The same analysis can be made for the scores of mothers of cleft palate children under instructions to listen to manner of speech. When intelligibility was allowed to vary at each of three levels of nasality the two measures of intelligibility yielded different results. When nasality was low the most accurate rating on the short scale was obtained for the most intelligible speaker. This group had a deviation score of .00. The groups listening to the speakers with Moderate and Low Intelligibility both had the same deviation score on the rating scale measure. (See Table XXV) However, on the percentage scale measure the estimate of error increased in accuracy progressively as intelligibility decreased from high to moderate and low. (See Table XXVI) There were no statistically significant differences between groups on either of the measures of intelligibility.

When nasality was moderate the highest deviation score on the rating scale measure was obtained for the speaker with High Intelligibility. The groups listening to the two less intelligible speakers at this level of nasality both obtained the same, lower deviation score. (See Table XXV) In contrast, the most accurate estimate of error percentage was made by the group listening to the highly intelligible speaker, who were least accurate in their use of the rating scale measure. The group listening to the moderately intelligible speaker made the least accurate estimate of the percentage of words in error. The group listening to the speaker with Low Intelligibility were slightly more accurate, but their deviation score was less than one percentage point below that of the least accurate group. (See Table XXVI) There were no statistically significant differences between groups.

When nasality was high the least accurate ratings of intelligibility, on both measures, were obtained for the most intelligible speaker. The group listening to the speaker with Moderate Intelligibility had a low deviation score on the rating scale measure and made the most accurate estimate of the percentage of words in error. The group listening to the least intelligible speaker obtained a deviation score of .00 on the rating scale measure. The percentage of error estimate for this group was slightly less accurate than that obtained by the group listening to the speaker with Moderate Intelligibility. (See Tables XXV and XXVI) There was a difference on the percentage measure, statistically significant at the .05 level between the least accurate group, who listened to the most intelligible speaker, and the group with the lowest Intelligibility. (See Table XXVII) The least accurate group differed statistically, at the .01 significance level, from the group listening to the speaker with Low Intelligibility

on the rating scale measure. This latter group had a deviation score of .00 on this short scale. These two groups also differed statistically, at the .05 significance level on the percentage of error estimate. This difference, again, was in favor of the group listening to the least intelligible speaker. (See Table XXVII)

In the score distribution for the six speakers at the higher nasality levels there was a tendency for ratings on the short scale to become more accurate as intelligibility decreased. This trend was not present in rating scale scores at the level of Low Nasality, where the most accurate rating was obtained for the highly intelligible speaker. (See Table XXV) When percentage of error estimate deviation scores were analyzed for the six speakers at the lower nasality levels, there was a tendency for the estimates to become less accurate as intelligibility decreased. This trend was not present at the level of High Nasality, where the least accurate estimate was obtained for the highly intelligible speaker. (See Table XXVI) The probability of the total distribution of rating scale scores for all nine speakers occurring by chance is .23, while for the percentage of error estimate it is .50. Both probability levels were derived from the application of the sign test.

When intelligibility was held constant at each of three levels, and the scores of mothers of cleft palate children were analyzed for variations in nasality no consistent trend emerged. When intelligibility was high listeners made progressively less accurate ratings of intelligibility on the short scale, as nasality increased from low to moderate and high. (See Table XXV) The least accurate estimate of the percentage of words in error was also made by the group listening to the most nasal speaker. However, the most accurate percentage of error estimate was made by the group listening to the moderately nasal speaker. The group listening to the speaker with Low Nasality were less accurate, however, their percentage deviation score fell nearer to that of the most accurate than the least accurate group. (See Table XXVI) There were statistical differences, significant at the .01 level, on both intelligibility measures, between the group listening to the least nasal speaker and the group listening to the most nasal speaker. (See Table XXVIII) These differences favored the group listening to the least nasal speaker. The group listening to the speaker with High Nasality, who were the least accurate group on both measures, also differed statistically at the .01 level from the group listening to the moderately nasal speaker on the percentage measure only. (See Table XXVIII) This difference favored the second group, who had the lowest deviation score of all three groups on this measure.

When intelligibility was moderate the same low deviation score for intelligibility was obtained for all three speakers, regardless of their nasality, on the rating scale measure. (See Table XXV) The deviation scores on the percentage measure were also close and low. The most accurate score was obtained by the group listening to the speaker with Low Nasality. The deviation score obtained for the speaker with High Nasality was less than one percentage point higher. The least accurate estimate of the percentage of words in error was made by the group listening to the moderately nasal speaker. (See Table XXVI) However, the range of difference between the most and least accurate groups was only 2.60 percentage points. There were no significant differences between groups.

When intelligiblity was low the most accurate rating scale score was obtained for the most nasal speaker. The group had a deviation score of .00. The groups listening to the two less nasal speakers both obtained the same low deviation score. (See Table XXV) The most accurate estimate of the percentage of words in error was made by the group who listened to the speaker with Low Nasality. The two groups who listened to the more nasal speakers both made the same deviation score on the percentage measure. The range of difference between groups was only 3.60 percentage points. (See Table XXVI) There were no significant differences between the groups. The probability of the rating scale deviation score distribution occurring by chance alone is .50, while the percentage score distribution has a .36 probability of being due to chance. Both probabilities are derived from the sign test.

When the intelligibility scores of the mothers of cleft palate children were analyzed for variation as the speech problem increased from normal to severe, a trend can be found in the percentage measure scores. The least accurate estimate of the percentage of words in error was made by the group listening to the most normal speaker. The most accurate group was that which listened to the worst speaker. The group listening to the moderately severe speaker obtained a deviation score less than one percentage point larger than that of the most accurate group. (See Table XXVI) However, the accuracy of the estimate of the percentage of words in error did increase as the speech problem increased in severity. The groups listening to the best and worst speakers both obtained a deviation score of .00 on the rating scale measure. The group listening to the moderately severe speaker made a less accurate rating, but their deviation score was also low. (See Table XXV) There were no significant differences between groups on either measure of intelligibility.

C. Effects of the Presence of a Cleft Palate Child in the Family

The final analysis to be made of the intelligibility scores of listeners under instructions to listen to manner of speech is concerned with the relative accuracy of the mothers of non-cleft palate children and the mothers of cleft palate children. When rating scale deviation scores were analyzed, the two groups had the same deviation scores for the speaker with Moderate Nasality and Intelligibility and the speaker with High Nasality and Low Intelligibility. In four cases out of the remaining seven comparisons the mothers of cleft palate children had lower deviation scores. In the other three cases the mothers of non-cleft palate children were more accurate in their use of the rating scale. (See Tables XXII and XXV) The probability of this distribution occurring by chance alone, however, is .50 according to the sign test.

When the deviation scores for the percentage measure were analyzed, the mothers of non-cleft palate children were more accurate, in their estimate of the percentage of words in error, in six of the nine available comparisons. The mothers of the cleft palate children were more accurate in only three cases. (See Tables XXIII and XXVI) The probability of this distribution of scores being due to chance is .25 according to the sign test.

There was a statistically significant difference between the two groups who listened to the speaker with Low Nasality and High Nasality. It was at the .05 level on the rating scale measure and favored the mothers of cleft palate children. There were no other significant differences between groups.

VII Summary of Major Findings

A. Content Information Test Scores

1. For both mothers of cleft palate and non-cleft palate children, listeners instructed to listen to content scored more on the Content Information Test than listeners instructed to listen to manner of speech or listeners under no specific instructions, i.e. the Control Group.

2. For the Content Instruction Groups, as the intelligibility of the speaker decreased within each level of nasality, Content Information Test scores also tended to decrease. This trend was most marked in the scores of the mothers of non-cleft palate children.

3. For the Content Instruction Groups among mothers of non-cleft palate children, as nasality increased within each level of intelligibility, Content Information Test scores tended to decrease. This was most evident at the level of Low Intelligibility. The same trend was present in the score pattern of the mothers of cleft palate children, but less consistently. It was most consistent at the level of Low Intelligibility.

4. For both mothers of cleft palate and non-cleft palate children, under content instructions, as the severity of the speech problem increased, (simultaneous increase of nasality with decrease of intelligibility), Content Information Test scores decreased steadily.

5. Mothers of non-cleft palate children tended to score higher on the Content Information Test than did mothers of cleft palate children, when both were under content instructions.

B. Nasality Rating Scale Scores

There were no statistically significant findings with regard to the nasality deviation scores. The accuracy of nasality ratings did not appear to be a function of listening instructions, the amount of nasality perceived, variations in intelligibility, nor background of the listener.

C. Intelligibility Rating Scale and Percentage Estimate of Words in Error

1. There were no consistent differences among mothers of non-cleft palate children, between Content and Manner Instruction Groups on Intelligibility Rating Scale scores. However, there was a slight tendency for the listeners under manner instructions to be more accurate than the Content Instruction Groups in their estimates of the percentage of words in error. The differences between the Manner Instruction and Control Groups were not significant.

2. Mothers of cleft palate children under manner instructions tended to be more accurate in their rating of intelligibility than did listener mothers under content instructions. They were also more accurate in their estimate of the percentage of words in error. Significant differences in accuracy of intelligibility ratings were not observed between the Manner Instruction and Control Groups.

3. Among mothers of non-cleft palate children under instructions to listen to manner, the accuracy of the estimates of the percentage of words in error tended to increase progressively as intelligibility decreased.

4. Among mothers of cleft palate children the two intelligibility measures tended to yield different results and appeared to be unrelated. No consistent trends emerged in the patterns of the two scores.

5. Among mothers of non-cleft palate children under instructions to listen to manner, the least accurate estimates of the percentage of words in error, were obtained for the highly nasal speakers.

6. Among mothers of cleft palate children under manner instructions no consistent intelligibility accuracy pattern was observed as nasality varied.

7. Among mothers of non-cleft palate children under manner instructions, more accurate intelligibility ratings on the three point scale were obtained as the speech problem increased in severity (simultaneous increase of nasality with decrease in intelligibility).

8. Among mothers of cleft palate children, under manner instructions, the accuracy of the estimates of the percentage of words in error increased progressively, although slightly, as the speech problem increased in severity (simultaneous increase of nasality with decrease in intelligibility).

9. There were no significant differences between the mothers of cleft palate children and the mothers of non-cleft palate children in accuracy of rating intelligibility and in accuracy of estimating the percentage of words in error when both were under manner instructions.

D. Measures of Nasality and Intelligibility

1. The two measures of intelligibility were highly and significantly correlated for all listeners. The measure of nasality was not significantly correlated with either of the intelligibility measures.

Chapter 4

Discussion and Conclusions

A. Measures of Content and Manner

The result of the statistical measure of internal consistency indicates that the Content Information Test was a reliable instrument. The data based on the measures of agreement among expert and experienced judges indicate that the three point rating scales for nasality and intelligibility were also reliable instruments.

In addition to assessing the reliability of the nasality and intelligibility measuring instruments before their use in the experimental phase of the study, their reliability was also determined when used by the experimental listeners. The agreement among the listeners was high for nasality and for both of the intelligibility measures. The agreement among the listeners was lowest for the estimation of the percentage of words in error (69 per cent). Agreement among listeners was somewhat higher for the intelligibility scale (84 per cent) than it was for the nasality scale (71 per cent).

The mothers of cleft palate children and the mothers of non-cleft palate children were fairly similar with regard to the numbers of mothers in agreement, within each listening group. However, the mothers of cleft palate children showed somewhat greater agreement among themselves in their use of the Nasality Rating Scale and in their estimation of the percentage of words in error. The mothers of non-cleft palate children showed greater agreement among themselves in their use of the Intelligibility Rating Scale.

The investigators speculate about the qualitative differences among the tasks required of the listeners and wonder whether these differences may be related to differences in the reliability of the various measures. The Content Information Test required recall of a number of units of information and did not require any evaluative judgements. The estimation of the percentage of words in error required a quantitative judgement, while the rating scales for nasality and intelligibility required qualitative evaluative judgements.

Thus, the tasks for the listeners appear to be qualitatively dissimilar for each of the measures of the Dependenc Variables. One might expect greater agreement among listeners when their task involved a quantitative estimate, as differentiated from a subjective qualitative evaluation. This in fact did not appear to be the case in

this study. The qualitative evaluation of intelligibility and the qualitative evaluation of nasality revealed greater agreement in general among the listeners than did the task of estimating the percentage of words in error. It is felt that this reversal in the expected tendency for agreement among listeners is related to the nature of the scales employed: i.e. the fineness of the discrimination required by the number of units in the scale for estimating the percentage of words in error; three points on the rating scales versus one hundred points on the estimation scale.

The correlations between the measure of content information and measures of intelligibility and nasality were low, although some were significant. The correlation between the two measures of intelligibility was significant and high. Thus, both instruments would appear to be measuring the same thing. Conversely, the measures of intelligibility were not significantly correlated with the measure of nasality and, it may, therefore, be assumed that these instruments were measuring different things.

The low, but significant correlations between the accuracy of assessing intelligibility and the content information measure seems to indicate, that listeners who assess intelligibility more accurately also score higher on the Content Information Test.

B. Effects of Listening Instructions, Variations in the Severity of Speech and the Background of the listener

Instructions to listen to content did influence the Content Information Test scores of listeners, in that mothers under such instructions had significantly higher Content Information Test scores than did mothers having other listening instructions. Instructions to listen to the manner of speech also had some effect on the accuracy of the listeners' assessment of intelligibility, but to a lesser degree than the effect of content instructions on Content Information Test scores. Such manner instructions did not seem to affect the accuracy of the listeners' ratings of nasality. Perhaps more specific instructions to attend to nasality, to attend to intelligibility and to attend to the percentage of words in error would have had a more profound effect on these specific scores.

Instructions to listen to content became less effective as intelligibility decreased and as nasality increased. The influence of these dimensions of speech was such that, mothers who listened to the worst speakers, under instructions to listen to content, obtained Content Information Test scores similar to those obtained by mothers

who had received other listening instructions, but who were listening to better speakers.

These data appear to reconcile the differences that were observed between the studies by Bar (1) and Sander (30, 31), conducted on populations of listeners to stutterers. Sander studied the effects of listening instructions on content reception, while listening to a mild stutterer, and Bar studied the same type of problem using a severe stutterer. In the former study the instructions showed an effect, while in the latter they did not. The findings of the present study, which systematically varied the dimensions of the severity of the speech problem (nasality and intelligibility) support the findings of both Bar and Sander.

The instructions to listen to content also appeared to be more effective with mothers of non-cleft palate children. These mothers obtained significantly higher Content Information Test scores than did the mothers of cleft palate children. These findings have interesting implications for the rehabilitation of the speech-handicapped individual in an oral communication situation. Instructions to listeners to listen to the content of a message are evidently effective in improving the reception of the message. However, such instructions lose a large measure of their effectiveness when the severity of the speech problem reaches a high level. Thus, while it may help a moderately speech handicapped individual, to have instructions given to his associates to listen to the content of what he is saying, when his speech problem is severe these instructions will be largely ineffective. At this point, in order to facilitate the accurate transmission and reception of a message, it would appear that it is necessary to do something to improve the speech of the individual sending the message.

It would also appear from this study that mothers of the speech handicapped do not modify their listening behavior to the same extent that the mothers of the non-speech handicapped do, in response to instructions to listen to content. Therefore, it may be that stronger instructions are needed for those listeners with experience with a speech problem, than for those listeners without such experience, in order to modify the listening behavior of the two groups to the same desired extent.

Neither instructions to listen to manner of speech, nor variations in the severity of the speech problem, nor the background of the listener appeared to affect the accuracy of qualitative judgements of nasality. It was

observed during the testing procedures that some mothers in all groups did not appear to make full use of the three points on the rating scale. In theory, 33 per cent of the ratings should fall at each point. For both mothers of cleft palate and non-cleft palate children the rating scale point chosen by 61 per cent of the listeners was Moderate Nasality. Mothers of non-cleft palate children distributed their remaining non-moderate ratings fairly evenly between the two extremes of the scale. However, among mothers of cleft palate children there was a low proportion of Low Nasality ratings, among their remaining non-moderate ratings, with a higher proportion of extreme nasality ratings. There were, in fact, more than twice as many ratings at the most deviant end of the scale than at the least deviant end.

The qualitative evaluative judgement of nasality, as low or normal, moderate and high, requires a degree of sophistication on the part of the listener, which our subjects did not appear to possess. Even with experience with the problem of cleft palate and/or specific instructions to listen to the manner of speech, listeners did not appear to make more accurate ratings than those listeners lacking such experience and/or specific instructions.

This finding raises interesting speculations concerning the accuracy with which the associates of a cleft palate child perceive the severity of his speech problem with regard to the dimension of nasality. This may be particularly important where his mother is concerned, in view of the tendency of a large proportion of the mothers of cleft palate children in this study to make ratings of nasality using the points on the scale indicating deviation from normal. It may be that the cleft palate child is subject to a negative evaluative judgement of this dimension of his speech problem, even when, by professional standards, it is not considered to be as deviant as his mother perceives it to be.

It might, therefore, be advisable to provide the associates of such a child, especially his parents, with some training in the accurate evaluation of this dimension of his speech problem. If this were done it might reduce the number of potential negative evaluations placed on the child. Such negative evaluations, if they became consistent, could well affect the self image of the child and hence influence his behavior in spheres other than speech, giving rise to further problems. Thus, in the overall preventative and rehabilitative process such training could play a role in alleviating potential problems.

The effects of instructions and the severity of the speech on the listeners' accuracy of assessing intelligibility varied. However, there were no significant differences between the mothers of cleft palate children and the mothers of non-cleft palate children in the overall accuracy of their ratings of intelligibility and their estimation of the percentage of words in error.

Among the mothers of non-cleft palate children it would appear that the presence of a certain amount of nasality did not systematically interfere with their accuracy of estimating the percentage of words in error. However, when the speaker was very excessively nasal these listeners' estimates were consistently less accurate. It can be inferred, therefore, that a listener can tolerate moderate amounts of nasality. It is possible that excessive nasality compounds the effects of changes in intelligibility to the point that the accuracy of a listener's estimation of intelligibility suffers. However, for mothers of cleft palate children there were no consistent trends in the accuracy of estimating intelligibility in relation to variations in nasality. This suggests the possibility that the mothers of cleft palate children, with their background of experience with nasality are able to view intelligibility separate from nasality. This finding, on the one hand, that the mothers of non-cleft palate children became less accurate in estimating the percentage of words in error as nasality increased, while, on the other hand, the accuracy of the mothers of cleft palate children did not suffer as nasality became excessive, appears to be related to an additional observation. The mothers of the cleft palate children did not show any systematic variation in the accuracy of their estimates of intelligibility with variations in intelligibility. However, among mothers of non-cleft palate children, their accuracy of estimating the percentage of words in error increased as the intelligibility of the speaker decreased. This suggests that possibly, for mothers without experience with cleft palate speech, it is necessary for the intelligibility problem to become more apparent and the nasality problem to become less apparent before they can accurately assess a problem of intelligibility.

C. General Conclusion

Although there were no significant differences between mothers of cleft palate and non-cleft palate children in the overall accuracy of their assessment of intelligibility or nasality, some specific factors, affecting accuracy, appear to be operating for the mothers of non-cleft palate children, which are not operating for mothers of cleft palate children. The data suggest that the accuracy of

the mothers of non-cleft palate children was influenced by the degree of nasality and intelligibility present in the various speakers.

This suggests that any thought about influencing listeners in a clinical context should recognize the differences among listeners. Implications from this study regarding such endeavors suggest that:

1. For mothers of cleft palate children, instructions to listen to content might have to be made stronger than such instructions to others, if they are to be as effective.

2. For mothers of non-cleft palate children (perhaps also for teachers, peers and other associates not having experience with cleft palate speech) their reactions to intelligibility may be confounded by the presence of excessive nasality. This may suggest the value of providing some systematic experience with this problem.

3. The influences of listening instructions, listener background and the severity of the speech problem on the reception of the content of the message suggest that, the rehabilitation of the cleft palate child is best served by a combination of clinical strategies which reduce the speech problem, i.e. decrease nasality and increase intelligibility, and which educate and prepare the listener to attend to the content of a message. Such listening strategies as attending to the content of what a speaker says, instead of how he says it, would appear to be a powerful reinforcing event for the speaker. Concurrently, strategies which modify the speech behavior of the cleft palate child, either through physical restortion, i.e. surgery, prosthodontia, etc., or through speech therapy, should result in a more rewarding experience for the listener.

APPENDICES

APPENDIX I (A)

Instructions for Recording

"As you read this passage, your voice is going to be recorded on tape. Read as naturally as possible, as if you were telling a friend of yours what's printed on the page. As you read, each word should be spoken as clearly as possible. Don't rush, as we're not trying to find out how fast you can read. Take your time, but read as well as you can."

APPENDIX I (B)

Instructions for Recording Error Passage

"Most of the errors in the passage have been made by leaving out the final sound of the word. Other errors have been made by using one sound in the place of another sound. The sounds most used in the place of another sound are "h," "sh," and "zh."

The "h" sound is made as in the word "hello" and is spelled with an "h." The "sh" sound is made as in the word "shoe" and is spelled "sh." The "zh" sound is the sound in "vision," "measure," or "glazier." The "zh" sound is spelled "si," "su," or "zi."

As you read this passage, your voice is going to be recorded on tape. Read as naturally as possible, as if you were telling a friend of yours what's printed on the page. As you read, each word should be spoken as clearly as possible. Don't rush, as we're not trying to find out how fast you can read. Take your time, but read as well as you can."

APPENDIX II

Reading Passages used in the Pilot Study, in determining the passage to be used for the experimental phase of this project.

APPENDIX II (A)

KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

In Japan the carp fish stands for bravery. During the Boy's Festival in May a kite, shaped like a carp fish, is flown for each boy in every house.

In America the kite has been used for other things. A kite was once used to find out what the weather might be. A kite was used in the building of the bridge at Niagra Falls. Alexander Bell, trying to make a better airplane, used a kite to carry a man 175 feet in the air.

APPENDIX II (B)

RAINFALL

The wettest spot in the world is a place called Cherrapunji, India, perched nearly a mile above sea level, in the Khasi mountain range. It rains there most of the year. Hot moist air from the Indian Ocean flows steadily over land and climbs the mountains. As this moist air is pushed higher and higher by the continuous flow of more air behind, it cools and rain pours down. The yearly rainfall for Cherrapunji averages 450 inches. In one four-day period 100 inches of rain fell. In 1861 (eighteen sixty-one) the people of Cherrapunji sloshed through 905 inches of rain. The driest spot in the United States, Greenland Ranch, Death Valley, has an average rainfall of less than one and a half inches. A reporter once said of the Cherrapunji rainy season, "The rain comes down in drops the size of baseballs, blown by the fierce winds at gunshot speed.

APPENDIX II (C)

WHALES

There are two kinds of whales, those with teeth and those without. These latter have in their mouths a sieve of whalebone, called "baleen," through which they strain food from the sea. The blue whales and the fin whales are baleen whales. The blue can be one hundred fifty feet long and can weigh one hundred fifty tons.

The cold waters around the Arctic ice cap are stained red for several miles, by the presence of billions of tiny shrimp like organisms, known as "Krill." The baleen whales feed on Krill, eating two thousand pounds of it a day.

The killer whales have teeth. As whales go they are small, perhaps twenty-five feet long and fifteen tons in weight. Killers can stand on their tails and stick their heads about eight feet out of the water. No animal in the world is fiercer than a killer whale. Two killers can kill a blue, ten times their size, by drowning him.

APPENDIX II (D)

HURRICANES

The hurricane is the most destructive storm known to man. In 1932 (nineteen-thirty-two) hurricane seas washed away two thousand five hundred people in Cuba. Another such storm killed three hundred thousand people in the Bay of Bengal.

Hurricanes are known by several names. Pacific islanders call them typhoons, but Australians call them willy-willies. Around the Indian Ocean they are called cyclones. All hurricanes are born over the ocean near the Equator, in the area called the Doldrums. Directly above the hurricane skies may be clear and blue, but around its rim rage rain and winds, of one hundred fifty to two hundred miles an hour. The eye of a full blown hurricane averages fifteen miles across, but the clouds marking the extent of the storm may stretch six hundred miles. In 1911 (nineteen eleven) a severe hurricane let fall nearly four feet of water in twenty-four hours.

APPENDIX III

Frequency of Appearance and Position of Consonant Phonemes in "Kite Customs"

Phonemes	Position		
	Initial	Medial	Final
p	---	4	2
b	10	2	---
t	10	6	20
d	7	3	14
k	17	2	3
g	---	1	---
f	13	1	---
v	1	6	4
s	5	1	5
z	---	---	19
sh	1	1	2
tsh	1	---	3
dzh	1	---	1
th (voiceless)	4	---	---
th (voiced)	18	1	---
m	9	5	3
n	6	20	18
ng	---	1	6
w	7	1	---
y	5	2	---
l	1	13	4
r	1	15	9
h	13	---	---
st	2	2	---
zd	---	---	5
rs	---	---	4
br	2	1	---
tr	3	---	---
dr	1	1	---
gr	1	1	---
fl	3	---	---

APPENDIX IV (A)

Instructions for Listening to Recorded Speeches to Pilot Study Listeners

"You are going to hear four recorded talks or speeches. Each one will be about one minute long. I want you to listen carefully because after you listen to each one, I am going to ask you to recall what you have just heard. Do you have any questions, listen to the first recording."

APPENDIX IV (B)

Instructions to Listeners (Content of Speech)

"You are going to listen to a recording of a girl's voice, I want you to pay close attention to what she is talking about. Listen as closely and attentively as you can. Pay close attention from the moment you hear her voice with the idea in mind that you are going to remember as much as you can about what the child says because after you have listened to the recording, I am going to ask you some questions about what you've just heard."

Order of Tests:

1. Identification (before instructions)
2. Questions
3. Intelligibility
4. Nasality

} reverse for 50 per cent

APPENDIX IV (C)

Instructions to Listeners (Manner of Speech)

"You are going to listen to a recording of a girl's voice. Pay close attention to her manner of speaking, the way she talks. Listen closely because after listening to the recording, I am going to ask you to make some judgements about the way she talks."

Order of tests:

1. Identification Form (before instructions)
2. Intelligibility } reverse for 50 per cent
3. Nasality }
4. Questions

APPENDIX IV (D)

Instructions to Listeners (Control)

"I want you to listen to a recording of a young girl's voice."

Order of Tests:

1. Identification form (before instructions)
2. Intelligibility } 50 per cent
3. Nasality }
4. Questions

1. Identification form (before instructions)
2. Questions
3. Intelligibility } 50 per cent
4. Nasality }

APPENDIX V

RATING OF NASALITY

Name of Rater _____

Number of Speaker _____

1	2	3
Normally nasal voice quality	Moderately nasal voice quality	Extremely nasal voice quality

Please think about the speaker that you have just heard. Decide whether the child's voice was normally nasal in quality, moderately nasal in quality, or extremely nasal in quality. Then rate the speaker, 1, 2, or 3, accordingly, on the above rating scale.

Thank you for your cooperation.

APPENDIX VI

RATING OF INTELLIGIBILITY

Name of Rater _____

Number of Speaker _____

1	2	3
Normally Intelligible Speech	Moderately Unintelligible Speech	Extremely Unintelligible Speech

Please think about the speaker that you have just heard. Decide whether the child's speech was normally intelligible, moderately unintelligible, or extremely unintelligible. Then rate the speaker, 1, 2, or 3, accordingly, on the above rating scale.

On what percentage of words do you think the child made errors? Make an estimate and mark it with a check on the above percentage scale.

Thank you for your cooperation.

APPENDIX VII

QUESTIONS FOR CONTENT OF THE PASSAGE

Please, write your answers to the following questions in the spaces provided for this purpose.

1. What is the name of the passage you have just heard?

   Ans. _____

2. Where is Kite's Day celebrated?

   Ans. _____

3. On what day of what month is Kite's Day celebrated?

   Ans. _____

4. In the old story, what did the man dream?

   Ans. _____

5. What did he do, because he had this dream?

   Ans. _____

6. Was his dream fulfilled, and if so, how?

   Ans. _____

7. Why is Kite's Day celebrated?

   Ans. _____

8. What is the kite supposed to do for its owner?

   Ans. _____

   _____

9. In Japan, what does the carp fish stand for?

   Ans. _____

10. In what month is the Japanese Boy's Festival held?

    Ans. _____

11. What happens during the Boy's Festival?

    Ans. _____

12. How has the kite been used in America?

Ans. _____

_____

13. What was Alexander Bell trying to do, when he used a kite to lift a man off the ground?

Ans. _____

14. How high did Bell raise the man from the ground with the kite?

Ans. _____

APPENDIX VIII

IDENTIFICATION SHEET

Please, complete the following items and questions. All information is confidential and no individual will be identified in any report on this study. This information is needed for working purposes only.

Date _____

1. Name _____ Date of Birth _____

2. Address _____ Phone _____

_____

_____

3. Education: Completed College _____

Attended College

Completed High School _____

Grade completed _____

4. Family:

a) Husband's name _____

b) Husband's occupation _____

c) Your occupation _____

d) Children: Number _____

Ages ____ ____ ____ ____ ____ ____

Sex: Male _____ Female _____

5. Have you ever had any trouble with your hearing?

Yes _____

No _____

If so, when? _____

6. How well do you hear now?

Very well _____ With difficulty _____

Well _____

7. How good a listener are you?

Very good _____ Fair _____

Good _____ Poor _____

APPENDIX IX

The following pages contain tables showing frequency distributions related to the nominal variables. These variables are, listeners' educational level, occupation, the occupation of their spouse, the number of children in their families, the age of the listener, ages of the cleft palate children of listeners and the normal children of listeners, and assessments of hearing and listening abilities of listeners.

APPENDIX IX

TABLE I. Educational Level of Listeners

Educational Level	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
6th Grade	1	---
7th Grade	1	---
8th Grade	6	---
9th Grade	8	---
10th Grade	11	1
11th Grade	14	---
12th Grade	78	40
Attended College	4	29
Completed College	5	53
Graduate Degree	---	4
Business Training	4	3
Technical Training	3	5
Totals	135	135

APPENDIX IX

TABLE II Occupations of Listeners

Occupations	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
Professional	3	11
Business	---	---
White Collar	3	4
Clerk-Typist	4	2
Skilled Labor	1	1
Unskilled Labor	4	---
Homemaker	113	112
Homemaker--on Relief	2	---
Student	---	5
Totals	135	135

APPENDIX IX

TABLE III: Occupations of Spouse of Listener

Occupations	No. Spouses of Mothers of Cleft Children	No. Spouses of Mothers of Non-Cleft Children
Professional	9	76
Business	2	26
Landowner--Farmer	5	---
White Collar	17	20
Clerk-Typist	4	3
Skilled Labor	64	9
Unskilled Labor	23	---
Unemployed	3	---
No Information	8	1
Totals	135	135

APPENDIX IX

TABLE IV: Number of Children in Family of Listener

No. of Children	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
1	11	5
2	31	49
3	29	44
4	29	26
5	15	9
6	7	2
7	7	---
8	1	---
9	2	---
10	---	---
11	1	---
12	2	---
Totals	135	135

APPENDIX IX

TABLE V: Chronological Age of Listeners

Age Range	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
20 - 30 years	18	6
31 - 40 years	69	81
41 - 50 years	31	43
51 or more years	9	1
No information	8	4
Totals	135	135

TABLE VI: Distribution of Children in Age Range 6-12 Years, in Families of Listeners

Age Range	No. of Cleft Children	No. of Non-Cleft Children
6 - 8 years	33	34
8 - 10 years	60	57
10 - 12 years	42	44
Totals	135	135

APPENDIX IX

TABLE VII: History of Hearing Loss in Listeners

Occurrence of Loss	No. of Mothers of Cleft Children	No. of Mothers Of Non-Cleft Children
No	128	129
Yes - within last five years	4	2
Yes - more than five years ago	---	---
Yes - more than five years ago & current	3	4
Totals	135	135

TABLE VIII. Listener's Self Rating of Hearing

Rating	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
Very Well	79	75
Well	52	56
With Difficulty	4	4
Totals	135	135

APPENDIX IX

TABLE IX: Listener's Self Rating as a Listener

Rating	No. of Mothers of Cleft Children	No. of Mothers of Non-Cleft Children
Very Good	23	21
Good	73	85
Fair	36	29
Poor	3	---
Totals	135	135

APPENDIX X

The following pages contain orthographic transcriptions of the passage "Kite Customs," as spoken by each of the nine speakers. Each box around a sound, syllable or word locates an error. When the upper half of the box is blank, the error is one of omission, the material in the lower half of the box being that which was omitted. When the error is of the nature of a substitution, the material in the upper half of the box was substituted for the material in the lower half of the box.

Speaker 1

APPENDIX X (A)

KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

In Japan the carp fish stands for bravery. During the Boy's Festival in May a kite, shaped like a carp fish, is flown for each boy in every house.

In America the kite has been used for other things. A kite was once used to find out what the weather might be. A kite was used in the building of the bridge at Niagra Falls. Alexander Bell, trying to make a better airplane, used a kite to carry a man one hundred and seventy five feet in the air.

Speaker 2

APPENDIX X (B)

KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

In Japan the carp fish stands for bravery. During the Boy's Festival in May a kite, shaped like a carp fish, is flown for each boy in every house.

In America the kite has been used for other things. A kite was once used to find out what the weather might be. A kite was used in the building of the bridge at Niagra Falls. Alexander Bell, trying to make a better airplane, used a kite to carry a man one hundred and seventy five feet in the air.

Speaker 3

TIE KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Tie Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

In Japan the carp fish stands for bravery. During the Boy's Festival in May a kite, shaped like a carp fish, is flown for each boy in every house.

In America the tie kite has been used for other things. A kite was once used to find out what the weather might be. A tie kite was used in the building of the bridge at Niagra Falls. Alexander Bell, trying to make a better airplane, used a kite to carry a man one hundred and seventy five feet in the air.

Speaker 4

APPENDIX X (D)

KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

In Japan the carp fish stands for bravery. During the Boy's Festival in May a kite, shaped like a carp fish, is flown for each boy in every house.

In America the kite has been used for other things. A kite was once used to find out what the weather might be. A kite was used in the building of the bridge at Niagra Falls. Alexander Bell, trying to make a better airplane, used a kite to carry a man one hundred and seventy five feet in the air.

Speaker 5

APPENDIX X (Ξ)

KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Tite-ish Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

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KITE CUSTOMS

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Speaker 7

APPENDIX X (G)

KITE CUSTOMS

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KITE CUSTOMS

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KITE CUSTOMS

In China the ninth day of the ninth month is called Kite's Day. A very old story tells that many many years ago a man dreamed that a great trouble would come to him on a certain day. On that day he took his family out to a high hill and had fun flying kites. He returned in the evening to find his house burned down and his animals buried in the ashes. Kite's Day celebrates the saving of this family. Each beautiful kite is supposed to float away the troubles which might come to its owner.

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Effects of Listening Instructions and Severity of Cleft Palate Speech on Listeners
(Final Report)

Shames, George H. and others

University of Pittsburgh, Pgh., Pa. Department of Speech

REPORT/SERIES NO.

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125

Listening
Listening Instructions
Cleft Palate Speech
Comparisons between Mothers of Cleft and Non-Cleft Palate Children
Nasality and Intelligibility

Groups of mothers of cleft and non-cleft palate children listened to a reading of a passage by a cleft palate child. The speech sample for each group contained specified combinations of nasality and intelligibility. Each group was either uninstructed, or instructed to listen to the content or the manner of speech. The mothers assessed the nasality and intelligibility of the speaker and were given an information test on the material heard.

Mothers of cleft and non-cleft children under content instructions scored higher on the content test than mothers under different instructions. However, the mothers of non-cleft children scored significantly higher than the mothers of cleft children. The content score varied with the severity of the speech problem. The accuracy of rating Nasality did not vary with the intelligibility or nasality of the speaker, the listening instructions, or the background of the listener. There were no significant differences between the mothers of cleft and non-cleft children in accuracy of rating intelligibility and estimating the percentage of words in error, when both were under Manner instructions. Mothers of cleft children under Manner instructions were more accurate on both intelligibility measures, than such mothers instructed to listen to Content.