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The Effect of Exposure to Information on Listeners' Attitudes Toward Speakers with Voice or Resonance Disorders

by

Amarpreet Lallh 

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

in

Speech-Language Pathology

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *The Effect of Exposure to Information on Listeners' Attitudes Toward Speakers with Voice or Resonance Disorders* submitted by *Amarpreet Lallh* in partial fulfillment of the requirements for the degree of *Master of Science* in *Speech-Language Pathology*.

Anne Putnam Rochet

Anne Putnam Rochet, Ph.D.

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Date: 1 October 1997

To my parents,

who taught me the value of education.

Abstract

This study investigated the attitudes of undergraduate university students toward adult speakers with voice or resonance disorders. It also investigated whether providing listeners with information about voice and resonance disorders affected their attitudes towards speakers with those disorders. Eighty students listened to speech samples of 9 women: 3 with normal voice and resonance, 3 with dysphonia due to vocal nodules, and 3 with hypernasal resonance due to velopharyngeal incompetence. Before listening to the speech samples, 40 students read two pages of information about voice and resonance disorders, while the other 40 read two pages of neutral information. Attitudes toward the speakers were measured with a 24-scale semantic differential instrument. The results indicated that listeners perceived the speakers with disorders more negatively than the speakers without disorders. Furthermore, the attitudes of listeners who read the information about voice and resonance disorders did not differ from those who read the neutral information.

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Chapter I. The Problem

Voice disorders exist "when quality, pitch, loudness, or flexibility differs from the voices of others of similar age, sex, and cultural group" (Aronson, 1990, p.6). A resonance disorder is a dysfunction in the coupling or uncoupling of the nasopharyngeal cavities during speech (Nicolosi, Harryman & Kresheck, 1989). Having a voice or resonance disorder can affect one's ability to produce clear and efficient voice and speech.

A voice or resonance disorder affects not only the speech signal that the listener hears, but also a listener's total perception of the speaker. A number of studies have shown that perceptions of personality characteristics of people with voice or resonance disorders are primarily negative (Blood & Hyman, 1977; Blood, Mahan & Hyman, 1979; Gelacek & Neiman, 1994; Ruscello, Lass & Podbesek, 1988). However, only a few studies have examined adults' attitudes towards other adults with voice or resonance disorders. Among these only two studies have used speakers who actually had such disorders rather than using speakers who merely simulated them.

Negative perceptions and attitudes about speakers with voice or resonance disorders may affect a speaker's social and vocational life (Aronson, 1990; Boone & McFarlane, 1988; Izdebski, Dedo & Boles, 1984; Smith et al., 1996). In order to encourage the full participation of people with voice or resonance disorders in society, it would be wise to try to change negative attitudes. No published reports have been found of research that has attempted to influence listeners' attitudes toward speakers with voice or resonance disorders, however. Therefore, this study was designed to address that particular issue.

A review of the literature pertinent to this investigation will begin with information about the measurement of attitudes. Next, studies on attitudes towards individuals with voice and resonance disorders will be examined. Also reviewed are the effects of negative public attitudes on the lives of people with voice or resonance disorders. Research on attempts to change attitudes toward persons with communication disorders will then be reviewed. Finally, implications of this research for the study of voice and resonance disorders will be outlined. Sections on research with other disorders and disabilities will be included throughout the manuscript, where relevant.

Chapter II. Literature Review

Attitudes Towards People with Disorders or Disabilities

The Study of Attitudes

"An attitude is an idea charged with emotion which predisposes a class of actions to a particular class of social situations" (Triandis, 1971, p.2). Therefore, an attitude has three components: a cognitive, an affective and a behavioral-intentions component. The cognitive component deals with a person's thoughts, perceptions or opinions about the attitude referent. The affective component deals with the feelings and emotions underlying those thoughts and perceptions. The behavioral component involves the intent or readiness to respond in a particular way (Antonak & Livneh, 1988).

Research on attitudes towards people with physical disabilities indicates that attitudes are mostly negative (Siller, 1976). People have attitudes towards disabled people as a group and seem to ignore the uniqueness of individuals with a disability (Eisenberg, 1982; Yuker & Block, 1979). This indicates that strong stereotypes have developed about people who have disabilities. Non-disabled people perceive those with a disability as being different from and inferior to themselves (Wright, 1988; Yuker & Block, 1979). This perceived inferiority often is not limited to specific areas affected by the disability, but is generalized to intellectual, social, personality or other physical aspects of the person (Eisenberg, 1982; Yuker & Block, 1979). This concept has been referred to as "negative spread effects" (Wright, 1988). Because of this perceived inferiority, people with disabilities are often relegated to a marginal status in society (Livneh, 1982).

The Measurement of Attitudes

Attitudes have been measured in the area of disability with a number of different procedures. There are a few measures which are commonly used. Likert scales (e.g., Attitude Toward Disabled Persons Scale, Yuker, Block & Younng, 1966) contain various attitude statements and require the rater to respond to a scale varying from *strongly agree* to *strongly disagree*. A more recent scale is The Interaction With Disabled Persons Scale (Gething & Wheeler, 1992). In this scale a rater indicates agreement or disagreement with statements on a five-point scale. This scale uses more contemporary attitude statements than the Attitude Toward Disabled Persons Scale and measures an individual's comfort with interacting with a disabled person.

Semantic differential scales (Osgood, Suci & Tannenbaum, 1957) are another common tool used to measure attitudes. They contain bipolar opposite adjective pairs with seven spaces between them. Semantic differential instruments are very versatile and can be used to study attitudes toward many different referents and concepts.

Another method of attitude measurement is a social-distance scale (e.g., Bogardus Social Distance Scale, Bogardus, 1933). This measures the social acceptance or rejection of a target group. Raters indicate their preferred level of social distance from members of the target group by checking off statements with which they agree. These statements represent a continuum of social distance. As an example, in studies of racial prejudice someone who selects the entire continuum of statements about people of a particular race ranging from "(I) would have (this person) live outside my country", the furthest social distance, to "(I) would marry (this person)", the closest social distance, exhibits very little social distance from those people and would be socially accepting of members of that race. Another person who checks only "(I) would have (this person) live outside my neighborhood" and "(I) would have (this person) live outside my country" exhibits large social distance and relative social rejection of that group of people.

Adjective lists are an additional way to measure attitudes (e.g., Disability Adjective Attitude Scale, Downes, 1967). This measure requires subjects to rate 100 descriptive adjectives on a six-point scale, according to how well each adjective describes the disabled group of people under study.

Most of these measures of attitudes have been developed specifically for physical or mental disabilities and are best suited for use with those disabilities. The measure most commonly used in attitude research in communication disorders is the semantic differential procedure, because it is flexible in terms of the concepts it can be applied to and has acceptable reliability and validity. The semantic differential procedure was used to obtain the dependent measure in this study, hence its characteristics will be described in more detail.

The semantic differential deals with the affective and cognitive aspects of an attitude but does not directly address the behavioral-intentions aspect of an attitude (Antonak & Livneh, 1988). It addresses the affective component by the positive or negative aspect of some of the adjectives used in the items. It reveals the cognitive component via the adjectives that subjects associate with the concept or attitude referent. This provides information about how the attitude referent is conceptualized as compared to other attitude referents within the same research or across different studies. Although

the semantic differential does not directly measure the behavioral-intentions component of an attitude, the three components are highly intercorrelated (McGuire, 1969).

A semantic differential is a measure of the connotative meaning of concepts. When using the semantic differential, it is possible to assess attitudes toward unusual concepts such as auditory or visual stimuli. Other attitude measures in the disability literature (e.g., Attitudes Towards Disabled Persons Scale, Yuker et al., 1966, & Interaction with Disabled Persons Scale, Gething & Wheeler, 1992) require that the concepts be expressed as an abstract category of people, such as "people with a disability" or "people with voice disorders".

In attitude research with the semantic differential, adjective pairs are often chosen with one positive and one negative adjective. (See examples in Appendix A.) Each individual pair of bipolar adjectives is called a scale. The semantic differential does not have a fixed set of scales. Osgood (1962) recommended the use of scales tailored to the specific concepts to be rated. In this way, the semantic differential is more akin to a method of attitude measurement than a published attitude test.

Scales used in a semantic differential instrument are often grouped according to common themes. The original studies with the semantic differential used factor analysis to group scales into clusters representing different themes or factors. Osgood and his colleagues found three factors that appeared quite regularly with most concepts. These were: *evaluation* (e.g., good-bad), *potency* (e.g., strong-weak), and *activity* (e.g., active-passive). Some researchers who use the semantic differential to measure attitudes use only the *evaluation* items which represent primarily the affective portion of attitudes. Other researchers use completely different scales (e.g., red-green, or narrow-wide) which are specifically tailored to the concept they are studying.

Raters using a semantic differential instrument mark one of the seven spaces between the poles of a scale to indicate the association of one of the adjectives with the concept being rated. The middle space is marked if the raters believe there is no association with either of the two adjectives, or if they rate the association as *neutral*. If they believe that the concept can be described by one of the adjectives, they mark in the direction of that adjective on the scale. The magnitude of the association of the concept with the adjective is indicated by how closely raters mark toward one end of the scale. The semantic differential also aims to measure first impressions about the relationship between an adjective and a concept. Thus, raters are encouraged to respond quickly with their first reactions to the attitude referent.

Despite its widespread use, the validity and reliability of the semantic differential procedure have been more difficult to assess than other attitude measures, because different items may make up a semantic differential when different researchers use it. In addition, at the time the initial studies were conducted by Osgood and his colleagues, computing power was limited. As a result, the number of subjects used and items readministered for re-test reliability were necessarily small. For these two reasons there are no large-scale studies on the reliability and validity of this procedure. Evidence for its validity and reliability must be derived instead from many small studies. Each one alone does not provide enough support for the validity and reliability of the semantic differential, but taken together they do suggest that this procedure is valid and reliable, as the text that follows explains.

Validity of the semantic differential.

The semantic differential has been correlated with other attitude measurement scales in order to determine its concurrent validity. For instance, it has been compared to Thurstone (1931) scales which are derived by having a large number of judges rate the favorableness of attitude statements with respect to the group to be investigated (Triandis, 1971). An equal-appearing interval scale is made of the statements based on these ratings.

Thurstone's (1931) standard scales measuring attitudes towards three concepts (the church, Form B of the Negro scale & Form A of the capital punishment scale) were administered to a group of 50 subjects along with semantic differential instruments assessing attitudes towards the same concepts (Osgood et al., 1957). The semantic differential adjectives were mainly representative of the *evaluation* factor. Subjects took both tests initially and also two weeks later. The Pearson's correlation coefficient between the semantic differential items and the Thurstone items for initial testing ranged from 0.74 to 0.82 for the three concepts and two weeks later ranged from 0.76 to 0.81.

The semantic differential procedure also has been compared to Guttman's scalogram analysis (Guttman, 1944). This procedure determines a subject's attitude by their response (agree or disagree) to a set of attitude statements which are a representation of the attitude continuum toward a concept. Twenty-eight farmers' attitudes toward crop rotation were measured with both a 14-item Guttman scale and three semantic differential scales (Osgood et al., 1957). The Spearman rank correlation coefficient (rho) between the two measures was 0.78.

The semantic differential was correlated with a modified Bogardus social distance scale in a study by Tannenbaum (cited in Osgood et al., 1957). As mentioned earlier in this section, social-distance scales ask a subject to indicate agreement or disagreement with a number of statements that vary according to the social distance depicted between the rater and the attitude referent (Triandis, 1971). Tannenbaum's study investigated Americans' perceptions of three groups of people categorized by national origin or religion. Correlations between the semantic differential (with the factors evaluation, potency & activity) and the social distance scale for 40 raters ranged from 0.72 to 0.80 for the three national/religious groups.

Brinton (1969) asked a group of 160 students attending three universities a question assessing their attitudes towards capital punishment. He used a 7-point scale with *strongly in favor of it* on one pole and *strongly against it* on the other. This question was used to divide the group into two sections: those who supported capital punishment and those who opposed it. Subjects who checked the middle (neutral) blank were eliminated. Next, the grouped subjects were given a 16-scale semantic differential rating the concept *capital punishment*. The results indicated that the two groups responded differently to the semantic differential based on their initial support or rejection of capital punishment. The average difference in mean scores between the groups was 1.72 scale points. The difference between the group means on individual scale items ranged from 0.21 to 3.87 points. The items which showed the most differentiation were evaluative (e.g., just-unjust, good-bad, valuable-worthless, fair-unfair, honest-dishonest). When the relationship between those five items and the one question about capital punishment was assessed, the correlation coefficient was 0.823. This supports using evaluative items as measures of attitude. This study also demonstrated that the semantic differential correlates well with a subject's overt statement of attitude about a concept.

More recent studies have used confirmatory factor analysis to determine the convergent and discriminant validity of the semantic differential in comparison with other commonly used scales. Flamer (1983) investigated differences in Likert, Thurstone and semantic differential techniques. He used 210 subjects; 60 % were students from a junior college, 25 % were community health nurses and 15 % were adults from the community. Attitudes towards three different concepts were assessed with the three attitude measures. The concepts were discipline of children, mathematics and "the law". Results of a factor analysis found that the measures discriminated between attitudes towards the different concepts but correlated with other scale measures when measuring attitudes toward the same concept. Therefore, the study found that the three procedures were

essentially equivalent in terms of convergent validity (correlations with other measures were high) and discriminant validity (correlations among responses to the three different concepts with each attitude measure were low).

Ofir, Reddy and Bechtel (1987) studied three different response formats--semantic differential, Likert, and single anchor scales--with an analysis of covariance procedure. Single anchor scales have an adjective with +1 to +3 on one side and -1 to -3 on the other side. Data from three investigations were pooled for this report. In studies one and two, undergraduate students (n=124) and adult consumers (n=89) responded to a 36-item questionnaire representing three concepts. In study three, 250 undergraduates rated a supermarket on various attitudinal items. All groups completed questionnaires which represented each of the three instruments. The results of the analysis suggested that the three scales were not equivalent in reliability and validity. The semantic differential scales were considered the overall best choice. They had high trait variance, indicating that the scales discriminated between different concepts. The semantic differential also had the smallest error variance and method variance, which indicates that it was reliable and the best scale at measuring what it was intended to measure.

In summary, the semantic differential procedure has been reported to correlate well with many other attitude instruments suggesting that it measures similar phenomena to those instruments. The semantic differential also has been shown to discriminate reasonably well among different concepts measured on the same scales. Studies that have compared different methods of attitude measurement report that overall the semantic differential is either equivalent or superior to other scale-type attitude measures.

Reliability of the semantic differential.

A number of intra-rater reliability calculations were conducted for the original set of scales and concepts used to test the semantic differential technique (Osgood et al., 1957). In the first study by Osgood and his colleagues, 1000 items were presented, and 40 scales and concepts were readministered to 100 subjects at the end of the test. A Pearson's correlation coefficient for those 40 items was 0.85. The average deviation from original response to second response was 0.67 scale points; chance level of deviation was calculated at 1.20 scale units. In addition, it was found that on 54.0 % of the ratings, subjects marked the same space on the semantic differential, while on 26.5 % they deviated by only one scale point. Therefore, the within-subject deviation in response from one testing to another was low.

A study by Bopp, cited in Osgood et al. (1957) utilized 40 subjects, who rated eight concepts over 13 scales. When retested immediately they deviated an average of 0.3 scale points across all scales. When retested two weeks later, they deviated an average of 0.54 scale points. Another investigation of reliability (Osgood et al., 1957) tested groups of 25 subjects who rated 10 scales and 10 concepts twice. Each group of 25 experienced a different test-retest interval. Findings indicated that when subjects were given three minutes between test and retest they deviated approximately 0.35 scale points. Subjects retested 3 weeks later deviated approximately 0.78 scale points. Osgood et al. also evaluated many other test-retest intervals between these extremes. By plotting the data for all of these test-retest intervals, the investigators estimated that the average deviation should never exceed one scale point regardless of the interval between test and retest. Using data from this same study, they found that 63.7 % of subjects did not deviate in scale position marked from test to retest. The percentage of subjects who deviated by one scale point was 26.5 %.

Norman (1969) studied 18 groups of 30 university students responding to concepts on semantic differential scales. He retested 30 subjects on 400 items (20 concepts x 20 scales) four weeks after initial testing. He found that 75 % of the subjects deviated by one scale position or less when retested. Pearson's correlation coefficients for scales representing the three major factors (evaluation, potency & activity) ranged from 0.76 - 0.80 between initial test and retesting. As well, the group mean ratings showed very high stability ($r = 0.97$) over time.

Jenkins, Russell and Suci (1958) studied 540 subjects rating 360 different concepts. Out of that group, 30 returned four weeks later to rerate 20 concepts on 20 scales. Jenkins et al. found that test-retest reliability for mean scores was high between the two occasions ($r = 0.97$).

A few studies have assessed the intra-rater reliability of the semantic differential technique, when used specifically as a measure of attitude. Tannenbaum (cited in Osgood et al., 1957) studied 135 subjects on two occasions separated by five weeks. Subjects rated six concepts with six scales chosen as loading highly on the evaluation factor. The test-retest reliability coefficients ranged from 0.87 to 0.93 for the six concepts; the mean reliability was 0.91. Reliability coefficients for another study (Osgood et al., 1957), aimed at establishing concurrent validity with Thurstone scales, examined responses of 50 subjects. These 50 subjects were retested two weeks later, and Pearson's correlation coefficients for their repeated measures ranged from 0.83 - 0.91 for three different concepts.

Inter-rater reliability of the semantic differential has been calculated less frequently than intra-rater reliability. Norman (1969) compared data from his group of undergraduate students with those from the group studied by Jenkins et al. (1958). Norman administered the same items to his students as Jenkins et al., and found that group mean values correlated well. The correlation coefficient between the ratings for the first administration in Norman's study and that of Jenkins et al. study was 0.92.

Inter-rater reliability has also been tested cross-culturally, in order to assess the generality of the factors (evaluation, potency & activity) when defining concepts. A study by Oyama and Tanaka (cited in Osgood, 1962) studied American and Japanese college females using a 35-scale semantic differential instrument. The concepts to be rated were embodied in abstract words and visual stimuli. The correlation coefficients between the ratings of the two groups ranged from 0.52 - 0.65 for the concepts rated. This correlation may not be high because of the translation of the semantic differential into Japanese and also because there may be real differences in the meaning of these concepts across cultures.

In summary, intra-rater reliability calculations for the semantic differential procedure have been high. Mean differences in ratings between one administration and a second administration have been less than one scale point across all the studies reported. Inter-rater reliability with the semantic differential procedure has been calculated less frequently but seems to be acceptable.

Communication Disorders

The semantic differential procedure and a number of other scaling techniques have been applied to the study of societal attitudes about people with communication disorders, and a small body of literature has accumulated on that topic. In general, this literature indicates that public attitudes toward speakers with communication disorders are negative.

A study by Burroughs and Small (1991) examined listener reactions to a speaker who simulated misarticulation of /l/. The adult male speaker read the first paragraph of the Rainbow Passage (Fairbanks, 1940). Groups of 20 listeners heard the speaker producing either normal articulation, speech with a single w/l substitution, or speech with 10 instances of w/l substitution. The single misarticulation was produced within the first five words of the passage in that particular condition. The speaker was rated on a 13-scale semantic differential instrument with items reflecting *evaluation* (e.g., bad-good, unintelligent-intelligent), *potency* (e.g., immature-mature, unsure-confident) and *activity*

(e.g., unassertive-assertive, withdrawn-outgoing). Results indicated that the single misarticulation of /l/ was enough to create negative impressions on the evaluation factor. The sample with 10 errors was evaluated lower than the sample with no errors on both the evaluation and potency dimensions. These results suggest that even minimal evidence of a speech disorder can have adverse effects on listeners' impressions of a speaker.

Silverman (1976) studied the effects of a lateral lisp on listeners' attitudes towards speakers. Students enrolled in broadcast communication (n=48) listened to a woman reading either with a simulated lateral lisp (90 % of /s/ & 79 % of /z/) or with normal articulation. The speaker was judged on a 49-scale semantic differential. Thirty-seven of the 49 scales were judged more negatively when the speaker spoke with a lisp. The author systematically replicated the study with business administration students, to assess the generality of the findings. Once again the sample with the lisp was judged more negatively. These findings suggest that many people are not tolerant of speech differences, even if they do not interfere significantly with communication. Listeners appeared to react negatively to the lisp simply because it was different from the norm.

Attitudes toward alaryngeal speakers also have been studied. A study by Gilmore (1974) is particularly relevant to this research and will be referred to several times in subsequent portions of this literature review. In Gilmore's study, two adult males who spoke with esophageal voice and two control adult males were videotaped and audiotaped for a study on vocational acceptability. Four hundred eighty men, who were members of male business and professional groups were selected as subjects for the study. The speakers simulated a work scenario where they dictated a telegram over the telephone. Some subjects saw only a video display of the speakers with no soundtrack, some heard only the soundtrack, and some subjects were exposed to both. Half of the subjects were provided with information stating that two of the speakers were normal and two had had a laryngectomy. Information also included a brief explanation of the effects of a laryngectomy. Dependent measures included a scale of social distance and a list of jobs, varied systematically for prestige level and public contact. The results indicated that esophageal speakers were rated less socially acceptable, and considered suitable for fewer jobs, and for jobs of lower prestige than the control speakers.

A number of studies on other communication disorders such as dysarthria and stuttering also appear in the literature. Gies-Zaborowski and Silverman (1986) studied fifth and sixth graders' perceptions of a child with cerebellar dysarthria. One group saw and heard a videotape of the girl speaking, while the other group saw only the videotape and could not hear the soundtrack. The students who heard and saw the child speak

perceived her as more *frightened, nervous, tense* and *unlovable* than the students who saw only her visual image but could not hear her speech. Similar results have been reported for studies of attitudes towards people who stutter (Woods & Williams, 1976; Lass et al., 1992). This research has illustrated that there is a very strong negative stuttering stereotype. Therefore, the literature contains evidence of negative attitudes toward people with a variety of communication disorders.

Voice and Speech

Listeners make a number of substantial assumptions about speakers based on their voice and speech. Listeners are able to infer a person's socio-economic status (Moe, 1972), height and weight (Lass & Davis, 1976) based on an audio sample of the person's speech, and they can deduce a person's sex (Lass, Hughes, Bowyer, Waters & Bourne, 1976; Schwartz & Rine, 1968), age (Ptacek & Sander, 1966), and race (Walton & Orlikoff, 1994), based on voice alone. Research also suggests that listeners have high inter-judge reliability when assigning personality characteristics to different speech samples and voice qualities (Addington, 1968; Aronovitch, 1976). Yet the personality characteristics assigned to certain voices generally do not correspond with actual personality measures of the speaker (Kramer, 1963). It appears that individuals are judged by their speech and voice frequently and that strong vocal stereotypes exist among people. Indeed, research suggests that a "beautiful is good" stereotype extends beyond physical appearance into the area of voice and speech (Zuckerman & Driver, 1989). In the same way that people who are beautiful are regarded positively in terms of personality, people with attractive voices are ascribed favorable personality traits. When rating voice and speech, subjects perceive themselves as more similar to people who are high in vocal attractiveness (Miyake & Zuckerman, 1993). They are also more likely to compare themselves to people who have attractive voices. This stereotype appears to work in reverse, as well. People see themselves as less like speakers with unattractive voices and assign the owners of those voices negative personality traits.

Voice and Resonance Disorders

A number of studies have examined the attitudes of listeners toward speakers with voice or resonance disorders. Research on children's voices suggests that children acquire an idea of what good voice quality is at a relatively young age. Lass, Ruscello, Stout and Hoffman (1991) studied children's perceptions of hoarse-voiced peers and normal-voiced peers. There were eight speaker subjects (aged 7 to 11 years) for the

voice-disordered group and eight for the normal-voice group. Each child was recorded while saying six, three-word phrases such as *the tall hat*. Twenty students aged 9 to 11 years served as listeners. Each student rated the six phrases of each speaker on a 22-scale semantic differential. For all 22 scales, the children with normal voice quality were rated more positively. Twelve of these items were significantly different between the two groups of speakers. Children with hoarse voices were labeled as more *dirty, sick, sad, foolish, nonconfident, boring, unlucky, poor* and *weak*, among other adjectives. In other studies with similar procedures (Lass, Ruscello, Harkins Bradshaw & Blankenship, 1991; Ruscello et al., 1988) adolescents and adults also responded more negatively toward the children with hoarse voices than toward children with normal voice quality. However, children's and adolescents' evaluations were not negative to the same degree as those of adults. This suggests that the stigma associated with a phonatory disorder may become stronger as people grow older.

The speech samples of three women who read a standard script served as examples of normal voice, mild-moderate hoarseness (MM) and moderate-severe hoarseness (MS) in an experiment by Gelacek & Neiman (1994). Vocal abuse was the cause of hoarseness in the dysphonic speakers. Eighty female undergraduate students heard the samples in both a total speech condition and a randomized spliced (RSP) speech condition. The RSP procedure randomly rearranged 200 ms segments of each speech sample, resulting in an unintelligible signal which isolated voice quality. Listeners rated the samples on a 16-scale semantic differential instrument. Three factors emerged in the factor analysis: achievement-assertiveness, personality and appearance. In general, the female with normal voice was rated more positively than were the females with hoarse voices. The woman with normal voice was considered more assertive, strong, confident, and higher achieving than the women with hoarse voices. However, in some instances the speaker with the MS voice was rated as positively as the speaker with the normal voice, while the MM voice was rated significantly worse than the other two. These results suggest that the characteristics of a moderate-to-severely dysphonic voice (low pitched, breathy & hoarse) may sometimes be considered pleasing to listeners when heard in a woman's voice. A discriminant function analysis determined that semantic differential ratings classified the voices into "normal" and "hoarse" with 73.75 % correct classification. The achievement-assertiveness factor was the most sensitive to voice quality. This finding has important implications for situations such as job interviews, in which the speaker may be rated on the potential for achievement and assertiveness, and must use her voice to convey that she possesses those attributes. Analysis of the RSP

speech condition indicated that in most cases the speaker with the normal voice was rated more positively than both hoarse-voiced speakers. Because the RSP speech was unintelligible, this condition effectively isolated voice quality as the target for the negative perceptions of the dysphonic speakers.

A recent study by Williams and Dietrich (1996) investigated reactions to the written description of a person with a voice disorder. A total of 465 undergraduate and graduate students at two universities read a paragraph about a hypothetical man and then rated him on a nine-scale semantic differential instrument. Each student rated one of five descriptions of the man who was 18 years old and had recently graduated from high school. The paragraph talked about his possible career interests in child development. The five descriptions varied by only one sentence in which he was described as having either normal speech, a voice disorder, a fluency disorder, an articulation disorder, or a language disorder. The information condition with the voice disorder read as follows "Perhaps because he has had a voice problem from early childhood, Raymond is interested in speech and language development". The only significant difference found among the five forms was that the conditions depicting no disorder and a language disorder were rated as significantly less ambitious than those depicting a voice disorder, stuttering or articulation disorder. The authors hypothesize that the individual with no disorder was rated as less ambitious because no reason was provided for his interest in speech and language. There were no significant differences between male and female responses, but age effects were found. Younger students tended to have more favorable ratings for the items *relaxed* and *employable* across all five conditions. Findings from this study suggest that there is no negative stereotype associated with the term "voice disorder" when it is used in the absence of an example of a speaker with the disorder.

Similar to the results of research on attitudes toward dysphonic speakers, research on resonance disorders has found that attitudes towards hypernasal speakers are primarily negative. A study involving children's peer perceptions was reported by Blood and Hyman (1977). Children in kindergarten, grade one and grade two (n=120), listened to four female children read a 51-word passage. The ages of the speakers were not specified. There was one speaker with each of the following classifications of nasal resonance: normal nasal resonance, mild hypernasality, moderate hypernasality, and severe hypernasality. After hearing each speaker, the students answered five questions such as the following: *Do you like the person telling the story? Do you think she had trouble talking?* Responses were classified as positive, negative or neutral. There were no statistical analyses, but examination of the data showed that as the nasality of speakers

increased from normal to severely hypernasal the number of negative responses the speaker received also increased. All responses to the speaker with severe hypernasality were coded as negative. The findings suggest that even children as young as five years old can recognize differences in resonance and seem to prefer normal resonance over hypernasal resonance.

Perceptions of adult speakers with resonance disorders have also been studied. McKinnon, Hess and Landry (1986) measured the reactions of college students to various speech disorders. Thirty-three listeners heard an adult female simulate moderate hypernasality, as well as stuttering and a lateral lisp. The same speaker also read for the normal speech condition. The listeners rated the speaker on a figure-placement task, (a projective measure of social or psychological distance) and a 30-scale semantic differential task. Results indicated that the students responded to the hypernasal voice with increased social distance when compared to their responses to the normal voice. There were significant differences on four of the five dimensions measured by the semantic differential. The hypernasal voice was rated as lower in overall evaluation and in understandability, and rated as higher in potency and in producing feelings of anxiety. The students' preferences for greater social and psychological distance between themselves and the woman with hypernasality, is a confirmation of the social stigma associated with hypernasal voices.

Some studies have examined listeners' perceptions of both voice and resonance disorders. Addington (1968) trained two female and two male speakers to simulate seven different voice qualities, while reading a standard passage. The qualities were labeled as breathy, tense, thin, flat, throaty, nasal and orotund (resonant). A group of trained student-judges (n=72) rated the presence or absence of the voice qualities in the original samples. Each sample was classified under the most prominent quality, but could contain more than one quality. Later, 16 groups of college students (n=320) rated one sample each on a 40-scale semantic differential, for different personality attributes. Results indicated that each of the vocal characteristics, with the exception of "thinness" in males, had the effect of altering the perceived personality of the speaker. In addition, female voices were more effective in altering perceptions of personality than were male voices. For the female voices, 44.4% of the correlations between personality characteristics and voice types were significant, while only 31.0% of the correlations were significant for males. Breathiness made the male voices seem "younger" and more "artistic", while it made the female voices sound more "feminine", "prettier", more "high strung" and "shallower". Tense voice quality made the men sound "older" and more "unyielding".

Women with tense voices sounded "younger", more "emotional" and less "intelligent". Increased nasality had the effect of invoking a wide variety of undesirable characteristics in both females and males. Ratings did not differ significantly between male and female listeners.

The effects of voice quality and resonance on appearance and personality were investigated by Blood et al. (1979). Twelve adult females (four with normal voices, four with harsh-breathy voices and four with hypernasal voices) were recorded as they read a standard passage. A photograph of each speaker was also taken at the time of the recording. Raters were 105 undergraduate college students tested in three different groups. The first group listened to the voices and saw the associated picture of the speaker. The next two groups heard the voices but saw a different photograph with each voice. Therefore, each picture was paired with each type of voice quality in one of the three groups. Subjects rated the voices and pictures on a 12-scale semantic differential instrument, made up of items dealing with personality and appearance. The authors found that the voices with normal quality were rated significantly higher on both personality and appearance. Consistently, the normal voices were rated the best, followed by the harsh-breathy voices and finally the hypernasal voices. However, the ratings for the harsh-breathy and hypernasal voices were not significantly different on either personality or appearance. Subjects rated the pictures as less attractive when they were paired with the disordered voices than when the same pictures were paired with the normal voices. Like many of the previously reported studies, this research demonstrated how voice and resonance quality can affect perceptions of personal attributes which have nothing to do with communication.

Some of the studies on attitudes toward speakers with voice or resonance disorders reviewed here used actual cases of disordered voices. Others used speakers with normal voices who simulated voice and resonance disorders. A benefit of using simulations is that the speaker variable is held constant across the different voice or resonance conditions. A disadvantage of this method is that the simulated voice may not be a true representation of a voice or resonance disorder. Scherer (1979) queried the ability of speakers to independently vary specific vocal parameters without unintentionally altering other parameters at the same time. The result may be a voice which is deviant, but not in the same way that a genuine voice or resonance disorder would be. Therefore, further research which uses actual cases of disordered voice or resonance would add support to the current literature on the effect of such disorders on listeners' attitudes toward speakers.

The literature reviewed in this section has suggested that speakers with communication disorders appear to be subject to the same negative stereotypes as people with physical disabilities. Even speakers with very minimal evidence of a speech disorder were rated more negatively than speakers with no evidence of such a disorder. Listeners rated speakers with communication disorders negatively even when the disorder did not interfere with communication of the speaker's message. Furthermore, laryngectomized esophageal speakers were considered unsuitable for certain jobs based on samples of their speech and voice (Gilmore, 1974). Research specifically on voice quality and resonance suggests that strong vocal stereotypes exist and listeners infer many qualities about speakers based on their voices. Collectively, the research suggests that listeners' impressions of personality, appearance and personal social distance from a speaker can be negatively influenced when the speaker has a voice or resonance disorder. Even when the speech signal had been altered to make it unintelligible, speakers with voice disorders were rated more negatively than speakers with normal voices. Studies also suggest that young children are able to distinguish between speakers with normal voice and resonance and speakers with disordered voice or resonance. Although the accumulated evidence about the influence of voice and resonance on listeners' attitudes appears compelling, its external validity remains somewhat limited because only two of the four studies that tested adult speakers and listeners used recordings of individuals with genuine voice or resonance disorders. Thus, further research on attitudes toward speakers with real voice and resonance disorders was warranted.

Effects of Negative Societal Attitudes

Communication Disorders

There is little information available within the literature on communication disorders that documents the direct impact of negative attitudes on the lives of people with communication disorders. Existing research implies that the effects range from being a nuisance to being detrimental to successful participation in society.

People with a hearing impairment or deafness are often socially isolated and may be rejected by the hearing community (Schein, 1979). Those with a severe hearing loss or deafness are less likely to complete high school (Schein & Delk, 1974) and more likely to hold a lower paying job than a hearing person (Schein, 1979). As a group, they also have higher unemployment rates (Schein & Delk, 1974).

Speakers with dysarthria may also have difficulty obtaining jobs. In a study by Hooks (cited in Yorkston, Beukelman & Bell, 1988) counselors reportedly said that people with dysarthria would be unsuccessful at jobs with both high and low speaking requirements. They said this despite being given information within personnel files which demonstrated that the dysarthric speakers in the study were qualified to do the work described for jobs with low speaking requirements. One can hypothesize that these counselors would behave the same way when actually dealing with clients who have dysarthria. Thus, it is possible that vocational options for speakers with dysarthria may be inappropriately narrowed by counselors or employers who hold these attitudes.

Woods and Carrow (1959) studied the social status of children enrolled in speech therapy in grades two through five. Ninety-six of the 1524 students who participated in the study were receiving therapy for voice, articulation, dysarthria or stuttering. All students were given a sociometric test with three questions which determined who their most and least favorite classmates were. Questions addressed whom they would, or would not, like to play with, study with and have as classmates next year. Students scored a "plus" for each nomination and a "minus" for each rejection. The authors found that children who were enrolled in speech therapy had significantly lower scores than those who were not in therapy. The implications of these findings are that children with speech or voice disorders may be socially rejected to a greater degree than their peers without communication disorders.

Employers' attitudes toward stuttering were assessed by Hurst and Cooper (1983). They had 644 employers complete a scale containing seven attitude statements about stuttering and employment, through a mail-out survey. Subjects reported their strength of agreement with the attitude statements. Eighty-five percent of the respondents believed that stuttering decreased employability, and 40.2 % believed it interfered with promotion possibilities. As well, 43.6 % thought that people who stutter should choose jobs with little speaking. If these beliefs are typical of most employers, then one can expect that stutterers are discriminated against in many occupational situations.

Similar attitudes were detected in Gilmore's (1974) study (introduced previously) of the impressions of men toward esophageal speakers. Gilmore found that the esophageal speakers were considered suitable for fewer jobs and for jobs with less prestige and public contact, than were the control speakers. In addition, the esophageal speakers were seen as less socially acceptable. These attitudes towards men with a

laryngectomy may affect the type of jobs they are hired for and their social interactions with others.

Voice and Resonance Disorders

Little research exists that provides information about the actual effects of negative attitudes on the lives of speakers with voice or resonance disorders. Most of the information available is anecdotal or must be inferred from studies on attitudes.

The literature is full of anecdotal accounts of clients who have encountered the negative attitudes of others. Men with high-pitched voices face many negative attitudes from peers and strangers (Aronson, 1990; Boone & McFarlane, 1988). Many of them are mistaken for women over the phone (Boone & McFarlane, 1988; Case, 1991). Speakers with voice disorders that seriously impair communication, such as aphonia, have reported fear of losing their jobs (Boone & McFarlane, 1988).

Smith et al. (1996) studied the effects of a voice disorder on an individual's quality of life. Patients (n=174) from two voice disorder clinics, and nonpatients (n=173) completed a questionnaire about the effects of voice problems on their work life and social life. The questionnaire also addressed the physical and communication difficulties they experienced due to their voice problems. Patients in this investigation had a wide variety of different voice disorders. Smith et al. found that the patient group reported significantly more adverse quality of life effects in each of the areas than the nonpatient group. Forty-nine percent of patients reported that their voice disorder affected their current job functioning, and 76% thought it would affect future job options. Seventy-five percent felt that social interactions were adversely affected by their disorder, and 58 % avoided social situations whenever possible. Many (52%) felt the need to interact differently with their family and friends, and 33% reported that their family and friends became annoyed with them because of their voices. Fifty-three percent of patients reported being embarrassed about their voices, and 65% reported feeling depressed because of their voice disorder.

Perhaps the most severe voice disorder is spasmodic dysphonia. The effects of listeners' attitudes are very apparent in this case. Some people with this disorder report that they have noticed derisive facial expressions of others and have been teased and stared at (Aronson, 1979, cited in Aronson, 1990). Aronson also reported that because of these social reactions, some of the dysphonic persons in his study dreaded answering phones, became socially withdrawn, spoke less and were depressed or suicidal. Sixty-four percent of the subjects reported becoming socially withdrawn and depressed since

developing the condition. Some subjects also reported missing promotions or quitting work. Spasmodic dysphonia interfered with the work situation of 41 % of the subjects.

Izdebski et al. (1984) constructed a case history profile of 200 patients with spasmodic dysphonia prior to recurrent laryngeal nerve resection and 200 control subjects matched for age, gender and occupational category. They found that spasmodic dysphonia interfered with social activities and work in the majority of the patients, and that 30 % of them had changed type of employment. Cannito, Murry and Woodson (1994) found anxiety toward speaking and a tendency to avoid communicative interactions in 20 subjects with spasmodic dysphonia who were assessed before and after botulinum toxin (botox) injection. Before the botox injections 19 of the 20 subjects reported withdrawal from social functions or had communication problems on a regular basis. This same number of subjects had a change in job status or were no longer working since the onset of spasmodic dysphonia. Although these studies do not prove that these negative effects on the lives of speakers were due solely to listeners' attitudes and reactions, the results do suggest that listeners' attitudes played a part in the speakers' life changes.

Evidence from research on persons with resonance disorders suggests that this population is also adversely affected by negative attitudes. McKinnon et al. (1986) found that college students prefer more social and psychological distance between themselves and a hypernasal speaker. One can infer that this means the students perceived the hypernasal speaker as different from themselves and might avoid them. Blood and Hyman (1977) found that children in kindergarten, grade one and grade two, were less likely to want to talk to someone with hypernasality or to express that they liked a person who had hypernasal speech.

Many authors report that children with cleft lips and/or palates are teased by their peers (Clifford, 1989; Lansdown, 1981; Noar, 1991). Van Demark and Van Demark (1970) found in their follow-up of 39 people with cleft lip and/or palate, that 20 subjects reported not participating in speaking activities, such as entering a school play, when they were offered the opportunity. Many authors report that individuals with a cleft lip or palate are more shy or withdrawn than their peers (Kapp-Simon, 1986; Noar, 1991; Tobiasen & Hiebert, 1993). Some young adults with cleft palate reported feeling they might be refused a date because of their speech (Van Demark & Van Demark, 1970). There are also reports that primary school children with cleft lip and/or palate have lower global self-concept scores (Kapp-Simon, 1986). As a group, they appear more sad, angry and anxious than control subjects (Kapp-Simon, 1986; Tobiasen & Hiebert, 1993).

Therefore, it appears that having a cleft palate has ramifications on social-psychological adjustment. Certainly, many of the negative reactions toward people with a cleft lip may be due to their appearance and not their speech. For those people who have excessive nasal resonance or other articulatory errors due to cleft palate, the distortion of their speech also may provoke negative social reactions in others.

In summary, research suggests that there are negative societal reactions toward speakers with communication disorders. For instance, people with a severe hearing impairment are often socially isolated from the hearing community. Studies suggest that speakers with dysarthria, stuttering or a laryngectomy may have their occupational options narrowed inappropriately by others. The social status of children with communication disorders may be lower than that of their peers. However, very little research has examined the effects of negative attitudes on speakers with voice and resonance disorders. The evidence that is available supports the conclusion that negative attitudes and reactions adversely affect speakers with those disorders. People with voice disorders reported being teased, missing promotions and fearing the loss of their jobs. As a result, many became socially withdrawn and depressed. Children with resonance disorders, such as those with a cleft palate, also report being teased by peers. These children may be more withdrawn, sad and anxious than their classmates. Because the available research suggests that negative societal reactions affect speakers with voice or resonance disorders, it would be valuable to attempt to influence attitudes toward speakers with those disorders.

Changing Attitudes

Physical Disabilities

Research on changing attitudes towards people with physical disabilities suggests that providing information about a disability plus contact with people who have a disability, is usually the best method (Anthony, 1972). Furthermore, it is necessary that the contact occur within a context where the disabled people and the able-bodied people are of equal status (Anthony, 1972; Yuker & Block, 1979). For instance, a relationship between colleagues (one with a disability & one without) would be more likely to change attitudes than a relationship between a client with a disability and a therapist without a disability (Yuker & Block, 1979). Because the therapist is in a "helping" role, the person who is helped may be perceived to have a lower status. All the methods that have been used to effect attitude change (e.g., information, contact, information + contact, & role-

playing) have been reported to be successful in some studies but not in others (Shaver, Curtis, Jesunathadas & Strong, 1987).

Communication Disorders

Very little research has been done within speech-language pathology in the area of changing attitudes towards people with communication disorders. Most of the research that has been done has focused on providing information alone. One study investigated the effect of role-playing a communication disorder on attitude change, and one used therapy as a contact experience. The studies reported in the literature differ substantially with respect to the type of information provided to subjects and also differ in terms of the effectiveness of information presentation. None of the research has focused on populations with voice quality or resonance disorders.

Leahy (1994) attempted to change negative stereotypes of 13 speech-language pathology students towards people who stutter by means of several forms of intervention. She organized tutorial sessions which provided information about stutterers. Some students worked with stuttering clients in therapy, and other students were invited to observe therapy. All students were invited to simulate stuttering for a day. Students also received information on the process of change and why it is difficult. The students' responses on a semantic differential instrument administered at the end of the class were compared with data from a previous study of students at another university, who did not receive any specialized intervention. The concepts rated for the semantic differential were: *typical adult male stutterer, typical adult male, typical 8-year-old boy stutterer* and *typical 8-year-old boy*. Results were mixed. Some of the semantic differential items were rated more positively by the group that received intervention than the control group (using mean values), and some were rated more negatively. No statistical comparisons were made between the two groups.

Leahy (1994) found no effect from providing information or contact on students' attitudes about the concept of *male stutterer*. However, Leahy's work had many design weaknesses that threaten its validity in drawing conclusions about changing attitudes. Very few subjects were used, and results were compared with a group of students who were not matched well enough to allow valid comparison. In addition, the amount and nature of subjects' contact with stutterers and information provided about stutterers were not uniform across students. Furthermore, subjects who refused to fill out the semantic differential on the grounds that a "typical" stutterer did not exist, were not included in the

analysis. These issues taken together suggest that the results of this study should be interpreted with caution.

Ruscello and Lass (1996) created an educational training program to test whether attitudes towards children with dysarthria could be changed with information. Sixteen undergraduate college students attended three experimental sessions. The sessions were separated by five to eight days. In the first session they listened to recorded samples of eight children with normal speech and eight with severe dysarthria due to cerebral palsy. Each child said six short phrases such as *the tall hat.* The samples were rated on 17 semantic differential scales. In the second session, the students attended a lecture and discussion that provided general information about normal communication and about a number of different communication disorders. One of the purposes of the information was to highlight that people with communication disorders do not differ from other individuals in characteristics not directly related to their disorder. In the final session, students re-rated the same samples of the children's speech. The children with normal speech were rated significantly better than those with dysarthria both before and after the lecture. The ratings of the children with dysarthria were not significantly different before and after the information, although there was a slight positive trend in the data for attitudes toward the dysarthric group after the information session.

The effects of information on attitudes towards persons with limited speech were investigated by Gorenflo and Gorenflo (1991). Undergraduate students (n=151) observed a videotape of a dysarthric man with cerebral palsy. He used a different method of communication in three taped conditions. The man spoke in one condition and used a communication device (an alphabet board or a computer-based voice output communication aid) in the other two. Half of the viewer subjects were provided with information about his disability, interests and accomplishments. The Attitudes Toward Nonspeaking Persons Scale was developed for the study and based on the Attitude Toward Disabled Persons Scale (Yuker et al., 1966). The scale measured two factors: *general evaluation* (e.g., *This person is not intelligent*) and *interactive-affective* (e.g., *I would feel uncomfortable with this person*). Information was effective in improving attitudes measured by the *general evaluation* but not the *interactive-affective* factor. The authors interpreted the results to indicate that information alone does not improve one's desire to interact with people who have limited speech, although it improves general evaluative attitudes.

Fifty-eight college students in a basic speech communication course participated in a study aimed at changing attitudes about older people with a hearing loss (Dampier,

Dancer, & Keiser, 1985). First the students completed two forms of 25 semantic differential items. The first form assessed perceptions (*Hearing impaired elderly persons are* ____) and the other assessed feelings (*I feel* _____ *toward hearing-impaired elderly persons*). Next, half of the subjects listened to an audiotaped program that was designed specifically to foster empathy toward older persons with hearing loss (i.e., empathy tape). The other subjects listened to a published audiotape that provided information about hearing but was not specifically focused on elderly hearing impaired people or designed to foster empathy (i.e., lecture tape). Each tape was 26 minutes in length. All subjects then completed the semantic differential instruments again. The results indicated that both tapes significantly improved the students' perceptions of elderly people with hearing impairment but only the empathy tape improved listeners' feelings toward them. The listeners rated themselves as feeling more *sociable*, *worthwhile*, and *calm* toward the target group after hearing the empathy tape. The authors suggest that intervention in the form of the empathy tape is preferable if the goal is to influence people's outward communication behaviors.

In Gilmore's (1974) study of social and vocational acceptability of male esophageal speakers, information about laryngectomy was provided to half of 480 raters who were members of male business and professional groups. The information stated that two speakers were "normal" and two had a laryngectomy and also included a brief explanation of the effects of a laryngectomy. Providing information significantly improved the raters' preferred level of closeness to the men with esophageal speech. It also significantly increased the number of different jobs and the prestige level of the jobs they were considered suitable for. However, as has been mentioned in earlier presentations of this research, providing information decreased the level of public contact in jobs that the raters chose for the men with esophageal speech.

Fifty undergraduate students in a speech pathology and audiology course were divided into three groups for a study on changing attitudes about speech, language and hearing disorders (Ibrahim & Herr, 1982). The *experiential* group role-played a specific speech, language or hearing disorder. The *informational* group received written information (in the form of personal accounts of people with communication disorders), and watched videos and a slide show about people with communication disorders or other disabilities. This group also engaged in discussion about people with communication disorders or other disabilities. Both groups received five hours of intervention over a three week period. A third group received no intervention and served as a control. Attitudes were measured using the Attitudes Toward Disabled Persons

Scale and the Disability Adjective Attitude Scale (Downes, 1967). All subjects were tested prior to intervention, immediately after intervention and six weeks post-intervention. Both the intervention groups had significantly more positive attitudes toward persons with communication disorders than the control group at the end of the five hours. Six weeks later, attitudes had improved further in the treatment groups.

Overall, these studies suggest that the presentation of information may sometimes be useful in altering attitudes toward speakers with communication disorders. Two studies indicated that information did not change attitudes (Leahy, 1994; Ruscello & Lass, 1996), three studies found mixed results depending on the construct being measured and the type of information used (Dampier et al., 1985; Gilmore, 1974; Gorenflo & Gorenflo, 1991), and another study found that information was useful in influencing attitudes (Ibrahim & Herr, 1982). While studies of physical disability suggest that information plus contact provides the best situation for attitude change, the use of information alone is more practical and its effects potentially more widespread. Although some of the studies in communication disorders reported mixed results for the use of information alone in attitude change, there was enough support for the concept to warrant further exploratory research, especially in an area such as voice and resonance disorders. As a society, we do not have a rigid definition of what a normal voice is (Aronson, 1990; Greene & Mathieson, 1989). Because of this, attitudes towards people with voice and resonance disorders may be particularly amenable to change.

Summary and Purpose

Evidence from this literature review suggests that attitudes toward speakers with voice or resonance disorders are primarily negative. However, further research in this area is desirable, as only a few studies had sampled listeners' attitudes in response to actual examples of adult voices with genuine disorders. In addition, previous studies on this topic had used few listener subjects or few samples of normal and disordered voice and resonance. The evidence which is available suggests that negative attitudes about speakers with voice or resonance disorders may adversely affect the psychological, social and economic well-being of people with those disorders. Therefore, more knowledge about these negative attitudes would help clinicians to better understand and deal with their clients' psychosocial problems and to identify methods that may be effective in changing societal attitudes as a part of their professional role. No previous research has been identified that has attempted to influence attitudes toward speakers with voice

quality or resonance disorders. Research on other communication disorders, however, has indicated that the use of information about disorders may reduce negative attitudes, and the use of written information to change attitudes is considered the most efficient method to influence a large number of people.

Because of the paucity of research both on attitudes toward speakers with voice or resonance disorders and on possible means of influencing those attitudes, an investigation addressing these topics was conducted. The purpose of the investigation was to determine if attitudes of adult listeners toward adult speakers with disorders of voice or resonance were different from those listeners' attitudes toward speakers with normal voice and resonance. Further, this study attempted to determine whether providing written information about voice and resonance disorders would influence listeners' attitudes about speakers with those disorders.

Research Questions

This investigation addressed the following research questions:

1. Are listeners' attitudes toward adults with normal voice and resonance different from their attitudes toward adults with voice or resonance disorders?
2. Does exposure to information about voice and resonance disorders affect listeners' attitudes about adults with either of those disorders?
3. Is there an interaction between voice and resonance status and exposure to information about voice and resonance disorders?

Chapter III. Methodology

Design and Variables

This study used a mixed experimental design exploring differences between and within groups. There were two independent variables. The first was "voice/resonance status", a within-group variable that had three levels: normal voice and resonance, disordered voice due to vocal nodules, and disordered resonance due to velopharyngeal incompetence. Speaker subjects varied according to this variable. The second independent variable was "type of information", which was a between-group variable. This had two levels: information about voice and resonance disorders, and information that was neutral with respect to such disorders. Listener subjects were divided into two groups based on this variable. The dependent variable was the mean score across semantic differential instrument scales for each voice/resonance status group.

Subjects

Speaker Subjects

Nine speaker subjects were recorded for the voice and resonance status samples: three with normal voice and resonance, three with disordered voice, and three with disordered resonance. Information about the age and status of speaker subjects is presented in Table 1. All were females ranging in age from 23 to 74 years old. Women were selected for study because the clinic from which the voice and resonance samples were drawn had more samples of women than men who met the selection criteria for this study. A standard text (The Grandfather Passage, Darley, Aronson & Brown, 1975; see Appendix B) was read aloud by all of the speakers in these recordings. All speaker subjects were native speakers of standard Canadian English, had hearing within normal limits for their ages and spoke with normal fluency.

Table 1

Age and Voice/Resonance Status for Speaker Subjects

Speaker subject	Age (years)	Voice/Resonance status
Control group		
N1	31	normal voice and resonance
N2	52	normal voice and resonance
N3	72	normal voice and resonance
Voice-disordered group		
V1	23	dysphonia due to vocal nodules
V2	35	dysphonia due to vocal nodules
V3	49	dysphonia due to vocal nodules
Resonance-disordered group		
R1	44	hypernasality due to botulinum toxin injections into palate as treatment for palatal myoclonus
R2	63	hypernasality due to ablative surgery to maxilla including velum
R3	74	hypernasality due to ablative surgery to maxilla including velum

Speakers with disorders.

The three speaker subjects with voice disorders were dysphonic due to vocal nodules. The three with disordered resonance had velopharyngeal incompetence due to focal injury. These subjects spoke with no articulatory errors, except for nasalization of vowels and a mild reduction in the intelligibility of obstruent consonants. That is, these consonants were articulated correctly but may have been spoken with a decrease in oral air pressure. Samples of speakers with disordered voice or resonance were obtained from two sources. Some were obtained from archival recordings from the Voice and Resonance Clinics of the Glenrose Rehabilitation Hospital in Edmonton. The others were obtained by asking former patients of those clinics to return to the hospital to record the *Grandfather Passage* (Darley et al., 1975). The Voice and Resonance Clinic coordinators presented the consent forms for these patients (Appendix C for speakers with voice disorders & Appendix D for speakers with resonance disorders) and recorded the subjects' reading when they returned to the hospital. Information about these subjects'

spoken language, hearing status, fluency and disorder was obtained from their hospital files to ensure they satisfied the experimental criteria.

Speakers with normal voice and resonance.

The three subjects with normal voice and resonance comprised a control group of speakers. They were recruited through personal contacts and advertisements in the University of Alberta graduate student e-mail news system. The three control speakers were recruited to fall within the following specific ages, 30 +/- 2 years, 50 +/- 2 years and 70 +/- 2 years. This was intended to match, as well as possible, the range of ages of the speakers with voice and resonance disorders. (See Table 1). The control group speakers were recorded on the University of Alberta campus. Potential subjects were asked to express consent to participate by reading and signing the form either in Appendix E (for young & middle-aged subjects) or Appendix F (for elder subjects) and were paid $5 for their participation. These speakers were screened by the investigator for normal hearing, voice, resonance, fluency and articulation. With the exception of the elder subjects, the subjects' hearing was screened at 25 dB HL in a sound-treated room at 500, 1000, 2000 and 4000 Hz. The elder subjects were asked to complete The Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982). This is a questionnaire that evaluates the self-perceived effects of hearing difficulties on an elder person's life. Subjects are asked 13 *emotional* questions (e.g., *Does a hearing problem make you irritable?*) and 12 *situational* questions (e.g., *Does a hearing problem cause you to avoid groups of people?*). Subjects respond with *Yes* (4 points), *Sometimes* (2 points), or *No* (0 points). Subjects who scored 20 or less were considered to have hearing that functioned within normal limits for their ages and daily communication needs. Subject N3 (age 72 years) scored a total of 0 points on this questionnaire.

Listener Subjects

Eighty listener subjects participated in this study. They were randomly assigned to one of two listener groups. One group received information about voice and resonance disorders prior to the listening task, and the other received information that was neutral with respect to voice and resonance disorders. Male and female listener subjects were separately randomized to ensure that an equal ratio of male to female listeners existed in each group.

Listener subjects were recruited from the University of Alberta undergraduate student population. Fifty-six female subjects and 24 male subjects participated. The

average age of subjects in the voice and resonance information condition was 22.8 years (ages ranged from 18 to 39 years), while the average age in the neutral information condition was 21.5 years (ages ranged from 18 to 36 years). In order to obtain a variety of subject backgrounds among the listeners, the investigator accepted no more than 25 % of all listener subjects from any particular faculty. A summary of the faculties in which these subjects were enrolled can be found in Table 2. The listener subjects had not taken any coursework in speech-language pathology. All interested persons were asked to express consent to participate by reading and signing the form in Appendix G. All listeners passed a hearing screening test at 25 dB HL at 500, 1000, 2000, and 4000 Hz, and were either native speakers of English or had received at least 10 years of schooling in Canadian English. This language criterion was used to ensure that subjects understood all the adjective items presented in the dependent measure of attitude and also understood the information materials presented. Listeners were recruited via advertisements in the student newspaper, notices posted around the university campus and word-of-mouth recruiting by other listener subjects who participated. Students were paid seven dollars each for their participation.

Table 2

Number of Listener Subjects Enrolled in Various Faculties and their Assignment to a Group According to Type of Information Received

	Group assignment by information type	
Faculty	Neutral	Voice & Resonance
Agriculture, Forestry and Home Economics	4	3
Arts	9	12
Business	2	2
Education	3	1
Engineering	1	0
Medicine and Oral Health Sciences	5	1
Native Studies	0	1
Nursing	1	5
Physical Education and Recreation	1	0
Rehabilitation Medicine	2	8
Science	12	7
Total	40	40

Materials and Attitude Measurement

Speaker Samples

Selection.

The disordered voice and resonance samples chosen for listeners to rate were moderate in severity and similar in ratings on The Voice Profile (Wilson, 1970). Voices were rated separately by the investigator (a speech-language pathologist) and three speech-language pathologists experienced in the diagnosis and treatment of persons with voice and resonance disorders. The Voice Clinic Coordinator, the investigator, and the other speech-language pathologist rated the speakers with voice disorders. The Resonance Clinic Coordinator rated the resonance samples along with the investigator and the other speech-language pathologist. The raters heard a number of samples of female speakers between the ages of 23 and 74 years with the required diagnoses who also met the other language and hearing requirements of this study. From this larger group of samples, three voice-disordered and three resonance-disordered samples that exhibited the desired profile for severity were selected. Two recordings that would serve eventually as practice samples, one representing each disorder, were also selected from this pool of samples. Recordings that were not used as experimental or practice samples were later erased.

The specific Voice Profile ratings for each of the experimental speakers in this study are presented in Appendix H. Moderate severity for each of the disorders was indicated by an overall rating of 4 or 5 on a 7-point scale (where 1 = normal & 7 = severe disorder). Disordered samples were considered acceptable for use in the study if the ratings of two out of three clinicians were similar for overall severity (i.e., 4 or 5 out of 7) and comparable for tension and breathiness on the laryngeal cavity scale and for hypernasal resonance on the resonating cavity scale. On the laryngeal cavity scale speakers with vocal nodules scored primarily a -2 (breathy) and +2 (tense) on the open/closed rating; some also scored a -2 (low) on the pitch scale. Speakers with disordered resonance scored primarily a +3 (moderately hypernasal) on the resonating cavity scale. Ratings indicated that the speakers with voice disorders had no evidence of abnormal resonance in their voices, and otherwise had characteristics typical of speakers with vocal nodules. The speakers with resonance disorders generally had hypernasality as the only rating that differed from normal, except for some speakers who were rated as having intermittent mild tension and intermittent diplophonia. The practice samples for

the voice and resonance conditions that were selected during these procedures each had an average rating of moderate severity on The Voice Profile.

The investigator determined whether potential control subjects had normal voice, resonance, fluency, and articulation by listening to them read the Rainbow passage (Fairbanks, 1940). During a subject's first reading of the passage the investigator judged articulation and during the second reading she assessed voice and resonance. Fluency was assessed throughout both readings. This performance also was captured on audiotape so that three other speech-language pathologists (the previously mentioned clinicians experienced with voice and resonance disorders) could evaluate the voice, resonance, fluency, and articulation characteristics of these potential control subjects on The Voice Profile (Wilson, 1970). Samples were used as controls if the speech-language pathologists concurred that their speech patterns were within normal limits with respect to the age of the speaker, for the variables of concern. One practice sample for the normal speaker condition also was chosen from among the pool of control speakers. Appendix H contains the ratings for the control speakers. These speakers scored as "1" or "normal" on most ratings, with the exception of some speakers (such as N3) who had mild intermittent diplophonia or intermittent periods of breathiness or tension. However, the characteristics of N3's voice were deemed typical for her age (72 years). The control speaker practice sample chosen was normal for all of the variables of concern with the exception of some intermittent glottal fry. Recordings that were not used as experimental or practice samples were erased.

Rate analysis.

All three groups of voice and resonance status samples (normal, voice-disordered, & resonance-disordered) were also screened for speaking rate, because extremely fast (e.g., ~261 syllables per minute) or slow (e.g., ~120 syllables per minute) rates of speech have been shown to affect listeners' perceptions of speakers' personalities (Brown, Strong & Rencher, 1974; Ray, 1986). In order to avoid the inclusion of speakers with an unusually fast or slow rate, the investigator calculated the mean rate and standard deviation for the nine samples. All fell within two standard deviations of the mean rate for the speakers' readings of the Grandfather Passage (mean = 201.4 syllables per minute, standard deviation 19.33); individual rates ranged from 177 to 230 syllables per minute and were considered within usable limits for the purpose of this study.

Information Materials for Listeners

Information materials used in this study came in two different forms: information about voice and resonance disorders (Appendix I) and information unrelated to voice and resonance disorders (Appendix J). Information about voice and resonance disorders was given to half of the listener subjects. This information was intended to influence the listeners' perceptions of the speakers. The other half of the listeners received information about the uniqueness of human language abilities and whether or not animals have true language capabilities. This information was intended to be neutral with respect to the objectives of this study while providing a comparable reading activity prior to the listening portion of the experiment. Subjects were randomly assigned to read one information topic or the other. Both types of information began with an introductory paragraph which stated that some of the speakers they were about to hear had a voice or resonance disorder.

The specific information about voice and resonance disorders (Appendix I) included definitions of the disorders, causes of the disorders, effects of the disorders on one's life and basic information about their treatment. The information was taken from reputable textbooks and educational brochures on voice and resonance. The printed version of this material consisted of 1020 words presented at a reading level of grade 11.2 (Flesch, 1948).

The neutral information about human language (Appendix J) was intended to be similar in length and reading level to the material about voice and resonance but did not include any specific information about voice or resonance disorders. Specifically, the neutral information included information about human language, bee communication, sea mammal and bird communication and primate communication. It consisted of 1025 words presented at a reading level of grade 11.3 (Flesch, 1948). Before using either form of the information materials, the examiner obtained feedback regarding the clarity of both forms from university students who were not participants in the experiment.

Preliminary evaluation of information materials.

Eight undergraduate university students (4 male & 4 female) read and evaluated the information materials. These students had no previous coursework in speech-language pathology and were either native speakers of English or had received at least 10 years of schooling in Canadian English. The average age of these evaluators was 21 years (ages ranged from 20 to 23 years) and they came from a variety of faculties including Arts, Education, Engineering, Science, and Pharmacy.

These eight evaluators were divided into two groups: one that read and rated the voice and resonance information first, and one that read and rated the neutral information first. This sequence of presentation was varied to reduce order effects in the responses. Two males and two females participated in each group. The specific questions that were asked about the information materials are included in Appendix K.

The evaluators were permitted to reread the information materials as many times as they wished. They were asked to underline any areas they found difficult to understand and if possible, to indicate what they found confusing about that portion of the material. They were also asked to rate the overall difficulty of the information on an ordinal scale with the following descriptors: *Difficult, Somewhat difficult, Average, Somewhat easy, Easy.*

The median and modal responses to the difficulty of both sets of information materials was *Easy*. The range of responses for the Voice and Resonance Information material was from *Somewhat difficult* to *Easy*, and from *Average* to *Easy* for the Neutral Information material. A Wilcoxon matched-pairs signed-ranks test was used to determine whether or not the two sets of information materials could be considered equivalent in difficulty. An alpha level of 0.05 was used for this calculation and the number of matched pairs were reduced to three due to a number of pairs which had no difference between them. The critical value, however, was estimated from a table (Bruning & Kintz, 1987) that started at 6 degrees of freedom. The two versions of the material were not significantly different on the basis of this analysis ($T = 2$; df 6, $p > .05$).

Based on the subjects' responses, a few minor revisions were made to the information materials. Most revisions were made to the neutral information materials, and most of the suggestions were expressed by only one rater. The changes made to the materials consisted of minor grammatical alterations or clarification of wording.

Multiple-choice questions for the information materials.

The investigator prepared four multiple-choice questions about each version of the information materials which listeners were to answer after reading the information. These two sets of questions are shown in Appendix L. The purpose of the questions was to ensure that the subjects had read the information materials.

Attitude Measure

Attitudes of listener subjects were assessed by a semantic differential instrument (Osgood et al., 1957). The specific scales used are listed in Appendix A. They were

drawn from Osgood et al. (1957) and a number of other studies on attitudes. These scales were intended to represent intellectual and social characteristics along with attraction and overall evaluation characteristics.

Procedures

Preparation of Listening Samples

The nine experimental speech samples that listeners heard were digitized from digital audiocassette and reel-to-reel analog audio records. In addition, three practice listening samples and the second sentence of all 12 samples (for an optional sentence replay) were digitized. All samples were low-pass filtered at 8.6 kHz and digitized at 22 kHz with 16-bit linear amplitude resolution via SoundEdit 16 (Version 2) (1995) on a Power Macintosh 6100 microcomputer (Apple Computer, Inc.). The intensity of the samples was standardized when the recordings were digitized and maximized without peak clipping to optimize amplitude resolution. A standard 500 ms silent period preceded the outset and followed the offset of each sample. Samples were edited to remove extraneous background noises, other voices on the digital record (e.g., those of a clinician), excessively long pauses and misread portions (that were subsequently corrected by the speaker). The edited versions of all the samples were saved as digital sound resources for presentation to listeners on a computer workstation under optimal listening conditions as described in a subsequent section.

Consent and Hearing Screening

Interested potential listener subjects were asked to fill out a consent form (Appendix G) upon arriving for their listening session. They also completed a short questionnaire (Appendix M) which obtained information about their age, sex and the faculty in which they were enrolled and were asked to provide an address if they wanted to receive a debriefing letter (Appendix N) with a short summary of the results of the study. Potential listener subjects then had their hearing screened in a sound-treated room. Any subjects who did not pass the hearing screening test were thanked for their interest but also told that they could not participate because of the hearing test results and were referred to their family physician. It was explained that the physician could then refer them to an audiologist for further hearing testing if necessary.

Listening Experiment

All subjects were tested individually in a sound-treated room (Industrial Acoustics Inc., Bronx, NY) in Corbett Hall on the University of Alberta campus. Each listener was seated on a chair at a comfortable distance in front of a computer workstation that included the Power Macintosh, a hand-controlled mouse and mousepad. Two external loudspeakers (S-40 Compact Monitor, Electro-Voice Inc.) were mounted on the wall in front of the listener subject, to the right and left of the computer workstation. The experimental speech samples underwent digital-to-analog conversion via the Power Macintosh hardware (corner frequency 8.6 kHz) and were routed to the two high-fidelity external loudspeakers for replay to listeners .

Preliminary testing of listening environment.

Before starting the study, the listening environment was tested to ensure the samples were intelligible and presented at a comfortable volume level. During preliminary testing the computer workstation had been set up halfway between the two external speakers mounted on the wall. When a listening test was performed with the computer in this position, a distracting stereo sound effect was found when sitting in front of the computer. As a result, the computer workstation was moved closer to one loudspeaker (the one to the listener's right when seated) to eliminate this effect. Hence, one loudspeaker was 1'3" to the (listeners') right of the computer workstation, while the other was 2'0" to the (listeners') left of the computer workstation.

The volume of the samples played from the external speakers was adjusted to a comfortable loudness level for the examiner and another speech-language pathologist. That volume was then measured with a sound level meter (Realistic, 33-2050) placed at an approximate location of a listener's right ear when sitting in front of the computer. The level was an average of 58 dB SPL (approximately 48 dB HL at most frequencies). The average level of comfortable loudness ranges from 40 to 55 dB above an individual's hearing threshold (Martin, 1986), therefore this volume was considered to be at an adequate level for the normal hearing listeners completing the task. This volume level was measured once before the experiment was started. As well, the volume level of the external speakers was checked for consistency before each listening session.

Interactive listening program.

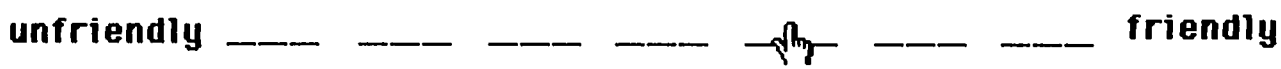
Listeners interacted with the computer during the experimental task using a mouse-driven cursor and customized software written in Hypercard (version 2.2; Apple

Canada Inc., 1993). A flow chart of the details of progression through the program is presented in Appendix O. The subject proceeded through the program by following simple instructions printed on the computer screen and responding, when appropriate, with the mouse. Each speaker sample was played, followed by the presentation of the 24 semantic differential scales, one at a time in a random order. Adjective pairs for each scale were presented on the computer screen as shown in Figure 1. Positive and negative adjectives were randomly presented on the right and left ends of the scale. This randomized presentation was intended to reduce the likelihood of a subject's rating all scales in a similar position, without carefully reading what the adjectives were.

The program was designed so that voice and resonance status (VR) samples were chosen randomly from the pool of nine VR resources by the computer for each new listener. The presentation order of the semantic differential scales also was randomly chosen by the computer program, each time a new VR sample was presented. In addition, three VR samples (33.3%) were randomly chosen from the pool of nine and replayed during the listening experiment. This constituted the 12-sample task that subjects were prepared to undertake.

In order to rate a VR sample on the semantic differential scales, the listener used a mouse-driven cursor to click on one of the seven spaces (displayed in Figure 1) between the two adjectives at the ends of the scale. Clicking on a space with the cursor highlighted the space momentarily. The program coded and stored all of the subjects' responses for later retrieval according to sample, scale and rating. The program would not continue until a response was registered for each semantic differential item.

With the presentation of each semantic differential item, the listener had the option of re-listening to the second sentence of the VR sample under review. This was to ensure that the listener's perceptual memory of the voice quality or resonance of the speaker did not drift across the 24-scale rating process. The subject could replay only the second sentence of the sample, however, ("Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever") and this could be done only once per semantic differential scale. After the subject responded to a particular scale item, the program presented the next scale item within two seconds. When all 24 scales had been presented for one VR sample, the program would reset itself and the button "begin" was displayed on the screen. When the listener clicked on this button, a new one, "ready to start" was displayed. When the subject clicked on this he or she was alerted to listen for the next voice. After a few seconds the next VR sample was played.



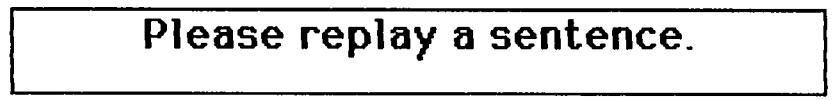


Figure 1. Example of the computer display on which listeners rated speech samples using a mouse-driven cursor. The cursor is shown ready to select one of the spaces along the semantic differential scale. Listeners also could use the cursor to "click" on the box in order to replay the second sentence of the sample being rated.

Listening task.

During the listening task the examiner first read the instructions for the task aloud (Appendix P) and asked the subject to follow along via an identical handout of the instructions. Subjects were told they would hear 12 samples and would rate each sample on 24 semantic differential scales. They were informed that some samples might be played more than once. Subjects were advised that the listening portion of the study was expected to take about 45 minutes. The instructions also illustrated how to use the mouse to select a position along the scales for each rating. They were told to respond based on their initial impressions and that they could re-listen to the second sentence of each sample once per semantic differential item if they desired. Subjects were also informed that they could not retract a response once they had selected it.

The subject then heard several samples that were used for practice. The subject was presented with an example of each type of voice/resonance status (normal, dysphonic, & hypernasal) along with three semantic differential scales on which to rate each practice sample.

Next, the experimenter set up the computer for the real listening task and the subject was asked to read either the voice and resonance information or the neutral information. Each subject was provided with a written copy of the material to read. He or she was also asked to answer four multiple choice questions which related to the information materials. These were printed on a separate page. A listener was told that he or she could take as much time as desired to read and reread the material and could refer back to the material when answering the questions. As soon as the investigator presented the information and was sure each subject understood the task, she left the room. The subject read the material and answered the questions (by circling the appropriate letter) at his or her own pace, after the investigator had left. Then the subject clicked on two boxes on the computer screen ("begin" & "ready to start") to begin listening. The listener then rated all 24 scales for the first sample, re-listening to a sentence of the sample once per semantic differential scale if desired. When all 24 scales had been presented for one VR sample, the computer program reset itself and presented another sample. The subject continued to listen to and rate the remaining 11 VR status samples until the computer indicated that the entire task was complete.

At the end of the listening experiment the investigator entered the test room, collected the listener's responses to the multiple choice questions, thanked the listener and paid her/him for participating. Immediately after a subject was excused, the principal

investigator off-loaded that listener's response file to a floppy diskette for storage and transfer to a spreadsheet for analysis.

Data Management and Analysis

Semantic Differential Scale Scoring

Semantic differential scales were scored from one to seven. The number one was assigned to the space closest to the negative adjective and the number seven to the space closest to the positive adjective. The spaces in between were assigned with the intervening numbers. The dependent measure was the mean score across the semantic differential instrument scales for each VR status group. High mean scores would indicate that the speakers were perceived positively by a listener and low scores would indicate speakers were perceived negatively.

Listener Reliability

Percent close agreement (+/- 1 scale point) was calculated on the data for every sample and scale to determine intra-rater reliability. This method (rather than percent exact agreement) was chosen, because some variability in rating was acceptable for this study. To assess intra-rater reliability, the examiner compared the ratings for the three VR samples that were repeated for each listener with that listener's original ratings to determine how often the ratings agreed within +/- 1 scale point.

Multiple-Choice Question Responses

The multiple-choice questions that were answered by the listener subjects were analyzed to determine the number of questions each subject answered correctly. Sixty-three of the 80 subjects answered all four questions correctly, 13 answered three questions correctly, and 4 answered only two questions correctly. The demographic characteristics and responses to the listening task of these four subjects were scrutinized to determine if they were unusual. Three of them answered the voice/resonance information questions and one answered the neutral information questions. Two were male and two were female. The investigator could find no unusual characteristics nor any demographic commonalties among those four subjects. These subjects' responses were compared to the mean response data for their listener cohort to determine if their responses were outliers. The mean, standard deviation, minimum response and maximum response from those four subjects are listed in Table 3 along with those values for the

Table 3

Descriptive Statistics for Subjects who Incorrectly Answered 2 Multiple-Choice Questions

Subject	Mean	Standard deviation	Minimum	Maximum
FNL17	4.407	1.188	1	7
FVR14	4.333	1.003	2.667	7
MVR9	3.801	1.656	1	6.667
MVR10	4.426	0.881	3	6.333
Voice/res info	4.685	1.391	1	7
Neutral info	4.658	1.353	1	7
All data	4.671	1.372	1	7

Note. Voice/res info = voice and resonance information group, Neutral info = neutral information group.

listeners in each information condition and for all subjects combined. All four subjects' mean scores fell within one standard deviation of their own group mean and of the mean for all subjects. Therefore, because these subjects' responses did not appear to be outliers, their data were included in all further analyses.

Preliminary Analyses of the Data

All statistical calculations were performed using StatView SE + Graphics software (1988) operating on a Macintosh II ci microcomputer. Multiple speakers were used in this study to ensure that the results were representative of the disorders rather than specific to a particular voice. Therefore, prior to any statistical calculation, the listener response data for all three speakers from each VR status group were combined so they would collectively represent each VR status condition. These data from each VR status group were analyzed with descriptive statistics to determine whether it was more appropriate to combine the results using a mean or a median score. Table 4 contains the descriptive statistics calculated for each voice and resonance status group. As the mean and median scores from each VR status group were similar, and the skewness and kurtosis values were less than +/- 1, it was considered appropriate to use the mean value across the three speakers in each VR status condition.

Table 4

Descriptive Statistics for each Voice and Resonance Status Condition Prior to Combining Data

Voice/Resonance status	Mean	Median	Skewness	Kurtosis
Normal voice & resonance	5.815	6	-.967	-.924
Voice disordered	4.455	5	-.144	-.902
Resonance disordered	3.732	4	.184	-.726

Factor analyses.

Before performing statistical calculations to test for group differences with respect to the experimental questions, the investigator performed a factor analysis on the data to determine which semantic differential scales contributed to factor constructs and which did not. Any semantic differential scales that were not represented by a factor were dropped from further analysis. The purpose of this preliminary analysis was to strengthen the validity of the semantic differential instrument by removing items that did not correlate well with the other items.

A principle component analysis was performed on the data. This was followed by a Varimax method (Kaiser, 1958) of orthogonal rotation of factors and an Orthotran method (Hofmann, 1978) of oblique rotation of factors. A priori, the investigator had proposed that if the two methods of rotation produced a similar factor structure, the orthogonal rotation would be utilized as the results of the factor analysis. If they did not have a similar factor structure, the oblique rotation method would be used as the factor analysis results. The orthogonal method was preferred because the results of that type of rotation are considered easier to interpret (Kline, 1994). The method of extraction of factors chosen was the larger of the numbers determined by either the 75% variance rule (Dillon & Goldstein, 1984) or by root curve analysis (Cattell, 1966).

Initially, a factor analysis was performed using all responses to each of the semantic differential scales for each listener subject. Therefore, 72 variables (24 scales x 3 VR status categories) were entered into the factor analysis. The results of this analysis were not interpreted, however, because the Measures of Variable Sampling Adequacy (Kaiser, 1970) were not close to ideal. The total matrix sampling adequacy (.58) indicated that some items in the matrix did not appear to be measuring the same type of psychometric content. Bartlett's Test of Sphericity (Bartlett, 1951) (X^2 = 10319.055, DF = 2627, p >.05) indicated that correlations in the matrix may have occurred as a function of chance. These measures likely resulted from the real differences in responses to each

of the three VR status groups of speakers. Because of this, the variables did not correlate well. Therefore, three separate factor analyses were performed, each containing the data from one VR status group (normal, voice-disordered or resonance-disordered). The results of these factor analyses are shown subsequently on pages 44 and 45.

Distribution analyses.

To determine whether nonparametric or parametric statistics were more appropriate to test for group differences, the investigator analyzed the distribution of the data. Normality of the data was tested by comparing the mean and median values to see if they were roughly equivalent. The mean of all of the data was 4.671, and the median was 4.667. In addition, the amounts of kurtosis and skewness in the data were determined. The data had a kurtosis value of -0.503 and a skewness value of -0.309. These values were considered approximately normal and suitable for analysis with parametric statistics for the purposes of testing for differences.

Descriptive statistics.

The mean, standard deviation, variance, and range were chosen to describe the distribution of the data. These values were calculated after some semantic differential scales were removed as a result of the factor analysis. These descriptive statistics are presented on pages 45 and 46.

Analyses of Variance and Post-hoc Testing

A two-factor analysis of variance (ANOVA) was chosen to test for between- (information type) and within-group (VR status) differences. Prior to testing for differences with the ANOVA, a test for homogeneity of independent variances was completed. This was done to ensure that data from subjects in the two information conditions had similar variances and could be considered to originate from the same population. A Scheffe F-test (Scheffe, 1953) was used for post-hoc analysis of differences between group means from the ANOVA.

Two other ANOVA's were computed. The first one tested for differences among the three dysphonic speakers. This was done because one voice-disordered speaker had considerably higher mean scores than did the other two voice-disordered speakers. The second ANOVA tested for differences in attitudes between female and male listener subjects. This was conducted because many previous studies in the attitude literature have found that females have more favorable attitudes toward people with disabilities

than males (e.g., Burley & Rinaldi, 1986; Chesler, 1965; Donaldson & Martinson, 1977; English, 1977; Stoval & Sedlacek, 1983).

Chapter IV. Results of Study

Reliability

The average percent close agreement for the listener subjects was 81.68 % with a standard deviation of 11.98 %. The average deviation was 0.80 scale points. The possibility of listeners' responding within +/- 1 scale values on the sample replays by chance alone was 38.8 % (Kreiman, Gerratt, Kempster, Erman & Berke, 1993). Notwithstanding the relatively high intra-rater reliability among listeners, the overall range of percent reliability did vary considerably, from 44.44 % to 100 %. An inspection of the demographic characteristics of the four subjects with the lowest intra-rater reliability did not reveal any unusual characteristics or any commonalties among the four listeners. Three of these subjects were female and one was male. Two were in the neutral information condition and two were in the voice/resonance information condition. Their data indicated highly unreliable responses only for replays of speakers with voice or resonance disorders, however not all of the replays of speakers with such disorders were rated highly unreliably. Each of the four subjects who heard a replay of a speaker with normal voice and resonance rated these speakers as reliably as most of the other listeners.

Factor Analyses

In all three factor analyses there was little or no change from the orthogonal to the oblique rotation, therefore the orthogonal rotation was interpreted. In each analysis, more than one factor was extracted, but most of the semantic differential scales tended to load very highly on one factor. The factor analysis with the normal speaker responses contained one factor on which 23 of the 24 scales loaded. The analysis with the results from the speakers with voice disorders contained one factor on which 22 of the 24 scales loaded. Finally, the analysis with the results from the speakers with resonance disorders contained one factor on which all 24 scales loaded. The two scales that did not correlate with the others in all three factor analyses (*independent & sociable*) were removed from further analysis. The remaining 22 semantic differential scales were considered to be correlated sufficiently to combine them into a single dependent variable for further analysis. This factor was called *Social Desirability*. The percentage of variability the factors accounted for and the highest and lowest loading of the retained semantic differential scales are presented in Table 5. After removing the two extraneous scales, the remaining semantic differential scales were combined using the mean value. This resulted

Table 5

Percentage of Variance Accounted for in the Single Retained Factor in each Factor Analysis and the Lowest and Highest Loadings of Retained Semantic Differential Scales

Factor analysis	Percent of variance	Lowest loading	Highest loading
Normal speakers	59.7	.666	.873
Dysphonic speakers	55.7	.652	.891
Hypernasal speakers	64.2	.684	.902

in one score which represented the average of the results on the 22 remaining semantic differential scales that were representative of a particular VR status group. The mean score was chosen, as opposed to the sum of the values across the semantic differential scales, because it was felt that the resulting value would be more obviously meaningful to interpret and easier to compare to other studies on attitudes.

Descriptive Statistics

The mean, standard deviation, variance, range and median of the responses from the listener subjects are reported in Table 6 for each of the two information conditions and for each VR status group.

Table 6

Descriptive Statistics for Listeners' Responses in Both Information Conditions and Each VR Status Group

	Mean	St dev	Variance	Range	Median
Neutral information					
VR status type					
Normal voice/resonance	5.846	.524	.275	2.227	5.909
Voice disorder	4.456	.625	.390	3.045	4.508
Resonance disorder	3.741	.905	.819	4.182	3.765
Total (Neutral information)	4.663	1.118	1.251	4.864	4.629
Voice/Resonance information					
VR status type					
Normal voice/resonance	5.797	.66	.435	2.303	5.773
Voice disorder	4.507	.764	.584	3.455	4.470
Resonance disorder	3.793	.981	.962	4.136	3.659
Total (Voice/Resonance information)	4.699	1.159	1.342	4.697	4.697

Note. St dev = Standard deviation

Analysis of Differences between Information Types and among VR Status Groups

The results of the preliminary test for homogeneity of independent variances for the data from the two listener groups were as follows: [$F(119, 119) = 1.152, p > .05$]. Therefore, the variances were considered homogeneous.

The results of the between-group comparison in the two-factor ANOVA revealed nonsignificant differences between the two information materials presented to listeners, [$F(1, 156) = .022, p = .8813$]. Listeners' perceptions of the speakers were similar regardless of the information they read prior to rating the speakers.

The results of the within-group comparison revealed that there was a main effect for VR status, [$F(2, 156) = 173.992, p = .0001$]. The interaction between information type and VR status was not significant, [$F(2, 156) = .152, p = .8587$]. Table 7 contains the group mean scores. The comparisons and results of post-hoc testing to determine which group means differed among the three VR status groups are summarized in Table 8. The results indicated that three significant differences existed among the three VR status group paired comparisons (normal voice & resonance, disordered voice, & disordered resonance). The speakers with voice disorders and those with resonance

Table 7

Group Mean Scores

	VR status			
Information type	Normal	Voice disorder	Resonance disorder	Total
neutral	5.846	4.456	3.741	4.681
voice and resonance	5.797	4.507	3.793	4.699
Total	5.821	4.482	3.767	4.690

Table 8

Post-hoc Analysis for Differences Between VR Status Groups

Comparison	Mean difference	Scheffe F-test
normal vs. voice disorder	1.34	62.883*
normal vs. resonance disorder	2.054	147.864*
voice disorder vs. resonance disorder	.715	17.894*

Note. * Significant at 95%

disorders were rated significantly less favorably than the speakers with normal voice and resonance. In addition, the speakers with resonance disorders were rated significantly less favorably than the speakers with voice disorders.

Power Calculation

The power of the between-group comparison (using a *t*-test power calculation) was estimated to be < 0.17 (Bird & Hall, 1986). The power of the within-group comparison (using a one-way ANOVA power calculation) was estimated to be 0.93.

Analysis of Differences Among Voice-Disordered Speakers

One of the speakers that represented the voice disorder condition (V3) appeared to be rated more highly than the other two speakers with voice disorders. This speaker had less tension in her voice and also spoke with more expressive intonation than the other voice-disordered speakers. She did not have pitch breaks, while the other two speakers had that characteristic. To test whether or not this speaker was rated in a manner that was significantly different from the other two in the dysphonic group, a one-factor repeated measures ANOVA was performed. The results revealed a significant

difference, [F (2, 158) = 155.681, p = .0001]. Speaker V3 was rated the highest (M= 5.642), followed by V1 (M= 4.157), and then V2, who had the lowest mean score (M= 3.646). The mean differences between the speakers and the results of post-hoc testing of the differences are displayed in Table 9.

Table 9

Post-hoc Analysis for Differences Between Voice Speaker Subjects

Speakers	Mean difference	Scheffe F-test
Speaker V1 vs. Speaker V2	.511	9.445*
Speaker V1 vs. Speaker V3	-1.485	79.853*
Speaker V2 vs. Speaker V3	-1.996	144.223*

Note. * Significant at 95%

The results indicate that speaker V3 was rated significantly higher than the other two speakers with voice disorders. In addition, a significant difference was found between speakers V1 and V2.

Analysis of Differences By Listener Sex

A two-factor (sex x VR status) ANOVA was computed to determine if differences existed between the responses of male and female listener subjects. The results revealed a nonsignificant difference, [F (1, 156) = 2.141, p = .1474]. The mean values for males and females for each VR status group are presented in Table 10.

Table 10

Group Mean Scores for Subjects Divided by Sex

	VR status			
Sex	Normal	Voice disorder	Resonance disorder	Total
female	5.931	4.525	3.782	4.746
male	5.564	4.381	3.732	4.559
Total	5.821	4.482	3.767	4.690

Chapter V. Discussion and Implications

Discussion

This study addressed whether there were differences among listeners' attitudes toward speakers with normal voice and resonance, speakers with voice disorders, and speakers with resonance disorders. It also addressed whether providing listeners with information about voice and resonance disorders would influence their attitudes toward speakers with either of those disorders.

Forty university students read information about voice and resonance disorders, and forty students read information that was neutral with respect to voice and resonance disorders. All eighty subjects then listened to samples of speech from women with normal voice and resonance, voice disorders, and resonance disorders. Speech samples were rated on a 24-scale semantic differential instrument.

This study found that speakers with normal voice and resonance were rated the most positively, followed by speakers with voice disorders and then speakers with resonance disorders. Mean attitude ratings for each of the three groups of speakers were significantly different from the other two. This study also found that there was not a significant difference between the ratings of listeners who read the voice and resonance information materials and those who read the neutral information materials. In addition, there was no interaction between the two independent variables (voice & resonance status, & information condition).

Listeners' Perceptions of Speakers

The first major finding of this study was that listener subjects perceived speakers from each of the three voice and resonance (VR) status conditions differently. The speakers with normal voice and resonance were rated the most positively, followed by the speakers with a voice disorder and finally the speakers with a resonance disorder. These results are consistent with those of other studies that have found adults with normal voice to be rated significantly better in terms of personality qualities than adults with voice disorders (Gelacek & Neiman, 1994) and adults simulating a resonance disorder (McKinnon et. al., 1986). This finding is also consistent with the results of other research that looked at both voice and resonance disorders. Blood et al. (1979) found the same hierarchy of attitude rankings for the three types of speakers, from most positive to most negative impressions. However, in their study listeners' ratings of the speakers with voice disorders and resonance disorders were not significantly different.

The present study also confirms what previous studies have found regarding speakers with resonance disorders, namely that speakers with hypernasal speech tend to be perceived very negatively (Addington, 1968; Blood & Hyman, 1977; Blood et al., 1979; McKinnon et al., 1986). One reason for the differences in the negative perceptions between speakers with resonance disorders and those with voice disorders might relate to listeners' individual experiences with each type of problem. For instance, listeners have likely heard famous people or acquaintances with a hoarse voice quality more often than they have encountered people with hypernasal resonance. These experiences may make speakers with voice disorders relatively more "acceptable" to the average listener. In addition, many people have had a temporary voice disorder similar to the dysphonias of this study as a symptom of a cold, whereas most people will not have had a similar experience with hypernasality. Because of this, listeners in the present study may have seen the speakers with resonance disorders, in particular, as unlike themselves. Miyake and Zuckerman (1993) have found that listeners tend to perceive less similarity between themselves and speakers who have unattractive voices. They then rate those voices more negatively as well.

Speakers were selected for this study whose speech, although hoarse or nasal-sounding, was intelligible. Because of this, when listeners rated a speaker negatively, they were likely responding with respect to their feelings about the speaker they heard and not about their ability to understand what that speaker said. Most previous studies of attitudes toward speakers with communication disorders have found that negative impressions of speakers are indeed unrelated to a decrease in a speaker's ability to communicate her or his message (Burroughs & Small, 1991; Silverman, 1976). Gelacek and Neiman's (1994) study is a good example of this; they found that even when listeners rated randomized spliced speech (unintelligible speech), speakers with hoarse voice quality were rated more negatively than a control speaker.

The results of this research also suggest that listeners' negative impressions of the speakers generalized from problems specifically due to their disorders to unrelated areas such as intelligence, kindness and appearance. These "negative spread effects" (Wright, 1988) have been documented repeatedly in the attitude literature (Lass et al., 1992; Siller, 1976; Silverman, 1976; Woods & Williams, 1976). Specific comparisons with individual semantic differential items among the three VR status groups were not made in this study. However, speakers with disorders were rated more negatively overall than speakers with normal voices on characteristics that included intelligence, reliability, kindness, and physical appearance. This finding has implications for social interactions and work.

Social situations can be hindered if people with voice or resonance disorders are perceived as *unfriendly*, *boring*, or *unattractive* upon first impressions. In a job interview, individuals must communicate with their voice as they try to demonstrate their competence and intelligence. Thus, in both situations an individual's voice may be sending an inaccurately negative message about that person. There is a potential for disadvantaged employment opportunities, if an employer forms an unfavorable impression based on an applicant's voice quality or resonance. The literature confirms that many people with voice disorders believe they have missed promotions because of their voices (Aronson, 1979, cited in Aronson, 1990) or that their voice disorder has affected future career options (Smith et al., 1996). Other studies about people who stutter (Hurst & Cooper, 1983), people who use esophageal speech (Gilmore, 1974) and people with dysarthria (Hooks, cited in Yorkston et al., 1988) suggest that many people in society believe that these individuals' employment opportunities should be limited.

In addition, the results of this study are particularly pertinent to communication between strangers by means of the telephone. In this study, listeners seemed to be able to easily form impressions of the speakers based on their voices and speech patterns alone. The majority of listeners rated toward the positive or negative ends of the scale for most responses (rather than the middle, *neutral* position). Helfrich (1979) indicated that the significance of speech cues increases when the people speaking cannot see each other, as is the case in phone conversations. This suggests that a voice or resonance disorder may have greater salience when individuals are talking on the phone. In that situation, listeners have no other facial or body language cues to influence their perceptions and, therefore, must rely only on speech cues and content. Gilmore's (1974) research on attitudes about esophageal speakers supports the idea that a communication disorder may be more noticeable to listeners if they only hear a sample of speech. He found that providing listeners with an audio sample alone resulted in more negative impressions than providing them with an audio plus video sample of a man using esophageal speech.

Clinically, the results of the present study are significant. The findings demonstrate that the speakers with disorders were perceived unfavorably on attributes unrelated to their communication disorder, even when their speech was intelligible. These unfavorable perceptions may have negative social and vocational consequences. Therefore, it becomes important to emphasize providing timely and appropriate clinical intervention for these individuals. Their disorder should be managed so that the negative consequences of their disorder can be reduced. However, many speech-language pathologists may not be aware of negative attitudes toward people with these disorders.

Clinicians can be made aware of these attitudes by reading the attitude literature and by asking about their clients' personal experiences of living with a voice or resonance disorder. Clinicians could incorporate questions about how others react to the clients' disorder as a regular part of clinical evaluation. This discussion could naturally lead to talking about ways to deal with other peoples' negative perceptions of individuals with voice or resonance disorders.

Clinicians should be prepared to counsel their clients on ways to deal with the social stigma of a voice or resonance disorder (Ruscello et al., 1988). Clinicians could teach their clients ways to present their "best voice" in critical situations such as a job interview. For instance, people with voice disorders due to vocal abuse can be taught to rest their voice and ensure their vocal folds are well hydrated in preparation for speaking during an interview. Similarly, people with mild resonance disorders could practice speaking by overarticulating and using greater oral opening to decrease the perception of nasality in their speech. Speech-language pathologists can also educate clients about their legal rights (Love, 1981). People with voice or resonance disorders should be aware of what to do, if they are inappropriately denied employment because of the way they speak.

Effect of Information on Listeners' Perceptions of Speakers

The second major finding of this study is that listener subjects who read information about voice and resonance did not differ significantly in their attitudes from listeners who read information that was neutral with respect to voice and resonance. This is consistent with the results of some but not all of the research that has examined the effects of information on listeners' perceptions of speakers with communication disorders. Some reports have indicated that information is able to alter negative attitudes (Dampier et al., 1985; Gilmore, 1974; Gorenflo & Gorenflo, 1991; Ibrahim & Herr, 1982), while others have indicated that information does not affect attitudes (Leahy, 1994; Ruscello & Lass, 1996).

The nature of attitudes.

The results of the present study imply that it is not easy to influence attitudes about people with communication disorders. It was hypothesized that negative attitudes about people with voice and resonance disorders might be easier to change than many other disorders, because no rigid definition of "normal" voice and resonance exists (Aronson, 1990; Greene & Mathieson, 1989). It was also hypothesized that subjects would not approach the listening task with many preconceived notions about individuals

with these disorders because voice disorders, for instance, are not associated with a widespread negative stereotype (Williams & Dietrich, 1996) in the same way that stuttering is (Lass et. al, 1992; Woods & Williams, 1976). Notwithstanding these factors, listeners' attitudes were not affected by the information provided about voice and resonance disorders in this study. Antonak and Livneh (1988) summarized literature on attitudes and concluded that they are complex and tend to be very stable, as evidenced by their general resistance to change. Heun and Heun (1975) outline a number of processes which interact to make attitudes difficult to change. The first one is comprised of *external factors*, such as the environment and people with whom one interacts, that both reinforce existing attitudes. The second type is comprised of *selective factors*, such as selectively exposing oneself to similar situations which reinforce current attitudes, or giving selective attention to things that are consistent with one's attitudes. The third process relates to the *internal structuring* of attitudes. This means that, because each attitude is related to so many other attitudes and to a person's self-concept, attitudes become more difficult to change.

Factors that influence attitude change.

In spite of the evidence that a number of interacting processes encourage attitudes to remain relatively stable, there are reports of instances in which attitudes can be influenced. Thus, comparisons among studies on attitude change within the field of communication disorders are useful to determine if any common factors emerge that account for why attitude change occurs in some instances and under certain conditions and why it does not occur in others. Factors to consider that are specifically related to the intervention used in these studies include: the form and amount of information provided, the passive or active nature of the information exchange, the ability of the information to evoke empathy, and the various types of interventions used in the literature. Other factors to consider when comparing these studies are the subjects from whom the attitudes were measured, the type of communication disorder that was the attitude referent, the nature of what was rated (speech samples, nonspeech communication, or a concept), the number of times the attitudes were measured, and the time period after intervention at which the attitudes were measured. Seven studies form the basis of such a comparison (Dampier et al., 1985; Gilmore, 1974; Gorenflo & Gorenflo, 1991; Ibrahim & Herr, 1982; Leahy, 1994; Ruscello & Lass, 1996; Lallh, 1997). In addition, theory and research from the broader attitude literature will be included where appropriate.

The forms and amounts of information used to influence attitudes have varied greatly among these studies of communication disorders, ranging from a few sentences of written information to a number of hours of different types of intervention, however no particular combination has emerged as consistently effective in attitude change. Four studies have reported an effect of information presentation on attitudes. Gilmore (1974) provided only a few sentences of information to the subjects in his study. This information briefly described the effects of a laryngectomy and labeled the communication disability of the esophageal speaker. Gorenflo and Gorenflo (1991) provided two paragraphs of written information on a nonspeaking person's disability, social activities, and academic and employment status. Dampier et al. (1985) used two different 26-minute audiotapes. The first provided factual information, and the second provided information designed to foster empathy toward elderly people with a hearing loss. Ibrahim and Herr (1982) provided five hours of intervention including written information (personal accounts of people with communication disorders), four films and a slide show, and discussion about communication disorders. Three other studies that also used different types and amount of information did not find an effect of information on attitudes towards people with communication disorders. The present study used approximately two pages of written information about voice and resonance disorders that included information about what voice and resonance disorders are, common causes and treatments, and how those disorders affect one's life. This information could be read in about five minutes. Ruscello and Lass (1996) measured attitudes toward children with dysarthria and provided their subjects with a lecture and discussion about normal communication and a variety of communication disorders. The length of the lecture and discussion was not specified. Finally, Leahy (1994) provided her subjects with information about stuttering via tutorial sessions, contact via opportunities to observe or provide therapy for stutterers, and role-playing via simulation of stuttering. Therefore, the forms of information varied considerably. They included written information (Gilmore, 1974; Gorenflo & Gorenflo, 1991; Ibrahim & Herr, 1982; Lallh, 1997) audiotapes (Dampier et al., 1985), lecture (Leahy, 1994; Ruscello & Lass, 1996), film (Ibrahim & Herr, 1982), and discussion (Ibrahim & Herr, 1982, Ruscello & Lass, 1996). The amount of information also varied greatly from information read in less than a minute (Gilmore, 1974) to five hours of intervention (Ibrahim & Herr, 1982). Across these seven studies, however, there are no common features among the types or amounts of information provided that might explain why some were able to change attitudes and others were not. Because there are studies that successfully used a smaller amount of

written information than the present study to influence attitudes (Gilmore, 1974; Gorenflo & Gorenflo, 1991), it is not clear why the amount and type of information used in the present study were not effective.

One possible explanation for the nonsignificant differences in this study between information conditions may be that the information was provided to listeners in a passive manner. Triandis compared attitude change via information conveyed either in a lecture or in a discussion among a group of people and concluded that discussion would usually be more successful. This is partly because the individuals are more actively involved and may commit to change with the other individuals present. In a lecture situation people are more passive and usually have less pressure to commit to change. Although this theory suggests that active means of information exchange is more likely to change attitudes, the results from studies using these methods within research on communication disorders are mixed. Ibrahim and Herr (1982) successfully used discussion along with other forms of information to change attitudes in their study. However, Ruscello and Lass (1996) used both discussion and lecture and did not measure an attitude change in their study, although it was not clear what proportion of time was spent in discussion and in lecture. Gilmore (1974) and Gorenflo and Gorenflo (1991) found a significant effect of having their subjects read information in their study, which is a relatively passive activity. In the present study the subjects also only read information. This information was intended to represent the type of material that could be provided to the public on a large scale, such as on a pamphlet or fact sheet. Again, it is unclear whether the passive or active nature of the task is a critical factor that determines whether information is effective for changing attitudes.

Although attempts were made in this investigation to include information that would foster empathy, listeners may need information that better allows them to take the perspective of the person with the disorder. According to Triandis' definition (Triandis, 1972), there are three components of an attitude: a cognitive, an affective and a behavioral-intentions component. It is arguable that the information presented to the listeners in this study addressed only the cognitive component. Dampier et al. (1985) stress empathy as a critical factor for influencing both the cognitive and affective aspects of an attitude. They were more successful at influencing attitudes with their empathy tape than with their lecture tape. Perhaps, the use of personal information about a real or fictitious person with a disorder would encourage listeners to empathize with the people they are rating. Gorenflo and Gorenflo (1991) for instance, used a two-paragraph description of a man with a disability in their study in order to influence attitudes. The

paragraphs included information about his interests and accomplishments along with information about his disability. Another possible form of information that may foster empathy for an individual with a disability is providing information about the person in the form of a story (written or film). The titles of the films used by Ibrahim and Herr (1982) (*A song for Michael, The inner world of aphasia, Walk awhile in my shoes, & Walk with me*) suggest that they also used information about specific individuals with a disability in their study, that in some cases might have taken the form of a story. The only exception to the above pattern is Gilmore's (1974) study that provided only factual information and was successful in improving attitudes. The written information used in the present study was created with the goal of fostering empathy along with providing information about the disorders. This was attempted through the provision of examples about how a voice or resonance disorder affects the lives of people who have those disorders. This material did not provide specific information about individuals and how they live with their disorders, but rather it provided more general information about people with voice and resonance disorders and stated different possible consequences of the disorders on their lives. Perhaps, this was not as effective in creating empathy towards the speakers as using information specific to an individual.

Another possible reason for nonsignificant differences between the two listener groups in this study is that information alone is not sufficient for changing attitudes. Individuals may require both information and direct interaction with a person who has a disorder in order to change their attitudes. This has been reported in the physical disability attitude literature (Anthony, 1972; English, 1977; Yuker & Block, 1979). Anthony (1972) suggested that both are required, because interaction alone may simply reinforce negative attitudes, and information alone may only provide knowledge about a disability and not necessarily affect feelings. However, no known research exists that has systematically provided a contact and information experience to affect attitudes about communication disorders. Role-playing having a disorder or disability is another recommended method for influencing attitudes (Yuker & Block, 1979). Ibrahim and Herr (1982) compared students' attitudes toward people with disabilities after providing them with either information about communication disorders or a role-playing experience in which they acted as though they were an individual with a communication disorder (such as stuttering or an articulation disorder). Ibrahim and Herr found that although both information and role-playing significantly improved attitudes, the mean scores for the group who role-played were higher. They argued that role-playing addresses more of the affective component of an attitude, while information addresses more of the cognitive

aspects. Role-playing may allow more direct experience with how someone with a communication disorder would feel and act in certain situations (i.e., *affective*), while information is generally more factual in nature (i.e., *cognitive*). In addition, as mentioned previously, theorists suggest that the more actively people participate in an attitude change technique, the more likely they will change their attitudes (Triandis, 1972; Yuker & Block, 1979). Role-playing is an active process compared to the more passive process of absorbing information from written material or lectures. However, contrary to the results from Ibrahim and Herr (1982) Leahy also provided her subjects with some role-playing experience which did not influence attitudes in her study. The role-playing in that study was not a separate intervention condition, however, and the amount and nature of the role-playing were not specified. More research employing these different types of interventions (i.e., contact + information, & role-playing) is needed before clearer patterns emerge from the literature to indicate which interventions are the most effective at influencing attitudes.

In summary, the information used in the present study (two pages of factual written information), was chosen because that amount of information was considered to be realistic for distribution on a large scale. Written information was chosen rather than a discussion or lecture format for the same reason and also because the investigator could control the information provided to each subject more precisely than in other formats, particularly discussion. Two other possible forms of intervention (interaction & role-playing) are not practical to use with more than a small number of people, and therefore were not used in this study. The attitude change literature specific to communication disorders does not provide any clear patterns regarding the form and amount of information necessary to produce attitude change. Nevertheless, the broader literature on attitudes suggests that types of intervention other than the one used in this investigation may be necessary if attitudes are to actually change. That is, it may be necessary to use information designed to evoke empathy or to use more active forms of information presentation such as a discussion. More research also is required which investigates role-playing or interactions as means for improving attitudes about people with communication disorders.

Types of raters and disorder.

The subjects who rated the speech samples or concepts in each of the seven studies involving attitude change with communication disorders also differed with respect to demographic characteristics and education. Two of the three studies that found no

effect of information used listener subjects who were undergraduate students with no experience in communication disorders (Lallh, 1997; Ruscello & Lass, 1996). Leahy (1994) on the other hand used students in speech-language pathology as listeners. The four studies that reported a positive influence from information also differed with respect to their rater populations. Gorenflo and Gorenflo (1991) used undergraduate students with no experience in communication disorders. Dampier et al. (1985) used undergraduate students enrolled in a speech communication course, and Ibrahim and Herr (1982) used students enrolled in a clinical speech pathology and audiology course. Finally, Gilmore (1974) used men enrolled in business and professional groups as raters. Thus, both types of studies (those that utilized subjects with prior knowledge of communication disorders & those utilizing subjects with no prior knowledge), found an effect of information on attitudes in at least one study, yet also did not measure an attitude change in at least one study. Men belonging to professional groups were used as subjects only once in a study where attitude change was measured.

The type of communication disorder studied was also different in all seven investigations. Ruscello and Lass (1996) studied children with dysarthria, Leahy (1994) studied the concept of "typical stutterer", Dampier et al. (1985) studied the concept "hearing-impaired elderly", Gilmore (1974) studied men speaking with esophageal speech, Gorenflo and Gorenflo (1991) studied a man with limited speech, Ibrahim and Herr (1982) studied the concept "disabled people" and the present investigation studied women with voice or resonance disorders. It is difficult to find a factor associated with the type of disorder studied that could account for why the studies of dysarthria, stuttering, and voice and resonance disorders reported no attitude change, while the studies of hearing impairment, esophageal speech, limited speech, and the concept of disabled people did. If the specific type of communication disorder investigated is a factor in determining whether or not information is effective for influencing attitudes, it has not been apparent in the results of studies on this topic so far and does not seem to be the case for other types of disabilities (English, 1977).

Nature of what was rated.

The nature of what subjects rated (i.e., actual speech samples, aided communication with no speech, or a concept) also differed among the seven studies pertinent to attitude change in the field of communication disorders. The present study and that of Ruscello and Lass (1996) used audio speech samples. Gilmore's (1974) research used video only, audio only, and video and audio conditions. Gorenflo and

Gorenflo (1991) used a video of a person with cerebral palsy who spoke in only one of the three communication situations presented in that study. In the other two conditions he used an alternative communication device. Leahy (1994), Dampier et al. (1985), and Ibrahim and Herr (1982) all had subjects rate a hypothetical concept. The present study, and those of Ruscello and Lass (1996), and Leahy (1994) were unsuccessful in influencing attitudes, while Gilmore (1974), Gorenflo and Gorenflo (1991), Dampier et al. (1985), and Ibrahim and Herr (1982) were successful at influencing attitudes. Again, as there are no consistent patterns between what was rated in the various studies and their outcomes, it is difficult to infer that this factor is influential in determining whether information influences attitudes toward people with communication disorders.

Frequencies and time period of attitude measurements.

The length of time after intervention at which attitudes are measured and the number of times attitudes are measured are other factors that may influence the effectiveness of information for attitude change. In the present study, and most of the other attitude change studies in communication disorders, attitudes were measured only once, immediately after subjects were exposed to the information. On the other hand, Ibrahim and Herr (1982) found that attitudes improved from the time they were measured immediately after the intervention, to six weeks later. It may be that attitude change occurs over a period of time after individuals have had a chance to fully process and integrate the information into their own belief systems. Therefore, it may have been wise to measure attitudes on more than one occasion in the present study.

Summary.

In summary, the seven studies that have investigated the influence of various interventions on attitudes toward individuals with communication disorders do not provide clear patterns regarding which factors or combinations of factors are effective when attempting to change attitudes. Studies to date on this topic have differed with respect to the types and quantity of intervention provided, the types of individuals who rated the attitude referent, the communication disorder serving as the attitude referent, the nature of what was rated in the task (communication sample or abstract concept), the number of times attitudes were measured, and time period after intervention when attitudes were measured. From this literature, it is not apparent why information is effective in some instances and not in others. Information from the broader attitude

research suggests that different types of information or perhaps information and contact or role-playing might be more successful for creating attitude change.

Listener Reliability

Intra-rater reliability.

Intra-rater reliability was measured to assess whether subjects formed relatively stable and consistent attitudes toward the speakers. Consistent responses increase the likelihood that the measured responses reflect the "true" underlying attitudes of the listeners. Intra-rater reliability was assessed by calculating percent-close agreement (+/- 1 scale point) between a listeners' first and second ratings of the three repeated VR samples they heard. The average deviation across the responses from all listeners was calculated to be 0.80 scale points. This indicated that on average listeners deviated by less than one scale point in their responses. This value of average deviation is marginally higher than the highest number in the range of intra-rater reliability values reported in Osgood et al. (1957) (0.3 - 0.78 scale points). Overall the intra-rater reliability of listeners' ratings was moderate-to-high (M=81.68%) and was considered acceptable for this study.

A factor that no doubt influenced listeners' reliability was the presence of speakers with voice and resonance disorders among the listening samples. Kreiman et al. (1993) stated that listeners' agreement levels when rating voice quality are higher for "normal" voices than for disordered voices. Listeners likely have relatively stable internal standards for typical voices because of their repeated exposure to these voices throughout their lifetimes (Kreiman, Gerratt, Precoda, & Berke, 1992). Their lack of experience hearing voices with disorders, however, may have decreased the consistency in their ratings about people with those disorders. Listeners could have also been unreliable because of factors such as fatigue and lapses in attention. This would have made the results more variable and thus less reliable. Lapses in attention could also be related to another source of unreliability, namely, clicking on a different place along a semantic differential scale than intended. For instance, one listener subject told the examiner that she had accidentally clicked on the opposite extreme end of the semantic differential scale than intended, because as she began to respond more quickly, she forgot to pay attention to which ends of the scale held the positive and negative adjectives for that item. She reported responding this way only a few times during the task. It may be that other subjects also occasionally made these errors while rating. As well, the unique randomized order in which each listener heard the voices may have influenced their ratings. Because the replayed speaker samples for intra-rater reliability were randomized among all 12 samples

the listeners heard, it was possible for a sample to be immediately followed by its own replay. In these cases, subjects may have been more reliable, particularly if they realized that they were rating the same voice. However, in cases where there was a greater amount of time between the original play and the replay, those ratings could possibly have become less consistent because subjects may have changed their internal rating "scale" during the intervening presentation of other voices. Subjects also may have actually changed their impressions of some speakers from the first rating to the second. They may have perceived speakers more positively or more negatively the second time they heard the speakers.

The mean level of percent close agreement in the study was substantially above the level of agreement by chance alone (38.8%). Therefore, most listeners formed consistent impressions of the speakers between the first rating and the second. The range of intra-rater reliability across all of the listeners was quite large however, due to a small number of listeners who appeared to substantially change their impressions of the speakers on repeated ratings. Closer evaluation of the four subjects with the lowest reliability revealed that instead of having poor reliability on all three repeated samples, they had very poor reliability on only one or two of them. In all cases the samples associated with the unreliable ratings represented either a voice or a resonance disorder. Some listeners made their ratings more positive the second time they rated a sample, while others made them more negative. It is not clear why these listeners were less consistent than the others. Perhaps, they changed their perceptual rating scale for the disordered voices as they heard more voices. It is also possible that these four subjects were somehow more susceptible to some of the previously mentioned factors that reduce listener reliability.

Listeners' varied responses to the speakers with voice disorders.

It was noticed during the analyses of the results of this study that listeners rated one voice-disordered speaker (V3) quite positively overall (M= 5.642) while rating the other two less positively overall (V1, M= 4.157; V2, M= 3.646). The mean differences among the attitude ratings for all three dysphonic speakers were significantly different, and the mean rating for V3 was only 0.179 points lower than the mean of the normal speakers. This suggests that V3 was perceived as positively as the normal speakers. As well, her positive ratings increased the overall mean score of the group with voice disorders. Consequently, this higher mean score may have influenced the results of the

ANOVA that revealed a significant difference between listeners' perceptions of voice-disordered and resonance-disordered speakers.

Although speaker V3 had many features in common with the other dysphonic speakers, such as a moderate severity rating, breathiness and diplophonia she had a slightly less tense voice and more expressive intonation than they did. During the preliminary ratings of her voice on the Voice Profile her sample was not characterized by pitch breaks, while the other two speakers (V1 & V2) had that feature. Pitch was not necessarily a discriminating feature as both speaker V3 and V1 were rated as having low pitch. Because V3 was rated quite positively overall, there may be certain combinations of dysphonic voice characteristics that are not displeasing to listeners. The fact that speech-language pathologists rated the overall severity and specific features of the three disordered voices in this study as being quite similar, while listeners reacted to those voices with significantly different ratings reveals an interesting discrepancy between perceptions of dysphonic voices that has also been observed in other studies. Gelacek and Neiman (1994) found that severity of disorder does not always correspond in the expected way with how positively a speaker is perceived. They found that listeners perceived a moderate-to-severely dysphonic voice as pleasing as a normal voice in some instances, while rating a speaker with a mildly dysphonic voice more negatively. In other instances a mildly dysphonic voice was rated similarly to a voice with no disorder. In interpreting their results, Gelacek and Neiman hypothesized that for some people, hoarseness may not create negative impressions. Rollin (1987) also has suggested that a wide variety of voice usage and quality is acceptable to listeners. This range of acceptability may be related to the observation that we as a society do not have a strict definition of what a normal voice is (Aronson, 1990; Greene & Mathieson, 1989). Thus, certain variations are considered acceptable. In the context of this premise, it could be argued that speaker V3 in the present study was rated significantly more positively than V2 or V1, because listeners may have experience hearing others with a voice quality similar to that of V3 and, therefore, did not consider her voice to be atypical.

Correlations among items on semantic differential.

Twenty-two of the 24 semantic differential items correlated highly when subjected to a factor analysis. All 22 of these loaded on a single factor (*Social desirability*) and ranged in loading magnitude from 0.652 to 0.902. This indicates that on the whole, when speakers were rated positively on one characteristic they were also rated positively on most others. Alternately, if a speaker was rated negatively on one scale, she was more

likely to be rated negatively on many others. This suggests that a listener's overall impressions of a speaker tended to be quite consistent across a range of personality, social and intelligence characteristics, regardless of whether that speaker had a normal voice, a voice disorder or a resonance disorder. This finding is not consistent with some previous research that has employed factor analysis, such as that of Gelacek and Neiman (1994). They studied the attitudes of undergraduate students (with no previous coursework in speech-language pathology) toward women with hoarse voices due to vocal abuse. They performed a factor analysis on 15 semantic differential items measuring attitudes about speakers with vocal nodules. Three factors emerged: achievement-assertiveness, personality, and appearance. Therefore, in their investigation, listeners responded differently to subsets of semantic differential items when rating speakers with vocal nodules. Perhaps in the present study these differences in responses to various semantic differential items were reduced due to the averaging of results across the three speakers in a particular VR status condition. Because results were averaged, the variance in the data was reduced. This would likely increase the correlations among the averaged data in the factor analysis, and as such, the semantic differential scales may have correlated more highly in the present study. However, some caution should be exercised when making direct comparisons between the present study and Gelacek and Neiman's study, because the specific semantic differential items used by Gelacek and Neiman are not available for comparison.

Male and female listeners.

This study did not find a significant difference in attitudes between male and female listener subjects. This corroborates findings from Addington's (1968) study where male and female listeners did not differ significantly in their ratings of various simulated disordered voice conditions. In addition, Williams and Dietrich (1996) found that there was no significant difference between female and male raters on their judgments about a hypothetical person with a voice disorder. The finding of no significant differences between females and males in the present study is, however, contradictory to the results of other studies involving different disabilities (physical, mental & communication-related) which tend to find that females' attitudes toward individuals with disabilities are more favorable than males' attitudes (e.g., Burley & Rinaldi, 1986; Chesler, 1965; Donaldson & Martinson, 1977; English, 1977; Stoval & Sedlacek, 1983). The fact that differences were not found between males and females in the present study should be

interpreted with caution, however, because the number of male listeners was small compared to the number of female listeners (males n=24, females n=56).

Statistical Power

Post-hoc calculations of statistical power were computed in this study to determine the likelihood of actually finding the differences the study was designed to detect and also to determine how likely it was that a Type II error was committed. Statistical power for the within-group comparison in the present study was estimated as 0.93 from a one-way ANOVA power calculation (Bird & Hall, 1986). Statistical power was estimated to be < 0.17 from a t-test power calculation for the between-group comparison. Therefore, the statistical power of this study is somewhat contradictory. For the within-group comparison, the power was extremely high, indicating that the number of listeners (80) almost ensured that differences would be found among the three voice and resonance status groups. Yet at the same time, for the between-group comparison the power was extremely low, indicating that the number of subjects (40 per group) made it almost impossible to detect a significant difference between the two groups. The moderate effect size for the within-group comparison (0.628) indicates that these differences were easy to detect in the present study and suggests that real differences likely exist in the attitudes of the university student population tested. For the between-group comparison, although the probability of committing a Type II error was high, the effect size was very small (0.016). This effect size is well below the level at which these differences would be considered meaningful in the real world. An estimate of the number of subjects required to detect a between-group difference in this study at a power of 0.10 was 4604 subjects (Kraemer & Thiemann, 1987). This calculation suggests that for the population of university students studied, there is likely no "real" difference in attitude ratings on the present task for the between-group comparison.

The investigator's choice to use 80 subjects in this study was based on a number of *a priori* considerations. Firstly, previous studies on differences in perceptions between speakers with voice or resonance disorders and control speakers were examined. Calculations of the recommended number of subjects from these studies suggested a range from 46 to 84. No estimates were made based on between-group independent variable comparisons, because at the time of the estimate there were no model studies that used the semantic differential instrument for testing these types of differences. The number of subjects required for a factor analysis also was considered. Kline (1994) recommended using at least 100 subjects when a factor analysis is part of the data

management, taking into account the ratio of the number of subjects to the number of experimental variables, and the number of subjects to the number of factors extracted. He suggested at least a 2:1 ratio for the subjects-to-variables consideration before performing the analysis (>48 subjects for the present study), and then at least a 20:1 ratio for the subjects-to-factors issue, after the factor analysis has been completed. Further *a priori* considerations were including enough subjects for the possible use of nonparametric statistics and a MANOVA if these analyses were required. Therefore, as a compromise among the above considerations, eighty subjects were chosen as the target number of listener subjects.

Validity of the Study

Internal validity.

A number of aspects of this study enhanced its internal validity. The speakers chosen for the study were all women. They were carefully evaluated to ensure that those with the specified disorders presented samples uncomplicated by other speech, language or intelligibility problems, and that the control speakers had no disorder. The speakers with disorders were rated as moderate in severity and comparable in terms of specific cardinal characteristics for dysphonia and hypernasality. The speaking content for this study was also controlled by having all speakers read the same material. The investigator also verified that reading rate was within the typical range across all samples.

The listener subjects were all undergraduate university students with no coursework in speech-language pathology. They all had normal hearing, and were either native speakers of English or had received at least 10 years of schooling in Canadian English. This ensured that they would not have difficulty understanding the information materials and adjective items. To ensure that listeners came from varied educational backgrounds, no more than 25 % of all listeners were accepted from any one faculty. This was done to ensure that the overall listener group responses were not too biased toward the typical responses of subjects with a particular educational background. As well, male and female subjects were separately randomized to ensure that the same sex ratio was present in both groups of listeners. This reduced any potential confounding effects of sex, in the event that there were significant differences between the responses of male and female listeners.

This study used both an experimental and a control set of information materials to equalize the time and difficulty involved in the task for both groups of listeners. The information materials were evaluated by university students prior to use to ensure the two

forms were understandable and comparable in overall difficulty. To ensure that listeners had read the information, they were required to answer four multiple-choice questions. Because the majority of subjects (79%) correctly answered all items, it is probable that they did indeed read the information. The task that listeners undertook was also standardized via the computer program presentation. The program allowed for control of order effects both for speakers (through randomization of sample presentation) and for semantic differential items presented with each sample. In addition, the potential for listener perceptual drift across the 24 scale items for any one sample was limited by allowing replay of the same portion of each sample during the rating task. This replay was limited to once per semantic differential item, however, to control the nature and frequency of replay across listeners. It is acknowledged that the effectiveness of the replay control was limited with respect to its frequency of use; some listeners may have used the replay option often, while others may have seldom used it. It was reasoned that the single, one-sentence replay per semantic differential item would help control the effects of perceptual drift on ratings and at the same time limit the possibility of excessive replay behaviour on the part of some listeners.

Threats to internal validity.

There were a few threats to the internal validity of this study that should be considered when interpreting the results. The speaker subjects with voice and resonance disorders for instance, were not matched in age, as this was not possible with the available clinical population. Instead each one of the three control subjects was selected to fit within the young, middle-aged and old categories represented among the disordered speakers. This is a concern because Deal and Oyer (1991) found that listener perceptions of speakers' voices can vary with age of the speaker. In their study, the voices of older speakers (with no disorder) tended to be rated as less pleasant than those of younger speakers. This held true regardless of the age of the raters. The variance in ages in the present study was potentially a confounding variable because it added another possible dimension that listeners might be influenced by, other than voice or resonance.

In addition, there may be other variables that could have influenced the listeners' ratings. For example, some speakers may have had differences in intonation that the listeners responded to. This is a possibility in the case where significant differences were found among listeners' reactions to the three speakers with voice disorders, an issue that has been discussed earlier in this chapter.

The power calculations for this study suggest that it may have been slightly too powerful (in the statistical sense) in its ability to detect differences among the three VR status groups, while not being powerful enough to detect differences between responses from subjects in the two information conditions. This is important because a comparison that is too powerful increases the probability of finding a significant difference when a difference does not truly exist in the population (a Type I error). The converse is true if the comparison is not powerful enough; it increases the likelihood that real differences in the population will not be detected by the statistical tests (a Type II error). For this study, the between-group differences were deemed small enough to be clinically insignificant and, therefore, a Type II error probably was not committed.

Although the listeners were asked multiple-choice questions for the purposes of ensuring they read the information materials, their responses do not ensure that they truly processed that knowledge and applied it during the semantic differential task. With respect to whether or not the information was processed, in future studies it might be useful to devise different methods for ensuring that the information was transmitted as intended. Perhaps, the experimenter could have discussed any incorrect answers and clarified any misunderstandings with the subjects before they started the listening task. Perhaps, a more rigorous method of evaluating subjects' knowledge could have been utilized, such as using more difficult questions and not allowing them to reread the information while answering the questions. This might have allowed for better evaluation of whether the information was actually comprehended by the subjects. It is acknowledged that ensuring that the subjects understood the information would still not ensure that they would apply that knowledge when completing the attitude task.

External validity.

A feature that strengthens the external validity of this study is that speakers with actual voice and resonance disorders were used rather than speakers with normal voice and resonance who simulated each disorder. This increases the likelihood that the samples of speakers with disorders are representative of other speakers with those disorders and that the attitudes sampled reflect responses evoked by real disorders. Speakers without disorders who attempt to recreate a voice or resonance disorder may unintentionally alter other parameters of their voices (Scherer, 1979). Listeners may respond to this simulated voice or resonance disorder in a manner that is unlike their responses to a speaker with a genuine disorder. This would threaten the validity of those responses when applied to individuals with actual disorders. As well, multiple speakers

were used to represent each speaking condition. The averaging of the data from listeners for the three speakers in each VR status condition reduced the probability that the overall results were specific to a particular voice and enhanced their validity as reactions to a typical dysphonia due to vocal nodules or hypernasality due to acquired velopharyngeal incompetence uncomplicated by voice or articulation problems.

The range in ages of the speaker subjects has been mentioned earlier as a possible threat to the internal validity of the study because of the confounding effects of perceived age on listeners' attitudes. That age range could be considered a boon to the study's external validity, however. The results of this study reflect listeners' attitudes about women's voices across a wide range in age (from 23 to 74 years). Therefore, the results can be considered relevant to young, middle-aged and old women.

The large number of listeners in the study increased the generality of the within-group independent variable findings, because the results are less likely to reflect idiosyncratic or eccentric responses specific to a small group of listeners. Instead they are probably representative of typical attitudes in the population of university students sampled.

Threats to external validity.

Some features that limit the external validity of this study also should be noted. The results for instance, cannot be generalized to listeners' attitudes about speakers with all voice and resonance disorders. Rather, they should be applied only to the disorders and severities of conditions used in this study and are relevant only when these disorders occur in female voices. Studies that have compared listeners' perceptions of male and female voices have found that listeners tend to perceive men's voices more positively than women's voices. Addington's (1968) study for instance, suggested that listeners rated women with voice quality variations more harshly than men with the same voice quality variations. Deal and Oyer (1991) also found that mens' voices (with no disorder) were rated as more pleasing than womens' voices.

Another limitation that threatens the external validity of these results is that they may not reflect the attitudes of individuals exposed to other types of information. Information provided through a discussion, which is a typically more active and perhaps a more personally meaningful way of acquiring information (Triandis, 1972), could be more successful for altering attitudes. Providing information that tells a listener about a specific individual with a disability (via a description or a story) might also be more successful than factual information that does not use specific personal information (e.g..

Gorenflo & Gorenflo, 1991). Finally, perhaps information provided in another medium, such as film (Ibrahim & Herr, 1982) or audiotapes (Dampier et al., 1985) would be more captivating to individuals. The results of this study also may not generalize to situations where a greater amount of intervention is provided (i.e., Ibrahim & Herr, 1982).

The listener subjects also must be considered when evaluating external validity. Although a large number of listeners was used, they did not represent a randomly selected group of people. Only university students who were primarily young and middle-class participated, and they were paid for their involvement. In addition, there were more female than male listeners. The results may be biased toward responses more typical of female university student subjects. These factors may be reduced in future research of this kind by selecting participants who are not primarily university students and who represent both sexes in equal numbers.

Finally, the experimental task performed in this study was not an actual interaction between a listener and speaker. This restricts the extent to which the results can be generalized to attitudes based on actual interactions. In an actual interaction over the phone, a listener would form an impression of a speaker based on the speaker's voice, and would also use message content to evaluate that speaker. In a face-to-face interaction the listener has not only the vocal characteristics and content of the speaker's message but also the physical appearance, affect, and mannerisms of the individual to consider. As such, voice quality becomes only one of many factors that influence a listener's perceptions of a speaker.

Chapter VI. Conclusions

This study found that university students rated speakers with normal voice and resonance more positively than speakers with voice disorders or resonance disorders, on a semantic differential scale measuring various aspects of personality and appearance. These results were consistent with other investigations of attitudes toward speakers with these disorders (Blood et al., 1979; Gelacek & Neiman, 1994). Many other studies in the field of communication disorders have also found that attitudes towards people with such disorders are negative (Burroughs & Small, 1991; Gies-Zaborowski & Silverman, 1986; Silverman, 1976; Woods & Williams, 1976; Lass et al., 1992). In the present study, a significant difference was also found between responses for speakers with voice and resonance disorders; those with dysphonic voices were rated more positively than those with hypernasal resonance.

The second major finding of this study was that attitudes of half of the listeners, who read information about voice and resonance disorders, were not significantly different from attitudes of the other half of the listeners, who read neutral information before rating the speakers. Information was also not effective at altering attitudes in some previous studies involving communication disorders (Leahy, 1994, Ruscello & Lass, 1996) but was found to be effective in other studies (Dampier et al., 1985; Gilmore, 1974; Gorenflo & Gorenflo, 1991; Ibrahim & Herr, 1982).

The results of the present study must be interpreted in light of its limitations. The results may apply only to the types of disorders studied and to the specific content and type of information used. In addition, the task did not involve an actual conversation between a speaker and listener. Nevertheless, the results suggest that people with voice or resonance disorders tend to be perceived in an primarily negative manner. Based on the nature of the adjectives associated with these speakers and previous information from the literature (e.g., Aronson, 1990; Smith et al., 1996; Tobiasen & Hiebert, 1993), these negative perceptions likely occur during phone conversations, social situations, and job interviews. Clinicians in speech-language pathology should be aware of these negative attitudes toward their clients and should provide their clients with appropriate therapy and strategies for dealing with negative reactions they may encounter.

The nature of attitudes towards people with communication disorders is an important research area to consider. Although a fair number of studies have discovered that negative attitudes exist, more detailed probes into the development of these attitudes

and their effects on the lives of individuals are needed. In addition, much remains to be discovered with respect to methods for preventing or altering prejudiced attitudes.

Recommendations for Future Research

There are many interesting areas within the study of attitudes and attitude change that could be investigated in future research. Firstly, it would be useful to determine whether the type of communication disorder used as the attitude referent is an important factor in determining whether information about that disorder is effective at changing attitudes. Published studies of attitudes toward people with communication disorders have examined perceptions about different disorders. Several studies on the same disorders are required before patterns emerge that may provide more information about the influence of disorder type on the potential for attitude change.

Another interesting area to explore would be the specific characteristics of voices with disorders that cause negative or positive reactions. Perhaps through computer manipulation, researchers could alter specific parameters of the voices to determine which ones listeners dislike most and least. They could also examine more closely those voices that are disordered but are rated quite positively by listeners (e.g., speaker V3) to determine what combinations of characteristics of disordered voices are pleasing to listeners. Another factor related to speaker subjects that could be better controlled in future investigations would be speaker variables such as intonation or presence of other dysphonic characteristics such as pitch breaks.

Similar studies should also be conducted with different etiologies and severities of disorders to broaden the generality of the findings. Males with voice and resonance disorders should also be studied. Studies that are designed to test for differences between female and male listeners should be conducted as well, using an adequate number of people of each sex. It may be that one sex has more favorable attitudes toward people with voice and resonance disorders. Studies that use listeners who are not primarily young and university-educated should be conducted to improve the generality of the findings.

The present study employed a between-group design whereby attitudes were compared between listeners who were randomly assigned to two groups which were found to have homogeneous variances. Future studies might also attempt to evaluate attitude change within an individual by measuring attitudes from the same people both

before and after presenting information. This design would contribute to the research on this topic by demonstrating actual attitude changes within a person.

In addition, a study similar to the present one with variations in the form of the attitude-change intervention could be conducted, including a different type of information, a combination of information and personal contact, or role-playing. Attitudes could also be measured some time after the intervention to determine if they change over time. Additional research in this field could use more extensive measures of listeners' comprehension of the information presented, to ensure that the information was transmitted as intended.

Finally, studies that use a more naturalistic type of voice presentation would be useful. Perhaps, measuring the attitudes of subjects who talk on the phone to people with voice and resonance disorders would achieve this objective. Studies that simulated a job interview situation using job applicants with voice or resonance disorders could be conducted, to determine if voice quality or resonance can indeed influence hiring decisions.

There are many avenues of research to explore in the area of attitudes about people with voice and resonance disorders. The primary types of studies that would add to this area of inquiry include those using different severities and types of disorders, different demographic characteristics of listeners, various types of intervention, and more naturalistic experimental tasks.

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Appendix A
Semantic Differential Items

Example semantic differential scale:

perfect _____ _____ _____ _____ _____ __X__ _____ imperfect

intelligent	unintelligent
competent	incompetent
independent	dependent
wise	foolish
confident	unsure
reliable	unreliable
cooperative	uncooperative
kind	unkind
sociable	shy
friendly	unfriendly
nice	mean
interesting	boring
beautiful	ugly
healthy	sick
attractive	unattractive
attracting	repelling
pleasant	unpleasant
soothing	aggravating
acceptable	unacceptable
approachable	unapproachable
positive	negative
perfect	imperfect
natural	unnatural
graceful	awkward

(Sources: Addington, 1968; Blood, Mahan & Hyman, 1979; Lass, Ruscello, Stout & Hoffman, 1991; Leahy, 1994; Osgood, Suci & Tannenbaum, 1957; Silverman, 1976 & Silverman, 1993)

Appendix B
Grandfather Passage

You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in the winter when the ooze or snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

(from Darley, Aronson & Brown, 1975)

Appendix C
Speaker Consent Form: Voice-Disordered Speakers

(Flesch reading grade level = 8.6)

Project title: Perceptions of speakers based on samples of their voices.

Investigator: Amar Lallh, graduate student in the M.Sc. degree program in speech language pathology, University of Alberta. (Supervisor: Dr. Anne Rochet, 492-0836)

Purpose: The purpose of this study is to find out how people perceive the personal attributes of speakers based on samples of their voices.

Procedures: We are asking you to participate in this study because your voice is a good example of a voice disorder due to vocal nodules. You will be asked to read a short paragraph aloud. This paragraph is shown on the next page. Reading the paragraph will take about 1 minute. You will read it during your routine evaluation in the Voice Clinic or at a time and place that is convenient for you. Your reading will be audiotaped. Later, students at the University will hear your voice along with a number of other voices.

You also must have normal hearing to participate in this study. The investigator may need to ask the Voice Clinic coordinator to check your hospital records to ensure that you do have normal hearing.

Benefits/Risks: There will be no direct benefits for participants. There are no known risks involved in participating.

Confidentiality: Your name and all other information about you will never be revealed to the people who will hear your voice. As well, you will not be identified in the written thesis or any scientific publications or presentations related to this project. You will be assigned a project I.D. number. This number will be used whenever your voice sample is identified. Only the investigator and her supervisor will have access to your personal information that goes with the project I.D. number. Your voice sample will be used only for this study and will be destroyed at the completion of the study.

I voluntarily agree to participate. I may refuse to answer any questions. I am free to withdraw my consent and stop my participation at any time. If I decide not to participate or I withdraw from the study, I will not experience any negative consequences.

I have read this form and this project has been discussed with me. All of my questions about this study have been answered to my satisfaction. If I have any further questions, I can contact Amar Lallh at 462-3317. I understand my involvement in this study. I have been given a copy of this consent form.

_____ _____

Subject's signature Date

_____

Subject's printed name

The person signing this form appears to understand what is involved in the study and voluntarily agrees to participate.

_____ _____

Voice Clinic Coordinator Amar Lallh, Investigator

The paragraph that you will read is shown below.

You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in the winter when the ooze or snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

Appendix D
Speaker Consent Form: Resonance-Disordered Speakers

(Flesch reading grade level = 8.8)

Project title: Perceptions of speakers based on samples of their voices.

Investigator: Amar Lallh, graduate student in the M.Sc. degree program in speech-language pathology, University of Alberta. (Supervisor: Dr. Anne Rochet, 492-0836)

Purpose: The purpose of this study is to find out how people perceive the personal attributes of speakers based on samples of their voices.

Procedures: We are asking you to participate in this study because your voice is good example of a resonance disorder due to velopharyngeal incompetence. You will be asked to read a short paragraph aloud. This paragraph is shown on the next page. Reading the paragraph will take about 1 minute. You will read it during your routine evaluation in the Resonance Clinic or at a time and place that is convenient for you. Your reading will be audiotaped. Later, students at the University will hear your voice along with a number of other voices.

You also must have normal hearing to participate in this study. The investigator may need to ask the Resonance Clinic coordinator to check your hospital records to ensure that you do have normal hearing.

Benefits/Risks: There will be no direct benefits for participants. There are no known risks involved in participating.

Confidentiality: Your name and all other information about you will never be revealed to the people who will hear your voice. As well, you will not be identified in the written thesis or any scientific publications or presentations related to this project. You will be assigned a project I.D. number. This number will be used whenever your voice sample is identified. Only the investigator and her supervisor will have access to your personal information that goes with the project I.D. number. Your voice sample will be used only for this study and will be destroyed at the completion of the study.

I voluntarily agree to participate. I may refuse to answer any questions. I am free to withdraw my consent and stop my participation at any time. If I decide not to participate or I withdraw from the study, I will not experience any negative consequences.

I have read this form and this project has been discussed with me. All of my questions about this study have been answered to my satisfaction. If I have any further questions, I can contact Amar Lallh at 462-3317. I understand my involvement in this study. I have been given a copy of this consent form.

_____ _____

Subject's signature Date

_____

Subject's printed name

The person signing this form appears to understand what is involved in the study and voluntarily agrees to participate.

_____ _____

Resonance Clinic coordinator Amar Lallh, Investigator

The paragraph that you will read is shown below.

You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in the winter when the ooze or snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

Appendix E

Speaker Consent Form: Normal Voice/Resonance-Young and Middle-aged Subjects

(Flesch reading grade level = 8.5)

Project title: Perceptions of speakers based on samples of their voices.

Investigator: Amar Lallh, graduate student in the M.Sc. degree program in speech language pathology, University of Alberta. (Supervisor: Dr. Anne Rochet, 492-0836)

Purpose: The purpose of this study is to find out how people perceive the personal attributes of speakers based on samples of their voices.

Procedures: We are asking you to participate in this study because your voice is a good example of a typical adult female voice. You will be asked to come to Corbett Hall at the University and read a short paragraph aloud. Your reading will be audiotaped. Later, students at the University will hear your voice along with a number of other voices.

You will be asked to read aloud briefly while the investigator listens to your voice and speech to ensure that they are suitable for this study. This reading will be recorded so that another speech-language pathologist also can assess your voice and speech. Your hearing will be tested by having you put on earphones and listen for tones. You must pass both of these preliminary tasks to have your speech sample used in this study. If it cannot be used it will be destroyed.

The entire session will take about 30 minutes. This includes the preliminary voice, speech, and hearing tests and the recording of your reading aloud.

Benefits/Risks: Participants will receive $5 for the time it takes to complete the task. There are no known risks involved in participating.

Confidentiality: Your name and all other information about you will never be revealed to the people who will hear your voice. As well, you will not be identified in the written thesis or any scientific publications or presentations related to this project. You will be assigned a project I.D. number. This number will be used whenever your voice sample is identified. Only the investigator and her supervisor will have access to your personal information that goes with the project I.D. number. Your voice sample will be used only for this study and will be destroyed at the completion of the study.

I voluntarily agree to participate. I may refuse to answer any questions. I am free to withdraw my consent and stop my participation at any time. If I decide not to participate or I withdraw from the study, I will not experience any negative consequences.

I have read this form and this project has been discussed with me. All of my questions about this study have been answered to my satisfaction. If I have any further questions, I can contact Amar Lallh at 462-3317. I understand my involvement in this study. I have been given a copy of this consent form.

Subject's signature _____ Date _____

Subject's printed name _____

The person signing this form appears to understand what is involved in the study and voluntarily agrees to participate.

Amar Lallh, Investigator _____

The paragraph that you will read is shown below.

You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in the winter when the ooze or snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

Appendix F

Speaker Consent Form: Normal Voice/Resonance-Elder Subjects

(Flesch reading grade level =8.6)

Project title: Perceptions of speakers based on samples of their voices.

Investigator: Amar Lallh, graduate student in the M.Sc. degree program in speech language pathology, University of Alberta. (Supervisor: Dr. Anne Rochet, 492-0836)

Purpose: The purpose of this study is to find out how people perceive the personal attributes of speakers based on samples of their voices.

Procedures: We are asking you to participate in this study because your voice is a good example of a typical adult female voice. You will be asked to come to Corbett Hall at the University and read a short paragraph aloud. Your reading will be audiotaped. Later, students at the University will hear your voice along with a number of other voices.

You will be asked to read aloud briefly while the investigator listens to your voice and speech to ensure that they are suitable for this study. This reading will be recorded so that another speech-language pathologist also can assess your voice and speech. Your hearing will be evaluated by having you answer questions about your hearing ability. You must pass both of these preliminary tasks to have your speech sample used in this study. If it cannot be used it will be destroyed.

The entire session will take about 30 minutes. This includes the preliminary voice, speech, and hearing tests and the recording of your reading aloud.

Benefits/Risks: Participants will receive $5 for the time it takes to complete the task. There are no known risks involved in participating.

Confidentiality: Your name and all other information about you will never be revealed to the people who will hear your voice. As well, you will not be identified in the written thesis or any scientific publications or presentations related to this project. You will be assigned a project I.D. number. This number will be used whenever your voice sample is identified. Only the investigator and her supervisor will have access to your personal information that goes with the project I.D. number.

Your voice sample will be used only for this study and will be destroyed at the completion of the study.

I voluntarily agree to participate. I may refuse to answer any questions. I am free to withdraw my consent and stop my participation at any time. If I decide not to participate or I withdraw from the study, I will not experience any negative consequences.

I have read this form and this project has been discussed with me. All of my questions about this study have been answered to my satisfaction. If I have any further questions, I can contact Amar Lallh at 462-3317. I understand my involvement in this study. I have been given a copy of this consent form.

_____ _____

Subject's signature Date

_____

Subject's printed name

The person signing this form appears to understand what is involved in the study and voluntarily agrees to participate.

_____

Amar Lallh, Investigator

The paragraph that you will read is shown below.

You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in the winter when the ooze or snow or ice prevents, he slowly takes a short walk in the open air each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language.

Appendix G
Listener Consent Form

(Flesch reading grade level =8.8)

Project title: Perceptions of speakers based on samples of their voices.

Investigator: Amar Lallh, graduate student in the M.Sc. degree program in speech-language pathology, University of Alberta. (Supervisor: Dr. Anne Rochet, 492-0836)

Purpose: The purpose of this study is to find out how people perceive the personal attributes of speakers based on samples of their voices.

Procedures: You will be asked to come to Corbett Hall at the University. You will listen to a number of different voices and will rate them on scales. The voice samples will be played by a computer. The rating scales will be shown on a computer screen. You will use a computer mouse to indicate your response to each scale.

Participants in this study need to have normal hearing. Your hearing will be tested before you start. This involves putting on some earphones and listening for tones. You must pass the hearing test to participate in the research project.

The entire research project will take about one hour. This will include the hearing test and the voice ratings.

Benefits/Risks: Participants will receive $7 for the time it takes to complete the task. There are no known risks involved in participating.

Confidentiality: Your responses on the computer will be identified by a project I.D. number only. The investigator and her supervisor will be the only people with access to the data from this study. All data will be stored in a secure location. Response data will be used only in the written thesis and any scientific publications or presentations related to this project.

I voluntarily agree to participate. I may refuse to answer any questions. I am free to withdraw my consent and stop my participation at any time. If I decide not to participate or I withdraw from the study, I will not experience any negative consequences.

I have read this form and this project has been discussed with me. All of my questions about this study have been answered to my satisfaction. If I have any further questions, I

can contact Amar Lallh at 462-3317. I understand my involvement in this study. I have been given a copy of this consent form.

_____ _____

Subject's signature Date

_____

Subject's printed name

The person signing this form appears to understand what is involved in the study and voluntarily agrees to participate.

_____

Amar Lallh, Investigator

Appendix H
Speaker Sample Ratings on The Voice Profile

Sample	Rater	Sev	Laryngeal cavity Pitch	Resonating cavity Open/Closed	Nasality	Gutt/Effem	Vocal Range	Diplo	Pitch Breaks
N1	A.L.	1	1	1	1	1	1	absent	absent
	A.P.R.	1	1	1	1	1	1	absent	absent
	C.Z.	1	-2(int)	+2(int)	1	1	1	int	absent
	M.O.	1	1	+2(int)	1	1	1	int	absent
N2	A.L.	1	1	1	1	1	1	absent	absent
	A.P.R.	1	1	1	1	1	1	absent	absent
	C.Z.	1	1	1	1	1	1	int	absent
	M.O.	1	1	1	1	1	1	int	absent
N3*	A.L.	1	1	-2(int)	1	1	1	int	absent
	A.P.R.	1	1	-2	1	1	1	int	absent
	C.Z.	2	-2	-2	1	1	1	int	absent
	M.O.	2	-2(int)	+2(int)	1	1	1	int	absent
V1	A.L.	4	-2	-2,+2	1	1	-2	int	present
	A.P.R.	4	1	-2,+2	1	1	1, -2(sec)	int	present
	C.Z.	5	-2(sec)	-2,+2	1	1	1	int	present
V2	A.L.	4	-2	-2,+2	1	1	-2	int	present
	A.P.R.	3	1	-2,+2	1	1	-2	present	present
	C.Z.	4	1	-2,+2	1	1	1	int	present
V3	A.L.	4	-2	-2,+2	1	1	1	int	absent
	A.P.R.	2	-2	-2,+2(int)	1	1	1	int	present
	C.Z.	4	-2	-2,+2(sec)	1	1	1	int	absent
R1	A.L.	4	1	+2(sec)	+3	1	-2	absent	absent
	A.P.R.	5	1	+2	+3	1	-2	present	absent
	M.O.	3	1	1	+3,+2	1	1	absent	absent
R2	A.L.	4	1	1	+3, +2(sec)	1	1	absent	absent
	A.P.R.	5	1	1	+3	1	1	int	absent
	M.O.	3	1	1	+3,+2	1	1	absent	absent
R3	A.L.	5	-2	1	+3	1	1	absent	absent
	A.P.R.	6	-2	+2(int)	+3, +4(int)	1	1	int	absent
	M.O.	5	1	1	+3,+4	1	1	absent	absent

Note. Sev=Severity, Gutt=Gutteral, Effem=Effeminate, Diplo=Diplophonia, int=intermittent characteristic, sec=secondary characteristic.

* Subject N3 was considered to have a normal voice for her age (72 years).

Appendix I
Voice and Resonance Information Materials

(Flesch reading grade level = 11.2; Total words = 1020)

You will hear a number of different speakers during the next 30-45 minutes. Some of the speakers you hear will have a voice or resonance disorder. Before you begin to rate the speakers, please read the information below about such disorders. Take as much time to read it as you need. In order to ensure you understand the material, you will be asked to answer 4 multiple-choice questions about it. Feel free to look back at these pages when answering the questions.

What are voice and resonance disorders?

A voice disorder exists when the pitch, loudness or quality of a speaker's voice calls attention to itself rather than to what the speaker is saying. People with a voice disorder may speak with one or more of the following characteristics: a voice pitch that is too high or too deep, a monotonous voice, a very loud or a very quiet voice, a voice with unstable loudness, a "breathy" sounding voice, or a "hoarse" sounding voice.

A resonance disorder exists when a speaker's voice sounds too nasal or has too little nasality. Too much nasality occurs when the speaker has difficulty raising the soft palate to close off the nasal passageway while speaking. This makes it sound as if the person is speaking through their nose. Speaking with too little nasality is similar to the way a person sounds when they have a cold.

What are some common causes of voice and resonance disorders?

Voice disorders have many different causes. They may be caused by over-use or misuse of the voice. Therefore, people who scream, speak or cough excessively may develop small growths, like calluses on their vocal cords. These benign growths, called vocal nodules, affect the way a voice sounds. Vocal nodules can also be caused by speaking or singing at an unnatural pitch.

There are also physical or medical causes of voice disorders. A person may have a voice disorder because of a paralyzed vocal cord. This results from damage to nerves that go to the voice box (larynx). Other diseases such as multiple sclerosis might also affect the way a person's voice sounds. Inflammation of the larynx, or laryngitis, is a common, temporary voice disorder which can occur from a bacterial or viral infection.

Some voice disorders have no known physical cause. Some of them are probably due to emotional problems or to personal stress. Voice disorders also can result from thyroid gland problems and hormonal disorders.

Resonance disorders with too much nasality can be caused by paralysis of the back of the palate (soft palate) and throat. This nerve damage can be caused by an injury to the neck or head. Too much nasality also can occur if a person has a soft palate that is too short to close off the entrance to the nasal passages. An infant may also be born with a malformed palate that did not join together fully during development. This is called cleft palate and may have a serious effect on speech. Sometimes people also speak with a

nasal voice when there appears to be no physical reason for doing so. This condition may be related to an emotional problem or to a problem that diagnostic methods cannot detect.

Too little nasality can be caused by enlarged adenoids. It can also be caused by an injury to the structures of the nasal passageway which may block air from passing through the nose. Air passage through the nose also may be blocked if the nose was malformed from birth.

How does a voice or resonance disorder affect one's life?

A voice or resonance disorder can seriously affect an individual's psychological well-being, social life and work. Because our voices are uniquely personal to each and every one of us, having a voice disorder can be emotionally upsetting. Most people rely on others to recognize their voices over the telephone. When someone does not recognize you, it can cause embarrassment and shame. Part of a person's identity is conveyed by his or her voice. It can be disturbing to hear yourself talk and not recognize or like the voice you are producing.

A person's social life can be affected by a voice or resonance disorder. People with these disorders have a difficult time speaking in noisy areas and, therefore, may avoid going out very much. They may also avoid using the telephone.

Because voice and resonance disorders can interfere with the ability to communicate effectively, having one can be devastating to a person's work or school achievement. People in jobs that rely on voice and speech, such as singers, lawyers and teachers, often cannot work effectively without voices that are clear and pleasant. Frequently other people cannot understand what speakers with voice or resonance disorders are saying. When a speaker has a voice disorder, he or she often must use a lot of energy to talk for a long time. Therefore, having a voice disorder can be stressful and tiring.

Common treatment for voice or resonance disorders

Treatment for voice and resonance disorders is provided by medical doctors, dentists and speech-language pathologists. Doctors may prescribe drugs for laryngitis or for allergies that irritate the voice. They provide surgery to repair cleft palates. Doctors also deal with other disease conditions or emotional problems that cause voice disorders. Dentists make oral appliances for people with too much nasality during speech.

Speech-language pathologists provide therapy for many persons with voice and resonance problems. They teach techniques which allow production of the best sounding voice possible for each person. They also focus on reducing behaviors that lead to poor use of voice. Speech therapy for resonance disorders usually occurs along with or after medical or dental services. Speech therapy for too much nasality focuses primarily on practicing ways of talking to make speech sound less nasal. Therapy for those who speak with too little nasality, focuses on practicing how to add more nasal resonance while speaking.

Summary

Voice and resonance disorders can hinder effective communication. They may also affect a person's psychological health and social life. However, when treatment is provided, many people with these problems can be helped.

Appendix J
Neutral Information Materials: Human Language

(Flesch reading grade level = 11.3; Total words =1025)

You will hear a number of different speakers during the next 30-45 minutes. Some of the speakers you hear will have a voice or resonance disorder. Before you begin to rate the speakers, please read the information below about human communication. Take as much time to read it as you need. In order to ensure you understand the material, you will be asked to answer 4 multiple-choice questions about it. Feel free to look back at these pages when answering the questions.

Human language

Whenever humans come together, they talk. Humans live in a world of language. People talk to their friends, their wives and husbands, their teachers, and their parents. They talk to bus drivers and total strangers. They talk face to face and over the telephone. Other people respond to them with more talk. Television and radio further swell this flow of words. Hardly a moment of life is free from words. People even talk in their dreams. Humans are the only animals that engage in this activity; they are the only animals that talk.

Human language has special properties that suggest it is both unique to humans and essentially similar in all humans. The characteristics that distinguish human language are apparent when language is compared to animal communication.

Animals are clearly able to communicate with one another and with humans, at some level. Cats and dogs meow or bark for attention. They can also convey messages by scratching at a door or looking expectantly at their dishes. Scratching and meowing are clearly not language, however. This is because the messages are very limited in terms of topics and ideas and also can be interpreted only in the context of the immediate situation.

There are three characteristics of language that make it more than just a communication system. True language is *productive*. Speakers can make many new sentences and can recombine words they already know to say something they've never heard before. Language also has *semanticity*. This means that it can represent ideas, events, and objects symbolically. People can talk about thoughts as easily as they talk about physical objects. The third criterion is that language has the possibility of *displacement*. Messages need not be tied to the immediate context, location or time.

Bee communication

Insects such as bees have an elaborate communication system. Unlike the expressive meowing of a hungry cat, in many senses the communication system of the bee shows displacement. This means that it tells other bees about something in the outside world rather than about something to do with the "here and now". A bee returning to the hive after finding nectar-filled flowers collects an audience of bees and then performs a dance. The dance indicates the direction from the hive and approximate distance to the

nectar. Other bees watch, join the dance and then head for the flowers. Although the movements of the dance have structure and meaning, there is only one possible conversation topic-- where to find nectar. The bees cannot tell one another that the flowers are pretty or that flying is monotonous.

Sea Mammals and birds

Whales and dolphins have elaborate systems of whistles and grunts that are meaningful to others of their species. Some birds also have a variety of meaningful calls. For example, birds may have calls for courting, flying away or warning. Again, although these communication systems have usefulness for these animals, they are all tied to the present situation and allow only a restricted set of messages.

Primate language

During the past half century, studies have examined whether primates could learn human language. These studies were conducted mainly to determine if language was a uniquely human ability or if it could be learned by other species. Scientists wanted to know how humans were different from other animals and how they were similar. Studies were conducted with chimpanzees, because of their genetic similarity to humans and because of their intelligence and social nature. Chimpanzees also naturally use a variety of vocal cries such as a food bark and a danger cry. Initial attempts to teach chimps oral language were not effective. Primates do not have the specialized vocal apparatus to produce speech that humans do. Without that specialized vocal apparatus, sound production as elaborate as human speech is almost impossible. Later studies used sign language which utilized the natural gestural abilities of chimps.

Studies that taught chimpanzees sign language found that chimps could learn a large number of signs. Some learned over a hundred signs and were able to combine several signs. Some chimps occasionally generalized words in much the same way that humans do. An example of this would be referring to a hat they had never seen before as a "hat". The chimp understood the concept "hat" applied not only to the hat it had seen while learning the sign for the word, but also to other similar items worn on the head. However, the chimps did not seem to produce grammar or word order in the way that even young human children would. When they produced long strings of signs they were often repetitions of signs. With years of specialized training some chimps were able to learn 100 words, whereas human children normally learn several thousand words before they go to school and without any special instruction.

For now it appears that primates do not have language as we know it. Humans are set apart from all other life forms on earth due to their complex ability to communicate with speech. However, new hope and speculation have arisen in recent years about primate language because of the discovery of a rare pygmy chimp. This chimp is found only in the remote rain forests of Zaire. It is smaller, more social, more intelligent, and more communicative than the common chimp. In one study a young pygmy chimp acquired manual signs merely by observing his mother's lessons. Further study may reveal greater language abilities in these animals than in other non-human primates.

Summary

Various animals have been studied to determine whether they possess language abilities similar to humans. The current evidence suggests that language is an ability that is uniquely human.

This material was adapted from the following two sources:

Jean Berko Gleason (Editor), The Development of Language (Second Edition). Copyright, 1989. Adapted by permission from Allyn and Bacon.

Victoria Fromkin & Robert Rodman, An Introduction to Language (Fourth Edition). Copyright, 1988; Harcourt Brace & Company. Reprinted by permission of the publisher.

Appendix K
Questions about Clarity of Information Materials

Please read all of the instructions before doing the task.

1. Please read the information titled "Voice and Resonance Information"* on the attached pages. You may reread the pages as many times as you wish.

2. Underline any areas that you find confusing or difficult to understand. If possible, indicate in the margin what you found confusing about the statement.

3. Rate the overall difficulty of the information to you. Circle the appropriate word or phrase.

Difficult Somewhat difficult Average Somewhat easy Easy

4. Is there anything else you would like to know about this topic? Please respond in the space below.

5. After completing these pages, continue on to the second reading passage.

*N.B. A similar form with the same set of questions was used with the "Human Language" information materials, with a change to the title written in item number one above.

Appendix L
Multiple-Choice Questions About Information Materials

Voice and Resonance Disorders Information Questions

1. A person has a voice disorder if he or she:
a. speaks with a pitch that is appropriate for his or her sex and age.
b. speaks with a hoarse voice.
c. speaks too fast.
d. speaks with an accent.

2. A resonance disorder can be caused by:
a. paralysis of nerves which go to the back of the throat.
b. a cleft palate.
c. injury to the nose.
d. all of the above.

3. Which of the following are probable social or work-related consequences of a voice disorder?
a. The person becomes more outgoing and talkative.
b. The person's voice is not loud enough for others to hear at work.
c. Others do not recognize the person over the telephone.
d. b and c.

4. Which of the following statements is true?
a. Dentists provide speech therapy for people with voice disorders.
b. Doctors provide speech therapy for people with voice and resonance disorders.
c. Speech-language pathologists provide therapy for people with various voice and resonance disorders.
d. Most voice and resonance problems cannot be helped with treatment.

Human Communication Information Questions

1. Which of the following statements is true?
a. Humans and animals speak in very similar ways.
b. Humans rely heavily on language in almost every aspect of their lives.
c. A dog's bark is an example of true language.
d. Humans can only talk about a limited number of topics.

2. Humans can combine words in novel ways to create unique sentences in their language. This phenomenon is referred to as:
a. productivity.
b. semanticity.
c. displacement.
d. none of the above.

3. When bees communicate, they are able to inform other bees about which of the following things:
a. the location of the nectar
b. what the flowers with the nectar look like.
c. the distance to the nectar.
d. a and c.

4. When the chimpanzees who were studied produced a sequence of signs:
a. they used as many different signs (words) as most human children.
b. they often repeated the same signs.
c. they also said the words out loud while making the sign.
d. the word order used was similar to human language word order.

Appendix M
Form for Identifying Information

Please complete the following questions. This information will be used only for statistical analysis and will be treated as confidential.

Project ID number _____

Age _____Years

Sex (please circle) Male Female

Faculty _____

Program/Department _____

If you would like to be sent a short explanation of the study and a brief summary of the overall results, please write your name, an address and a postal code below. (This information will not be used for any other purpose).

Name _____

Address _____

Postal Code _____

Appendix N
Debriefing Letter

Dear _____,

Some time ago, you were a subject in a research study conducted in the Department of Speech Pathology and Audiology at the University of Alberta. It was about how people perceive the personal attributes of speakers based on their voices.

You listened to three groups of speakers. Some speakers had normal voices, some had voice disorders, and some had resonance disorders. A person has a voice disorder when the pitch, loudness or quality of his or her voice calls attention to itself rather than to what that person is saying. A person has a resonance disorder when his or her voice sounds too nasal or has too little nasality.

One purpose of the study was to see if listeners' perceptions of speakers with normal voices would be different from their perceptions of speakers with disordered voice or resonance. The examiner predicted that listeners would rate the normal speakers more positively on the rating scales than they would rate the other speakers. The examiner expected that people would have less favorable perceptions of the speakers who had the disorders.

In the study, you read two pages of information before you rated the voices. Half of the listeners, including you*, read information about voice and resonance disorders, while the other half read information about human language. The second purpose of the study was to test whether the listeners who received specific information about voice and resonance disorders would rate speakers with those disorders more positively. The examiner thought that the listeners might have more positive perceptions about the speakers with disorders if they knew more about those disorders. Listeners who read information about human language did not learn anything about voice and resonance, per se. They were asked to read a passage that was neutral on those topics in order to keep the total time of the task similar between the two groups.

The results of the study indicated that the speakers with normal voice and resonance were perceived the most positively by the listeners. They were rated significantly more positively than the speakers who had voice disorders, who were in turn rated more positively than the speakers who had resonance disorders. There were no significant differences, however, between the ratings made by the group of listeners who read the information about voice and resonance disorders and the ratings made by listeners who read neutral information.

These results suggest that speakers with these disorders are perceived less positively by listeners, and that these less favorable perceptions often deal with characteristics that are unrelated to a person's ability to communicate. These results are consistent with the anecdotal evidence provided by speakers with these disorders who report facing less than favorable attitudes from others in their daily lives.

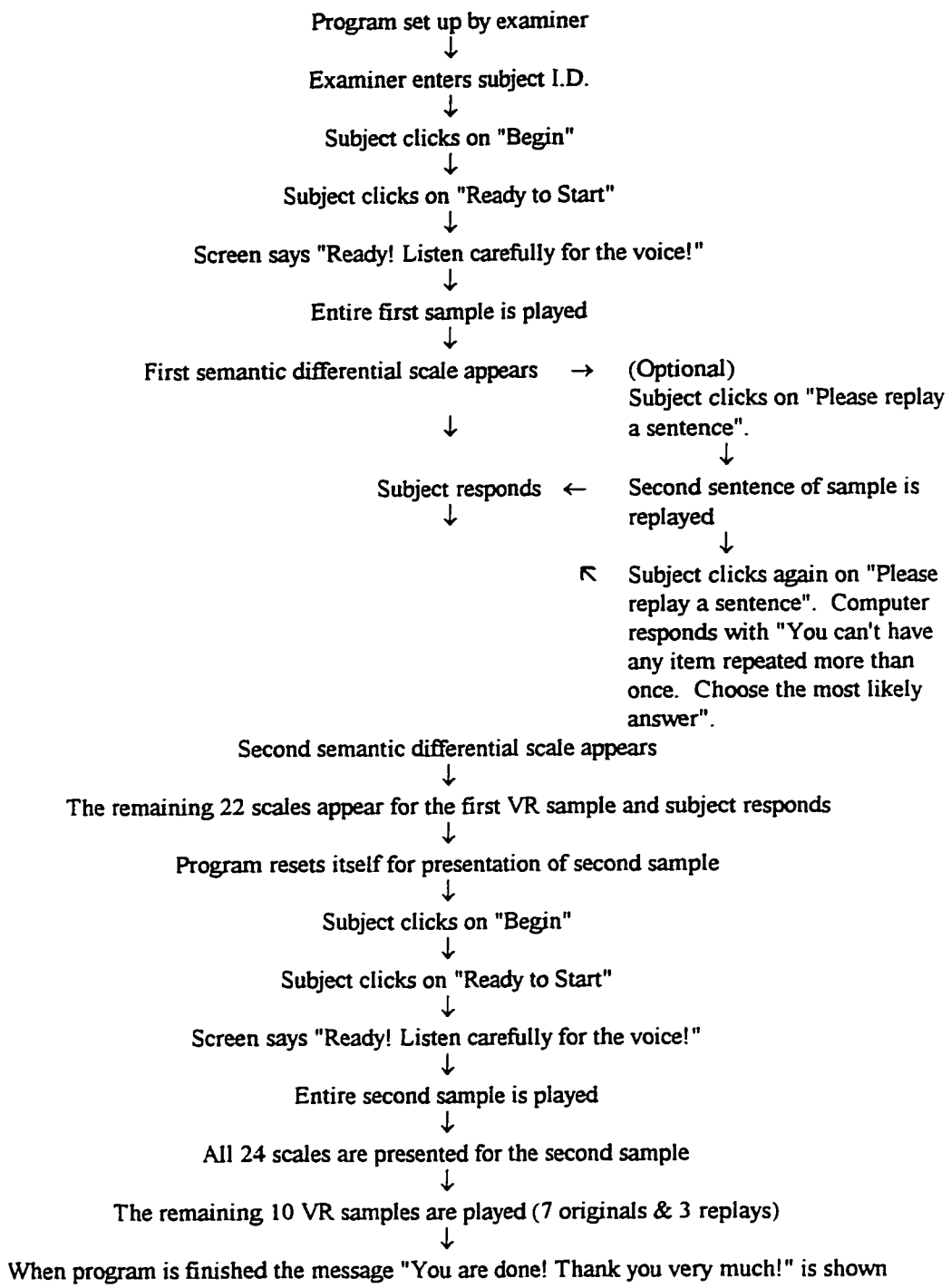
The results also suggest that providing information about these disorders to listeners does not appear to influence their perceptions. Listeners who understood more about the disorders of the speakers they were listening to responded in very similar ways

to those who knew little about the speakers' disorders. This indicates that information alone may not be enough to alter peoples' perceptions. Perhaps personal interaction with individuals who have these disorders is also required.

The results of this study have provided information that will be useful in understanding the social implications of these disorders. Thank you for your participation in this research. Your interest, time and efforts were much appreciated. If you have any questions about this study, please call Amar Lallh at 462-3317.

*N. B. This debriefing letter has been written specifically for the group of subjects who read the voice and resonance disorders information materials. A few words in paragraph four will be altered for subjects who read the neutral information materials.

Appendix O
Flow Chart of Listening Program



Appendix P
Instructions to Listener Subjects

The purpose of this study is to determine how people perceive the personal attributes of speakers, based on samples of their voices. You will hear 12 adult female voices in this study. You may hear some speakers more than once. The task will take about 45 minutes. Your job is to listen carefully to the recorded sample of each woman's voice and then rate that speaker on 24 scales with a descriptive word on either end.

Here is how to use the scales:
If you feel that the speaker you just heard can be described as *very closely related* to one end of the scale, you should click on the space as follows:

energetic __X__ _____ _____ _____ _____ _____ _____ lazy
(i.e., *extremely* energetic)

or

energetic _____ _____ _____ _____ _____ _____ __X__ lazy
(i.e., *extremely* lazy)

If you think that the speaker is *quite closely related* to one or the other end of the scale, you should click on the areas as follows:

energetic _____ __X__ _____ _____ _____ _____ _____ lazy
(i.e., *quite* energetic)

or

energetic _____ _____ _____ _____ _____ __X__ _____ lazy
(i.e., *quite* lazy)

If the speaker seems *only slightly related* to one end as opposed to the other end, then you should click as follows:

energetic _____ _____ __X__ _____ _____ _____ _____ lazy
(i.e., *slightly* energetic)

or

energetic _____ _____ _____ _____ __X__ _____ _____ lazy
(i.e., *slightly* lazy)

Remember, the direction toward which you select depends upon which of the two ends of the scale seems most characteristic of the speaker you are rating.

If you consider the speaker to be *neutral* on the scale or if the scale is *completely irrelevant* or unrelated to the speaker, then click on the middle space.

energetic _____ _____ _____ X _____ _____ _____ lazy

Do not worry or puzzle over individual items. It is your first impressions, your immediate "feelings" about the items that we wish to capture.

Make each item a separate and independent rating. Don't worry about how you rated the other items.

After selecting your response for an item, the next item will appear on the screen. Answer that item in the same manner. Any time an item is presented, you may re-listen to one of the speaker's sentences if you wish. You can do this by clicking on a box on the screen that says "Please replay a sentence".

After completing all 24 scales corresponding to a particular speaker, you will see a box on the screen which says "Begin". Click on this to prepare the computer for the next speaker. The next screen will say "Ready to Start". Click on this box when you are ready to hear the next recording. Rate the next speaker using the scales in the same way.

N.B. When clicking a scale position on the actual computer program the space was highlighted momentarily rather than being marked with an "X".

(adapted from Osgood, Suci, & Tannenbaum, 1957)