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ABSTRACT

To determine whether voice quality affects the way in which children with Down's syndrome are perceived, 24 undergraduate students at Auburn University (Georgia) viewed photographs of children (3 to 13 years old) with Down's syndrome. Two conditions were established: in the first, the photographs were paired with voice samples of the child pictured; in the second, the same photographs were paired with voice samples of non-retarded children. The undergraduates then rated each child on a 12-item semantic differential. The Down's syndrome children were rated significantly more positively when their photographs were paired with voice samples of non-retarded children. The greatest differences were on ratings of confidence and capability. It was concluded that the abnormal voice quality associated with Down's syndrome does have a stigmatizing effect. (Author/CL)

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STIGMATIC EFFECT OF THE VOICE IN DOWN'S SYNDROME

Presented as a poster session at the 1986 ASHA convention under the title  
Listener Reaction To Voice Quality of Down's Syndrome Children

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## Abstract

Photographs of children with Down's syndrome were presented under two conditions to two groups of judges. In condition one, the photographs were paired with voice samples of the child pictured. In condition two the same photographs were paired with voice samples of non-retarded children. The judges then rated each child on a 12 item semantic differential. The Down's syndrome children were rated significantly higher (more positively) when their photographs were paired with voice samples of non-retarded children. The greatest differences were on ratings of confidence and capability.

Stigmatic Effect in the Voice  
of Down's Syndrome

Children with Down's syndrome have typically been described as exhibiting an abnormal voice quality (Benda, 1965; Penrose & Smith, 1966; West, Kennedy & Carr, 1947). While several studies have investigated the acoustical aspects of this abnormal voice quality, (Hollien & Copeland, 1965; Michel & Carney, 1964; Montague, Brown, & Hollien, 1974; Montague, Hollien, Hollien, & Wold, 1978; Moran & Gilbert, 1978; 1982) it has yet to be determined whether voice quality has any effect on the way in which children with Down's syndrome are perceived by others. It has been established that voice quality does affect the way in which non-retarded speakers are perceived (Barbara, 1958; Murphy, 1964; Starkweather, 1961). However, in light of other physical stigmata associated with Down's syndrome, voice quality may not contribute significantly to the overall perception of children with Down's syndrome. If voice does not contribute to the stigmata of Down's syndrome, then speech pathologists should direct their efforts exclusively to speech and language problems of these children. If the voice of children with Down's syndrome does have a stigmatic effect, then speech pathologists should consider voice therapy in the treatment plan for these children.

The purpose of the present study was to determine whether voice quality affects the way in which children with Down's syndrome are perceived by a group of non-retarded adults.

#### Method

##### Measure of Perceptions

In order to measure the way in which Down's syndrome children were perceived, a semantic differential task was constructed (Osgood, Suci, & Tannenbaum, 1957). In a semantic differential, a group of raters are provided with a set of seven-step bipolar adjectival scales and instructed to indicate for each scale the direction and intensity of its association to the stimulus being rated (Silverman, 1977). The particular scales used in the present study (see Appendix A.) were selected after reviewing existing literature reporting concepts and perceptions associated with mentally retarded individuals. Investigations using the semantic differential technique were emphasized in the review and the bipolar adjectives selected in the present study were taken from prior research on perceptions of the mentally retarded. (Aloia, 1975; Greenbaum & Wang, 1965; Guskin, 1962a; 1962b; 1963). The scales used in the present study were listed in random order and the determination as to whether the positive or negative adjective was presented

first was also randomized.

### Subjects (raters)

Twenty-four junior and senior students in the Elementary Education curriculum at Auburn University served as subjects for the present study.

### Stimuli

Ten children with Down's syndrome (5 males, 5 females) ranging in age from 3 to 13 years were photographed using a 35mm camera with color film for slides. The children were then tape recorded as they produced prolonged isolated samples of the vowels /a/ (ah), /i/ (ee), and /u/ (oo). Ten non-retarded children matched for age and sex and judged by two speech pathologists to have normal voice quality were also tape recorded as they produced the three isolated vowels. All tape recordings were made with a TASCAM Model 22-2 tape recorder in conjunction with a Unidyne III Model 545 dynamic microphone. A mouth-to-microphone distance of 15 cm was maintained during recording. Prolonged vowels were selected as a stimulus in order to eliminate speech and language differences between the two groups of speakers so the raters could focus on vocal quality. Also, the task was one which all of the Down's syndrome children were willing and able to perform.

### Procedure

The twenty-four subjects (raters) were randomly

assigned to two groups of 12. Each group was then shown the photographs, in the form of slides, of the Down's syndrome children. The same slides were shown to both groups. The voice samples were presented to the raters via the same TASCAM Model 22-2 tape recorder/player in conjunction with a Realistic Model SA-150 amplifier and a Realistic Model MC-1201 speaker. The speaker was situated in the front of the room near the screen onto which the slides were projected. As a slide was presented, an experimenter played the three vowel sample associated with a slide three successive times to allow the raters to assess the voice quality of the sample. For each group, half the slides were paired with the voice sample of the child pictured while the other half were paired with the voice sample of a non-retarded child matched for age and sex. The presentations were arranged in such a manner that each slide was viewed by 12 raters in each voice condition (paired with own voice, paired with non-retarded child's voice). For each of the 10 slides, the raters were asked to examine all of the 12 adjectival scales and to indicate how close each adjective came to their perception of the child pictured. After all raters indicated their completion of the twelve scales, the next slide was shown and the rating procedure repeated until all 10 slides had been viewed. The seven steps between each

bipolar adjective pair were explained to the raters in the following manner: "This adjective describes my perception of the child as follows:

adj. a <sup>very</sup> well:well:somewhat:neutral:somewhat:well:well: <sup>very</sup> adj. b

Therefore, ratings to the left or right indicated a strong association with one of the adjectives, ratings toward the middle indicated a weak association, and a rating at the midpoint indicated no association with either adjective.

#### Results and Discussion

For purposes of analysis the seven points between the bipolar adjectives were assigned numbers with 1 = a strong association with the negative adjective, 4 = a neutral response, and 7 = a strong association with the positive adjective. The mean ratings on each scale for each voice condition are presented in Table 1. Mean ratings of the Down's syndrome children were lower (less

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Insert Table 1. about here

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positive) when pictures of the children were paired with their own voice samples than when the same pictures were paired with voice samples from non-retarded children. A Wilcoxon signed ranks test (Hollander & Wolfe, 1973)



indicated that this difference between voice conditions was statistically significant ( $T=9.5$ ,  $p<.05$ ). The two scales for which the "own voice" condition did not receive lower ratings than the "non-retarded voice" condition were scale four (calm-excitable) and scale nine (cooperative-uncooperative). For scale four the "own voice" condition received higher (more positive) ratings. The term calm as a contrast to excitable may have been interpreted by the raters as "lethargic" and therefore may not reflect a positive perception. On scale nine (cooperative-uncooperative) both voice conditions received identical mean ratings. Cooperativeness is extremely difficult to judge based only on a photograph and a voice sample with no opportunity to interact with the child.

Although consistent and statistically significant, the differences in ratings between the two voice conditions are rather small, and several of the means presented in Table 1 tend toward the neutral rating of four. Because the meaning of a neutral rating in the present study is not entirely clear, perhaps a technique other than a hypothesis test would help in interpreting the data. Another way to interpret a semantic differential is described by Silverman (1977). Silverman indicates that it is possible to derive three indices of the emotional tone of a person's reaction to

a stimulus by determining the number of scales receiving positive ratings (5-7), negative ratings (1-3), and neutral ratings (4). (Because the present study deals with average ratings, ratings of 1-3.4 were considered negative, ratings of 3.5-4.5 were considered neutral, and ratings of 4.6-7 were considered positive). The Overall Tone Index is the number of positive scales divided by the number of negative scales. A quotient of less than 1.0 indicates a negative reaction to a stimulus; a quotient of greater than 1.0 a positive reaction. A quotient of approximately 1.0 indicates no overall tone to the person's reaction to the stimulus (Silverman, 1977, p. 266). In the present study the average Overall Tone Index for Down's syndrome children in the "own voice" condition was 4.23 while in the "non-retarded voice" condition the Overall Tone Index was 5.93. Both indices are positive, but the index for the "non-retarded voice" condition is more positive. The Negativity Index is the number of scales with negative ratings divided by the total number of scales. The possible values of this index range from 0.0 to 1.0. The higher the quotient, the more negative the reaction to the stimulus. In the present study the Negativity Index for Down's syndrome children in the "own voice" condition was .37 and for the same children in the "non-retarded voice" condition the Negativity Index was

.14. The "own voice" condition resulted in a more negative reaction to the stimuli. The Positivity Index is the number of scales with positive ratings divided by the total number of scales. The range of the Positivity Index is 0.0 to 1.0 and the higher the quotient the more positive the reaction to the stimulus. In the present study the Positivity Index of Down's syndrome children in the "own voice" condition was .51 while for the same children in the "non-retarded voice" condition the Positivity Index was .62. The "non-retarded voice" condition resulted in a more positive reaction to the stimuli. The Overall Tone, Negativity and Positivity Indices all support the finding reported above; that photographs of Down's syndrome children paired with samples of their own voice consistently resulted in less positive perceptions of those children than did the same photographs paired with the voice samples of non-retarded children.

From the results of the present study it can be concluded that the abnormal voice quality associated with Down's syndrome does have a stigmatic effect. Down's syndrome children were perceived more positively when their photographs were associated with a voice sample of normal quality. The greatest negative effects of voice quality in the present study appeared to be causing children with Down's syndrome to be perceived as

less confident, and less capable. Such perceptions might possibly affect judgements regarding academic and social planning for these children. The implications of the present study are three-fold. First, research should continue to attempt to identify those acoustic and physiological parameters which result in the abnormal voice quality associated with Down's syndrome. Second, professionals responsible for developing academic and social programs for children with Down's syndrome should be aware of the abnormal voice quality associated with the syndrome and should be aware of the potential contribution of voice quality to their perceptions of these children. Third, while voice therapy with retarded populations is difficult, speech pathologists must give some consideration to voice quality in addition to language and articulation in planning speech therapy programs for children with Down's syndrome.

In the present study undergraduate students served as raters. Professionals who are more experienced and more familiar with Down's syndrome children may not be influenced by voice quality to the same degree as students. Also, the present study made no attempt to determine whether voice had a more negative effect on male children or female children. These questions should be addressed in future research.

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TABLE 1. Mean and range of judges ratings of Down's syndrome children in two voice conditions.

Scale <sup>a</sup>	With Own Voice		With Voice of Non-Retarded Children	
	Mean	Range	Mean	Range
1. (Lazy-Ambitious)	3.9	(2.6 - 5.5)	4.7	(3.6 - 6.2)
2. (Unfriendly-Friendly)	5.0	(3.1 - 6.2)	5.7	(4.3 - 6.6)
3. (Distractible-Attentive)	3.7	(2.6 - 5.3)	4.1	(3.2 - 5.4)
4. (Excitable-Calm)	4.6	(3.4 - 6.0)	3.7	(2.3 - 5.0)
5. (Unsociable-Sociable)	4.2	(2.8 - 5.9)	5.0	(3.4 - 6.2)
6. (Not likable-Likable)	5.4	(4.4 - 6.2)	5.5	(4.3 - 6.2)
7. (Timid-Confident)	3.1	(1.6 - 5.4)	4.5	(3.0 - 6.6)
8. (Unpleasant-Pleasant)	5.0	(3.5 - 6.0)	5.4	(4.3 - 6.2)
9. (Uncooperative-Cooperative)	4.7	(3.3 - 5.9)	4.7	(4.2 - 6.0)
10. (Impulsive-Controlled)	4.4	(3.0 - 5.3)	4.5	(3.6 - 5.4)
11. (Helpless-Capable)	4.1	(2.6 - 5.3)	5.0	(4.0 - 6.3)
12. (Unreliable-Reliable)	4.0	(2.6 - 4.9)	4.5	(3.8 - 5.8)

<sup>a</sup> For ease in interpreting the table, the negative adjective of each scale is always listed first. This was not the case during the collection of the data.



APPENDIX A. The 12 scale semantic differential used in the present study.

Ambitious	__:	__:	__:	__:	__:	__:	__:	Lazy
Unfriendly	__:	__:	__:	__:	__:	__:	__:	Friendly
Distractable	__:	__:	__:	__:	__:	__:	__:	Attentive
Calm	__:	__:	__:	__:	__:	__:	__:	Excitable
Sociable	__:	__:	__:	__:	__:	__:	__:	Unsociable
Not likable	__:	__:	__:	__:	__:	__:	__:	Likable
Confident	__:	__:	__:	__:	__:	__:	__:	Timid
Unpleasant	__:	__:	__:	__:	__:	__:	__:	Pleasant
Cooperative	__:	__:	__:	__:	__:	__:	__:	Uncooperative
Controlled	__:	__:	__:	__:	__:	__:	__:	Impulsive
Helpless	__:	__:	__:	__:	__:	__:	__:	Capable
Reliable	__:	__:	__:	__:	__:	__:	__:	Unreliable

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