Listeners' Attitude Toward People With Dysphonia

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Summary: Objectives. The human voice provides extensive information about the speaker, in addition to the intended linguistic message. Therefore, voice is an essential component in the process of forming an initial attitude toward the speaker. People with communication disorders are typically judged by listeners more negatively than those speaking normally. This trend, however, was not reported consistently regarding voice disorders. Therefore, the aim of this study was to examine listeners' attitude toward dysphonic speakers. In addition, the impact of speaker's and listener's gender on these attitudes was also examined.

Methods. Seventy-four naive listeners evaluated recorded voice samples of six dysphonic and six nondysphonic speakers. Evaluation was performed using a semantic differential scale with 12 bipolar items. In addition, factor analysis was performed to validate listeners' attitudes and allow generalization of the results.

Results. Statistically significant negative attitudes toward dysphonic speakers were found at all 12 scales ($P < 0.001$). Moreover, dysphonic women were rated more negatively than dysphonic men. Nonetheless, listeners' gender and age did not affect their attitude toward speakers ($P > 0.05$). These results were further enhanced and supported by a factor analysis performed based on the original attitude rating scores.

Conclusions. Our findings provide empirical evidence for the negative attitudes with which dysphonic speakers are faced; demonstrating how women are affected by these attitudes more than men and highlight the importance of addressing and relating to these facets in the diagnostic and therapeutic process.

Key Words: Dysphonia–Attitude–Semantic differential scale–Factor analysis–Hebrew.

INTRODUCTION

The human voice is a basic means for communication, even before the development of speech. Being of immense importance for lingual communication, the human voice conveys vast information about the speaker. It was shown that listeners can reliably estimate speakers' physical characteristics based on their voice.[1–3] In addition, listeners infer from the speaker's voice about his/her personality traits,[4–6] although these assumptions are not necessarily accurate. For example, speakers who use a loud voice and a fast speaking rate were judged by listeners as being critical, on the one hand, but having good stress management capabilities, on the other hand.[7] In another study, listeners were able to correctly estimate and rate salespersons' effectiveness, based solely on their voice.[8]

The way in which society perceives an individual affects his/her social and interpersonal encounters, occupational possibilities, and overall quality of life.[8,9] People with various speech and communication disorders are perceived more negatively, judged as less intelligent, capable, and educated, as more aggressive, emotionally unstable, stressed, insensitive, having lower self-esteem, and as less attractive and socially successful.[10] In light of these reports, we were specifically interested to learn whether listeners form a negative attitude toward dysphonic speakers.

Attitude is a general (positive or negative) evaluation toward an idea, a person, or a group of people.[11] Attitudes are usually adopted at a young age; they form the individual's perception of other people and events and are typically consistent throughout one's life. Identifying an individual's attitude toward another person or an idea can be performed, first, by simply asking that person to describe or define the object or by asking to provide associated terms.[12] Another approach for identifying an attitude would provide pairs of contrasting adjectives and ask whether the object is, for example, "good or bad," "soft or hard," or "strong or weak." This approach can be further enhanced by assigning an ordinal rating scale to each pair of contrasting adjectives. This method was advocated by Osgood et al,[12] who developed semantic differential questionnaires for evaluating attitudes. Using this tool, the participant is required to evaluate a person or an idea using a series of bipolar rating scales, by which the direction and intensity of the examined attitude can be characterized.[13]

The efficiency of such tool is dependent on the adequate selection of the included adjectives. Hence, a limited number of contrasting adjectives should be used, such that a broad representation of the studies attitude is provided, on the one hand, but it does not become too long, repetitive, and tiresome, on the other hand.

Osgood et al[12] performed a factor analysis on data collected from more than 50 bipolar scales. They concluded that all scales could be arranged into three factors. The primary factor, which contained approximately 70% of all scales, was entitled *Evaluation*. The following two factors were entitled *Potency* and *Activity*. The validity of these three factors was then repeatedly confirmed in numerous studies on a wide variety of different attitudes (for a basic review, refer the study by Heise[14]). Each of the three factors is most directly and intuitively represented by a prototypical pair of adjectives. *Evaluation* is the best represented by "good-bad" or "positive-negative" and *Potency* is represented by "strong-weak" and *Activity* by "active-passive."

Different listeners tend to exhibit similar attitudes toward speakers' emotions and personality, although in many cases these attitudes are not based on empirical facts.[5] For example, listeners make the association between speakers with

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"attractive voices" to a variety of positive personal traits. This bias is referred to as the "vocal stereotype" ("what sounds beautiful, is good").[6] Vocal attractiveness was found to associate with biological and physiological characteristics, such as age, body size, health, fertility, and even sexual behavior.[6] In men, lower fundamental frequency is perceived as more attractive. This is assumed to be related to the association between the expected proportion between body size and laryngeal size (both vibratory and resonatory mechanisms); that is, as large body size is considered an attractive physical characteristic, men with lower fundamental frequency are perceived by women as more attractive. Following the same pattern, men perceive women with high pitch as more attractive because smaller body size is considered an attractive physical feature for women.[15,16] This observation was also supported as men were shown to judge women's voice as more attractive around ovulation, when pitch was elevated.[17]

People with communication disorders are sometimes perceived negatively. Different methodological approaches were used to identify and quantify this attitude. When people were presented with a short written paragraph, which included a description of a person with a speech impediment, readers tended to rate this person as less intelligent and as having lower social skills, maturity, and leadership capabilities.[10,18]

A more robust approach for identifying negative attitudes toward people with communication disorders was based on perceptual evaluation of recordings of speech/voice samples that include such impediments and comparing those with normal recordings. In these studies, listeners were asked to evaluate normal speech as well as disordered speech patterns (eg, stuttering, lisping, language disorders, hypernasality, and dysphonia), all produced by actors.[10,18] Listeners' responses were quantified using semantic differential questionnaires and demonstrated a consistent and negative attitude toward the disordered speech. Furthermore, it was shown that negative attitudes toward people with speech problems can be formed even in the presence of minor speech problems. Such negative attitudes were observed when listeners were presented with a recording of a speaker who produced a paragraph with 98 words of which only a single word was misarticulated.[19] It should be noted that in among these studies, dysphonia was rated as the disorder that resulted in the *least* negative effect on listeners' attitudes, in comparison with other communication disorders.

In an extensive review on the subjective experience of people with dysphonia, it was reported that they experience a general negative social response.[9] Dysphonic people reported that their voice disorder has limited their occupational abilities, hindered their professional promotion, and even resulted in losing their jobs. This has led to reported fear of public speaking, depression, and in some cases even suicidal tendencies. Such reports are further supported by the growing body of research that focuses on voice-related quality of life and the widespread use of relevant self-administered questionnaires in voice clinics around the world.[20–25] Although it is clear that people with dysphonia experience negative social reactions and that their quality of life is affected, the extent to which this subjective experience is based on actual negative attitudes of their listeners is unclear.

A small number of studies have directly examined listeners' specific attitudes toward dysphonic speakers. In these studies, women with dysphonia were rated by listeners as less attractive and as possessing more negative personality traits, compared with women with normal voice.[9,26] Similar results were also reported among teenagers.[13] Moreover, it was shown that dysphonia severity is negatively correlated with a listener's attitude, such that people with severe dysphonia are perceived more negatively on personality scales than people with mild dysphonia.[27]

In conclusion, previous studies have shown that listeners exhibit negative attitudes toward people with dysphonia. Nonetheless, a number of methodological issues emerge from these studies, which warrant further examination of this topic. First, some studies were based on the recordings of a single speaker,[10,19,28] providing a limited representation of dysphonic voices. Second, dysphonia demonstration was based, in several studies, on the recordings of actors who portrayed voice disorders and not on genuine dysphonic voices.[9,10] Third, most previous studies included only female voices,[9,26] with no reference to male speakers and especially with no comparison between genders.

Therefore, in preparation for the present study, it was deemed desirable to address these limitations and use recordings of multiple speakers instead of a single speaker, avoid the use of actors and use genuine recordings, and include both male and female speakers. In addition, in preparation of the semantic differential questionnaire for this study, special attention was given to the selection of the adjective pairs to enable a valid representation of the three factors of the examined attitude. Therefore, the purpose of this study was to examine possible listeners' attitudes toward people with dysphonia and explore possible effects of listeners' and speakers' gender and age on these expected attitudes.

METHODS

Listeners

After obtaining the approval of our institution's ethical committee and a written consent from all participants, 74 naive listeners (26 men and 48 women) volunteered for participation in the study. None of the listeners had prior voice problems or any specific familiarity with dysphonic speakers. Listeners were assigned to two age categories. Forty-five listeners were assigned to the "younger" category (age $\leq$ 40 years), and 29 were assigned to the "older" category (age > 41 years). Table 1 presents listeners' gender and age distribution.

Voice samples

Six dysphonic speakers (three men with a mean age of 44.3 years and three women with a mean age of 48.3 years) and six matching nondysphonic speakers were recorded for this study while reading the "Thousand Islands" reading passage. This is a Hebrew phonetically balanced reading passage (Appendix).

TABLE 1.
Listeners Gender and Age Distribution

	Gender	
Age Category	Men	Women
Younger	n = 11	n = 34
	M = 31.18	M = 29.44
	SD = 5.53	SD = 4.76
	Range: 23–40	Range: 17–28
Older	n = 15	n = 14
	M = 59.00	M = 62.05
	SD = 8.45	SD = 6.68
	Range: 41–75	Range: 49–74

All speakers had normal speech intelligibility and no speech, articulation, or fluency disorders and all were native Hebrew speakers. The recordings of the reading passage were then evaluated by two experienced speech therapists, who performed a perceptual evaluation using the five GRBAS (Grade, Roughness, Breathiness, Asthenia and Strain) scales. Table 2 presents speakers' data and GRBAS ratings made by the two speech therapists.

Recordings

Each speaker was recorded individually while seated in a quiet room. The Thousand Islands reading passage was presented on a paper sheet and the speakers were instructed to read it first silently, to familiarize themselves with it, and then read it aloud. All recordings were performed using a PC20 Sennheiser headset microphone (Sennheiser Communications GmbH, Wedemark, Germany), which was positioned at a fixed distance of 7 cm from the corner of the speaker's mouth. Signal was recorded using *GoldWave*, Ver. 5.57 (GoldWave, Inc., Newfoundland, Canada) with a sampling rate of 48 kHz (16 bit) and saved as a mono channel WAV file. Four segments were extracted from each recording, and each segment included three sentences and lasted 11–15 seconds. Thus, 48 samples were used for the study (12 speakers × 4 samples).

Semantic differential scales

Listeners' evaluation of the different speakers was performed using a semantic differential questionnaire designed specifically for this purpose. The questionnaire included 12 seven-point rating scales. As suggested by Osgood et al,[12] the three major factors used for subjective evaluation (ie, *Evaluation*, *Potency*, and *Activity*) were represented by the 12 selected adjective pairs.

The selection of the adjectives for this study was performed based on a pilot study, in which eight native Hebrew speakers were asked to provide an opposite adjective to a given set of 23 adjectives. The 12 adjective pairs that received the highest agreement rates among the eight judges were used for the final version of the questionnaire. Special attention was given to select only single-word adjectives and avoid the use of negative prefix to any given term, such as "nonfriendly," "unhappy," or "dissatisfied." Consequently, the *Evaluation* factor was represented by six scales of bipolar adjectives: (a) positive-negative, (b) healthy-ill, (c)

TABLE 2.
Speakers' Background Information and GRBAS Ratings Made by Two Speech Therapists

	Speakers					
Group	1	2	3	4	5	6
Dysphonic						
Gender	M	M	M	F	F	F
Age	43	50	40	38	46	61
Occupation	Manager	Teacher	Sales	Teacher	Sales	House keeping
Finding	Unilateral Cyst	Unilateral Polyp	Unilateral paralysis	Functional	Bilateral nodules	Functional
Perceptual						
G	2, 2	2, 2	2, 3	2, 2	2, 2	2, 1
R	2, 2	2, 0	0, 0	2, 2	2, 2	2, 2
B	0, 1	0, 2	2, 3	1, 1	1, 1	1, 1
A	0, 0	0, 2	2, 2	0, 0	0, 0	0, 0
S	2, 1	2, 1	0, 0	1, 1	1, 1	2, 1
NonDysphonic						
Gender	M	M	M	F	F	F
Age	38	58	41	38	41	61
Occupation	Manager	Teacher	Sales	Teacher	Therapist	Secretary
Finding	Normal	Normal	Normal	Normal	Normal	Normal
Perceptual						
G	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
R	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
B	0, 0	0, 0	0, 0	0, 0	1, 0	0, 0
A	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
S	0, 0	0, 0	0, 1	0, 0	0, 0	0, 0

successful-loser, (d) sexy-repulsive, (e) smart-stupid, and (f) sociable-solitary. The *Potency* factor was represented by three scales: (a) strong-weak, (b) masculine-feminine, and (c) decisive-hesitant. The *Activity* factor was represented by three scales: (a) active-passive, (b) aggressive-gentle, and (c) tense-calm.

For presentation purposes, each pair was placed at the two ends of a seven-point scale, and the location of each adjective at the right/left side was altered randomly. The 12 scales were then presented in a random order that was changed between subjects.

In addition to the 12 items of the semantic differential questionnaire, listeners were also asked to respond to four binary (yes/no) questions concerning their attitude toward the speaker. These questions were included to enhance the content validity of the semantic differential questionnaire and enable determent attitude assignment, in case listeners choose a neutral attitude on the rating scales (ie, consistently choose the score of 4, on the seven-point scale). These questions were: (a) Do you like this person? (b) Would you ask for help from this person? (c) Would you hire this person? and (d) Would you buy a car from this person?

Procedure

Participants performed the evaluation task using a Web site designed for this purpose. First, a brief explanation of the procedure was presented. Then, the listener was instructed to put on headphones and adjust the volume to a comfortable level while listening to a recorded speech sample (which was not part of the study). After confirming being ready, a sample task was introduced, and the listener was instructed to mark on his/her selection on the presented seven-point scale.

Each listener rated a single recording of each of the 12 speakers. The order of presentation of the reading segments was kept in accordance with the order in the complete Thousand Islands passage to maintain its coherence. Following the presentation of the 12 segments, two segments were presented again for test-retest reliability evaluation. Each scale was presented on the computer screen alone, and after the listener had performed the rating task, the following scale appeared on the screen. After completion of this task, the four binary questions were presented similarly. Finally, the listener was required to complete a brief anamnesis questionnaire. All responses were, then, fed automatically to a computerized spreadsheet. The complete task required approximately 30 minutes for each listener.

Analyses

Statistical analyses were performed using analysis of variance (ANOVA), in which listeners' gender (male/female) and age (younger/older) were included and speaker's gender (male/female) and voice (dysphonic/nondysphonic) were treated as repeated measures. Test-retest reliability was evaluated for all 12 scales. A Spearman correlation test revealed a significant correlation between the repeated presentations of the scales ($P < 0.001$) and a paired sample t test confirmed no significant difference ($P > 0.05$) between the two presentations of the scales. To evaluate the overall validity of the semantic differential questionnaire, a Spearman correlation coefficient was calculated for the comparison between the responses to the four binary questions and the three computed attitude factors. A strong and statistically significant correlation was found between the *Evaluation* factor and the four questions ($0.88 \leq r \leq 0.94$, $P < 0.0001$). In contrast, the correlation coefficients between the *Potency* and *Activity* factors and the four questions failed to reach statistical significance.

RESULTS

Evaluation of 12 attitude scales

Listeners' ratings on the 12 scales were arranged, such that 1 represents the most negative response, 4 represents a neutral response, and 7 represents the most positive response. The only exceptions for that were the latter two scales ("aggressive-gentle" and "tense-calm"), for which a reversed ordinal scale was used. This was required due to the nature of these adjectives, such that "more aggressive," for example, was evaluated as a negative trait, as opposed to "more gentle." Table 3 presents mean and standard deviation of all listeners' ratings of the dysphonic and nondysphonic speakers, on the 12 scales.

To examine differences between the ratings of dysphonic and nondysphonic speakers, as well as of men and women, a separate ANOVA was performed for each scale, as described above. Table 4 presented listeners ratings arranged by dysphonia group and by gender and a summary of the statistical analyses. Data show that, in general, the dysphonic group was rated by listeners more negatively than the nondysphonic group. This result was consistent and statistically significant for all 12 scales.

Table 4 also demonstrates differences in listeners' ratings given to men and women, regardless of their being dysphonic or not. In general, women were perceived more favorably than men on six scales. Specifically, women were rated as more positive, healthier, successful, sexy, less aggressive, and less tense than men were ($0.0001 < P < 0.01$). In contrast, women received lower ratings on the "smart-stupid" and strong-weak scales ($0.0001 < P < 0.002$). On the "sociable-solitary," "decisive-hesitant," and "active-passive" scales, there was no main effect for Gender ($P > 0.05$). Finally, as expected, a statistically significant main effect for Gender was found for the masculine-feminine scale, such that women were perceived as more feminine and men as more masculine ($P < 0.0001$).

A significant Gender × Dysphonia interaction was found for nine of the 12 scales. Specifically, these nine scales included: "positive-negative" ($F_{3,70} = 5.29$, $P = 0.02$), "healthy-ill" ($F_{3,70} = 7.00$, $P = 0.009$), "successful-loser" ($F_{3,70} = 9.96$, $P = 0.02$), "sexy-repulsive" ($F_{3,70} = 16.34$, $P = 0.0001$), "sociable-solitary" ($F_{3,70} = 30.42$, $P < 0.0001$), strong-weak ($F_{3,70} = 13.48$, $P = 0.0005$), masculine-feminine ($F_{3,70} = 25.23$, $P < 0.0001$), decisive-hesitant ($F_{3,70} = 19.00$, $P < 0.0001$), and active-passive ($F_{3,70} = 50.70$, $P < 0.0001$). The other three scales (smart-stupid, aggressive-gentle, and tense-calm) did not reveal a significant Gender × Dysphonia interaction ($0.14 < P < 0.74$).

This significant Gender × Dysphonia interaction is attributed to the fact that dysphonia resulted in lowered women's ratings

TABLE 3.
Means and Standard Deviations (in Parentheses) of the Listeners' Ratings on the 12 Scales, for the Dysphonic and Nondysphonic Speakers

	Dysphonic		Nondysphonic	
Rating Scale	Men	Women	Men	Women
Positive-negative	4.04 (0.34)	4.39 (0.43	5.03 (0.41)	5.43 (0.46)
Healthy-ill	3.51 (0.54)	3.73 (0.89)	5.33 (0.53)	5.51 (0.64)
Successful-loser	3.86 (0.50)	3.83 (0.31)	4.58 (0.54)	4.99 (0.61)
Sexy-repulsive	3.38 (0.24)	3.74 (0.59)	4.30 (0.53)	4.75 (0.76)
Smart-stupid	3.99 (0.37)	3.64 (0.46)	4.53 (0.29)	4.19 (0.52)
Sociable-solitary	3.93 (0.43)	4.09 (0.65)	4.76 (0.38)	5.14 (0.75)
Strong-weak	3.82 (0.60)	3.48 (0.50)	4.62 (0.61)	4.69 (0.68)
Masculine-feminine	5.69 (0.31)	2.46 (0.89)	5.66 (0.39)	1.82 (0.32)
Decisive-hesitant	3.82 (0.60)	3.35 (0.62)	4.57 (0.64)	4.82 (0.79)
Active-passive	3.98 (0.71)	3.74 (0.37)	4.55 (0.65)	4.81 (0.71)
Aggressive-gentle*	3.90 (0.47)	3.38 (0.38)	3.64 (0.56)	3.09 (0.20)
Tense-calm*	4.40 (0.16)	4.06 (0.33)	3.50 (0.41)	2.95 (0.44)

* On the first 10 scales, 1 represents a lower evaluation (eg, less strong and less active) and 7 represents a higher evaluation (eg, stronger and more active). Because of the nature of the latter two scales, these ratings were evaluated using a reversed ordinal scale, such that 7 represented "more aggressive" and "more tense."

on most scales more than it lowered men's ratings. In other words, women's ratings were more negatively affected by their dysphonia than men's ratings. This interaction is illustrated in Figure 1, as mean ratings of all scales. Note that in this figure, values obtained from the masculine-feminine scale were excluded to eliminate obvious gender-based bias.

Effect of listeners' gender and age

To evaluate possible effect of listeners' gender and age on their ratings, all responses were arranged according to the listener's gender and age group. ANOVA revealed no significant main effect for listener's gender on 11 of the 12 scales ($P > 0.05$). The only exception for this result was the sexy-repulsive scale on which male listeners rated all speakers more positively (ie, more sexy) than female listeners did (4.18 vs 3.96, respectively; $F_{1,72} = 12.95$, $P = 0.0006$).

Listener's age did not affect their ratings on 10 of the 12 scales ($P > 0.05$). The only two scales on which younger and older listeners responded differently were positive-negative ($F_{1,72} = 6.01$, $P = 0.02$) and healthy-ill ($F_{1,72} = 9.80$,

TABLE 4.
Means and Standard Deviations (in Parentheses) of Listeners' Ratings on the Twelve Scales for Both Groups and Genders

	Dysphonia			Gender		
Rating Scale	Dysphonic	Nondysphonic	Group Difference Significance	Men	Women	Gender Difference Significance
Positive-negative	4.21 (1.38)	5.23 (1.22)	$F_{1,72} = 155.85$, $P < 0.0001$	4.53 (1.38)	4.91 (1.39)	$F_{1,72} = 6.19$, $P = 0.01$
Healthy-ill	3.62 (1.60)	5.43 (1.34)	$F_{1,72} = 87.68$, $P < 0.0001$	4.43 (1.72)	4.62 (1.73)	$F_{1,72} = 11.01$, $P = 0.001$
Successful-loser	3.85 (1.25)	4.78 (1.34)	$F_{1,72} = 97.91$, $P < 0.0001$	4.22 (1.37)	4.44 (1.38)	$F_{1,72} = 8.03$, $P = 0.006$
Sexy-repulsive	3.56 (1.26)	4.52 (1.28)	$F_{1,72} = 151.07$, $P < 0.0001$	3.84 (0.62)	4.24 (0.82)	$F_{1,72} = 12.57$, $P = 0.007$
Smart-stupid	3.82 (1.60)	4.36 (1.66)	$F_{1,72} = 20.01$, $P < 0.0001$	4.26 (1.56)	3.92 (1.72)	$F_{1,72} = 22.55$, $P < 0.0001$
Sociable-solitary	4.01 (1.45)	4.95 (1.38)	$F_{1,72} = 69.68$, $P < 0.0001$	4.34 (0.58)	4.62 (0.32)	$F_{1,72} = 0.90$, $P = 0.34$
Strong-weak	3.65 (1.54)	4.65 (1.42)	$F_{1,72} = 101.32$, $P < 0.0001$	4.22 (1.61)	4.09 (1.51)	$F_{1,72} = 10.16$, $P = 0.002$
Masculine-feminine	4.08 (1.97)	3.74 (2.24)	$F_{1,72} = 20.83$, $P < 0.0001$	5.68 (1.18)	2.14 (1.14)	$F_{1,72} = 1979.56$, $P < 0.0001$
Decisive-hesitant	3.59 (1.64)	4.70 (1.55)	$F_{1,72} = 112.00$, $P < 0.0001$	4.19 (0.69)	4.08 (1.02)	$F_{1,72} = 3.00$, $P = 0.08$
Active-passive	3.86 (1.53)	4.68 (1.47)	$F_{1,72} = 52.57$, $P < 0.0001$	4.26 (1.57)	4.27 (1.54)	$F_{1,72} = 1.46$, $P = 0.23$
Aggressive-gentle*	3.65 (1.35)	3.37 (1.34)	$F_{1,72} = 8.28$, $P = 0.005$	3.77 (1.34)	3.24 (1.31)	$F_{1,72} = 33.25$, $P < 0.0001$
Tense-calm*	4.23 (1.60)	3.22 (1.50)	$F_{1,72} = 69.30$, $P < 0.0001$	3.95 (1.63)	3.51 (1.61)	$F_{1,72} = 8.77$, $P = 0.004$

* On the first 10 scales, 1 represents a lower evaluation (eg, less strong and less active) and 7 represents a higher evaluation (eg, stronger and more active). Because of the nature of the latter two scales, these ratings were evaluated using a reversed ordinal scale, such that 7 represented "more aggressive" and "more tense."

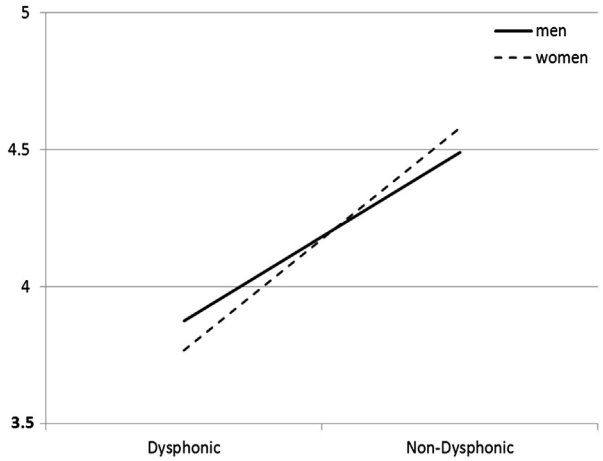

FIGURE 1. Overall mean ratings for men and women in both dysphonic and nondysphonic groups.Mean values presented in this figure were calculated after excluding the values obtained from the "masculine-feminine" scale to avoid gender-based bias.

$P = 0.02$). In both cases, older listeners rated speakers more favorably than younger listeners did (4.90 vs 4.56 and 4.74 vs 4.33, respectively).

Factor analysis

Based on the principles set by Osgood et al,[12] the 12 scales used in this study were selected as representing the three underlying attitude factors (*Evaluation*, *Potency*, and *Activity*). The *Evaluation* factor consisted of a mean score based on the six scales: positive-negative, healthy-ill, successful-loser, smart-stupid, sexy-repulsive, and sociable-solitary. The *Potency* factor consisted of a mean score based on the three scales: strong-weak, masculine-feminine, and decisive-hesitant. The *Activity* factor consisted of a mean score based on the three scales: active-passive, aggressive-gentle, and tense-calm.

Table 5 presents mean factors' scores given by the four listeners' categories to the four groups of speakers.

Data show that on the primary *Evaluation* factor, nondysphonic speakers were rated higher than dysphonic speakers (4.87 vs 3.85, respectively; $F_{1,72} = 87.6$, $P < 0.0001$). Women were rated more positively than men (4.45 vs 4.27, respectively; $F_{1,72} = 5.31$, $P < 0.02$), and a significant Dysphonia × Gender interaction was found ($F_{1,72} = 27.8$, $P < 0.0001$).

On the *Potency* factor, nondysphonic speakers were rated higher than dysphonic speakers (4.36 vs 3.76, respectively; $F_{1,72} = 77.3$, $P < 0.0001$). Men were rated more positively than women (4.70 vs 3.43, respectively; $F_{1,72} = 298.30$, $P < 0.0001$). Nonetheless, no significant Dysphonia × Gender interaction was found ($F_{1,72} = 2.84$, $P = 0.09$).

On the *Activity* factor, dysphonic speakers were rated higher than nondysphonic speakers (3.91 vs 3.75, respectively; $F_{1,72} = 5.32$, $P = 0.02$). Men were rated as more active than women (3.99 vs 3.68, respectively; $F_{1,72} = 29.4$, $P < 0.0001$) but no significant Dysphonia × Gender interaction was found ($F_{1,72} = 0.96$, $P < 0.33$).

No significant effect was found for *listener's* gender and age on the three factors ($P > 0.05$).

Binary questions

Listener's responses to the four binary questions were subjected to statistical analysis to receive supplementary information on listeners' attitude toward dysphonic speakers. Table 6 presents a summary of the listeners' responses to these questions, as well as a summary of the statistical analysis.

On all four questions, listeners rated nondysphonic speakers more positively. However, gender differences were found only on the first two questions ("Do you like this person?" and "Would you ask help from this person?"). In both cases, women were rated more positively than men were. On these two questions, a significant Gender × Dysphonia interaction was also found.

TABLE 5.
Mean Scores on the Attitude's Three Factors, Given by the Four Groups of Listeners to the Four Speakers' Groups

	Listeners		Speakers			
			Dysphonic		Nondysphonic	
Factors	Age Group	Gender	Men	Women	Men	Women
Evaluation	Younger	Men	4.00 (0.41)	3.97 (0.45)	4.40 (0.33)	4.80 (0.30)
		Women	3.60 (0.31)	3.85 (0.29)	4.72 (0.42)	5.02 (0.46)
	Older	Men	3.81 (0.24)	4.04 (0.29)	5.03 (0.35)	5.30 (0.59)
		Women	3.90 (0.39)	3.82 (0.36)	4.82 (0.46)	5.01 (0.45)
Potency	Younger	Men	4.78 (0.86)	3.25 (0.77)	4.71 (0.81)	3.67 (1.61)
		Women	4.43 (1.18)	3.01 (0.53)	5.05 (0.69)	3.68 (1.70)
	Older	Men	4.12 (1.29)	3.17 (0.48)	4.97 (0.46)	4.03 (1.95)
		Women	4.40 (0.75)	3.11 (0.55)	4.86 (0.42)	3.84 (1.56)
Activity	Younger	Men	4.05 (0.40)	3.82 (0.48)	3.79 (0.64)	3.64 (0.98)
		Women	4.17 (0.29)	3.70 (0.34)	3.93 (0.58)	3.65 (1.08)
	Older	Men	3.92 (0.55)	3.67 (0.33)	3.67 (0.61)	3.54 (1.20)
		Women	3.98 (0.35)	3.79 (0.32)	4.12 (0.45)	3.76 (0.70)

TABLE 6.
Summary of Listeners' Responses to the Four Binary Questions, Comparing Dysphonic and Nondysphonic Men and Women

Question	Dysphonic		Nondysphonic		Statistical Analyses		
	Men (%)	Women (%)	Men (%)	Women (%)	Dysphonia Differences	Gender Differences	Interaction
Do you like this person?	47	55	71	66	$F_{1,72} = 66.28$, $P < 0.0001$	$F_{1,72} = 5.86$, $P < 0.02$	$F_{1,72} = 7.62$, $P < 0.007$
Would you ask for help from this person?	37	48	66	79	$F_{1,72} = 53.95$, $P < 0.0001$	$F_{1,72} = 5.39$, $P < 0.023$	$F_{1,72} = 4.24$, $P < 0.043$
Would you hire this person?	56	58	85	82	$F_{1,72} = 54.39$, $P < 0.0001$	$F_{1,72} = 0.01$, $P = 0.77$	$F_{1,72} = 1.49$, $P = 0.22$
Would you buy a car from this person	23	39	68	60	$F_{1,72} = 20.27$, $P < 0.0001$	$F_{1,72} = 0.29$, $P = 0.59$	$F_{1,72} = 0.18$, $P = 0.69$

DISCUSSION

The primary purpose of this study was to learn whether listeners adopt a certain attitude toward speakers with dysphonia, which is different from their attitude toward nondysphonic speakers. Previous research has suggested that listeners might exhibit negative attitudes toward dysphonic speakers. However, these results were obtained in studies that included various methodological limitations, such as using imitated dysphonia, applying a single speaker design, and examining a single gender of speakers. Therefore, the present study used genuine recordings of dysphonic speakers and compared them with the recordings of nondysphonic speakers. We also included both male and female speakers as well as listeners. Furthermore, special attention was given to the selection of the contrasting adjectives, ensuring a valid representation of the three essential dimensions of the studied attitude.

Attitude toward dysphonia

Listeners' attitudes toward dysphonic speakers were negative, in comparison with their attitudes toward nondysphonic speakers. This finding was consistent and statistically significant for all 12 scales. Specifically, dysphonic speakers were rated as more negative, ill, and tense, whereas nondysphonic speakers were rated as more successful, sexy, sociable, and smart. Although the general negative attitude toward dysphonia was expected, based on the previous literature; it was surprising to learn that dysphonic speakers were rated as less active and strong than nondysphonic speakers. Furthermore, it was previously suggested that hoarseness can be perceived as an appealing trait and that a hoarse voice could be judged as sexy.[29] This was not supported by our findings. Instead, it was found that listeners rated dysphonic speakers as *less* sexy (or more repulsive).

Examination of the factor analysis, which arranged the 12 scales into three factors, confirmed that dysphonic speakers were rated lower than nondysphonic speakers on both *Evaluation* and *Potency* factors. In contrast, dysphonic speakers were rated higher than nondysphonic speakers on the *Activity* factor. The high scores on the Activity factor, obtained for the dysphonic speakers, is primarily the result of their higher scores on the "aggressive-gentle" and "tense-calm" scales. Therefore, higher scores on these two scales represent negative attributes (ie, aggressive and tense). This analysis lends support to the conclusion that dysphonic speakers are perceived by listeners as possessing more negative personality traits than nondysphonic speakers.

This finding is of special interest, in light of the fact that a large proportion of the population has a voice problem. In Israel, for example, approximately 16% of the general population report themselves as having a voice problem and 34% reported of having a voice problem in the past year.[30] These findings are in agreement with equivalent reports from other locations.[31] Therefore, it can be expected that because listeners are regularly familiar with dysphonic speakers (or even had a voice problem themselves), they would not hold a negative attitude toward dysphonic speakers. Nonetheless, our results demonstrate that listeners hold a solid and consistent negative attitude

toward people with dysphonia, which spans across all three factors and all 12 scales.

Attitude toward dysphonic men and women

In contrast to the consistent findings of listeners' preference for nondysphonic voices, a less consistent result was obtained when men and women's voices were compared. Primarily and as expected, women's voices were rated as more feminine than men's voices and *vice versa*. Beyond that, women were judged more positively than men on six of the 12 scales (ie, positive-negative, healthy-ill, successful-loser, sexy-repulsive, aggressive-gentle, and tense-calm). On the other hand, women were judged as less smart and strong than men. On the remaining three scales (sociable-solitary, decisive-hesitant, and active-passive), no significant gender differences were identified.

Examination of the factor analysis revealed that women were rated higher than men on the *Evaluation* factor but lower than men on the *Potency* and *Activity* factors. This finding is reminiscent of previous studies demonstrating that attitudes and general stereotypes about women are mostly favorable compared with men, despite the widely accepted idea that people hold a negative stereotype about women.[32] According to these studies, the positive *general* attitude toward women is accompanied by the perception of women as inferior to men on various specific aspects. Therefore, our finding that women were evaluated more positively than men on the *Evaluation* factor but lower than men on both *Potency* and *Activity* factors can be interpreted as a reflection of that general tendency. This discussion is beyond the scope of the present study. Suffice to say that this finding represents a general cultural predisposition, more than a specific voice-related attitude.

A more specifically related finding was the statistically significant interaction between Gender and Dysphonia on the *Evaluation* factor. This interaction reflects the fact that among nondysphonic speakers, women were evaluated higher than men. However, among dysphonic speakers, women were rated lower than men. In other words, women were "penalized" more than men for having a hoarse voice. Therefore, the favorable inclination toward women was observed, as long as they had normal voice quality; whereas hoarse women were judged less favorably than men, which eliminated the feminine advantage.

This result has special practical importance because voice disorders are more prevalent in women than in men.[33,34] Therefore, this finding implies that it is not only that women have a higher incidence of voice disorders, they are also more severely affected than men, due to listeners' reactions to their voice. One possible explanation for the significant reduction in the evaluation of dysphonic women could be related to listeners' preference to high pitch in women, compared with low pitch in men.[15,16] Because dysphonic voices are more commonly characterized by low pitch, this affects women's voices more than men's. Thus, dysphonia causes women to exhibit a more severe deviation from the stereotyped female voice.

Listeners' gender and age

Previous research has entertained the possibility that listeners' characteristics could affect their perception of speakers' voice and related features.[35] In accordance to that, some studies have reported gender differences in deciphering nonverbal vocal cues, implying that women might exhibit different attitudes than men.[36] Similarly, it was suggested that women tend to rate speakers with speech-fluency disturbances more positively than men do.[10] However, studies that directly examined the effect of listeners' gender on their attitude toward *voice disorders* did not reveal such effect.[5,9] Therefore, our assumption was that men and women would not differ in their attitude toward dysphonic and nondysphonic speakers. Indeed, results supported this assumption and demonstrated no effect for listeners' gender.

Interestingly, the only scale on which men and women rated voice differently was the sexy-repulsive scale. As noted, men rated all speakers as more "sexy" than women did. Although this difference was small in magnitude, it was highly statistically significant. This finding probably reflects a general inclination of men, more than women, to relate to a person or an object as attractive or sexy. In that respect, it was previously shown, for example, that men's judgments of women's attractiveness are based on a specific and limited set of features. As a group, men tend to rely on the same set of features when evaluating attractiveness. In contrast, women, as a group, are less consistent in their judgments, and they used a more diverse set of features for evaluating men's attractiveness.[37] Therefore, it is more likely that this finding reflect a cultural gender difference in ratings of attractiveness, more than reflecting specifically on the evaluation of voice and attitudes related to it.

The literature does not provide a consistent conclusion with regard to the possible effect of listeners' age on their evaluation and attitude toward dysphonic speakers. In one study, for example, it was reported that listeners at different age groups all showed negative attitudes toward dysphonic speakers. However, children and teenagers rated dysphonic voices less negatively than the adult group.[13] Another study, however, failed to identify such a tendency and reported no effect of the listeners' age on their evaluation of dysphonic voices at different severity levels.[27]

In the present study, listeners' age did not affect their ratings of the dysphonic and nondysphonic speakers on most scales. Specifically, although no significant effect for listeners' age was found for 10 of the 12 scales, the only two scales on which a significant difference was found were positive-negative and healthy-ill. In both cases, older listeners rated all speakers as more positive and as more healthy. In other words, older listeners were more tolerant of dysphonia, on these two scales, than younger listeners. Therefore, it appears that the present study lends support to the idea that, in general, attitudes toward dysphonia are consistent, regardless of the listener's age.

Finally, the results obtained from the four binary questions supported and provided added validity to the conclusions drawn from the rating scales and factor analysis. As shown, listeners viewed dysphonic people as less likable, trustworthy, and reliable than nondysphonic speakers. The observed preference for women over men was seen in the first two questions (do you like this person? and would you ask for help from this person) but not on the other two questions. As expected, responses to these

two questions demonstrated similar results as the *Evaluation* factor, as they represent a general tendency to like/dislike this person.

CONCLUSIONS

People with dysphonia face negative attitudes and reactions by the people with whom they interact. Our study provides empirical evidence for the negative attitude toward dysphonic speakers. It also sheds light on the different properties of this attitude showing that dysphonic people are perceived as having more negative personality traits, such as being less attractive, less potent, and more aggressiveness and tense. Furthermore, listeners viewed dysphonic speakers as less agreeable and as less reliable.

These findings highlight the importance of addressing social attitudes in the initial evaluation of a dysphonic patient, and even more importantly, during the course of voice therapy. Appreciating the negative impact that dysphonia have on the speaker's quality of life could improve and deepen our understanding of the difficulties which our patients face. Moreover, this study demonstrated that dysphonic women are exposed to more negative attitudes than dysphonic men. This could be viewed as a possible explanation to the fact that women are more inclined to seek voice therapy than men. It is therefore suggested that addressing these issues in the therapy room could be even more relevant and valuable, when providing voice therapy to women.

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APPENDIX

The "Thousand Islands" Hebrew Reading Passage

אלף האיים

רוטב "אלף האיים" הוא רוטב אותו מכינים ממיונז, קטשופ ומגוון של ירקות חתוכים. הרוטב יכול להכיל בצלים, מלפפונים חמוצים, פלפלים, זיתים וביצה קשה. ניתן להשתמש ברוטב כממרח לכריך או כרוטב לסלט. בשנים האחרונות הפך הרוטב למקובל מאוד ברשתות המזון המהיר. את הרוטב מוסיפים כמעט לכל מאכל, מהמבורגר ועד לסלט.

רוטב "אלף האיים" נקרא על שם "ממלכת אלף האיים". זו קבוצת איים קטנים באוקיאנוס ההודי. שלושה רבעים מהאזור מכוסים בים. בשטח היבשתי של הממלכה קיימים אלף וחמש מאות איים, שרק מאתיים מהם מיושבים. האיים הללו הם ראשי הרים תת-מימיים אשר מבצבצים מעל פני הים. באיים אין הרים או גבעות, ולכן הממלכה נחשבת למדינה השטוחה בעולם.

"אלף האיים" היא מדינה עם דגל, חוקים, בתי-ספר ומשטרה. תושבי האיים מנותקים מהעולם וחיים בכפרים קטנים ובעיירות. בכל אי ניתן למצוא כפר או עיירה אחת בלבד. מרבית האיים עשירים בצמחיה טרופית ובעצי קוקוס. ניתן להקיף כל אי תוך עשר דקות, בהליכה איטית על חוף הים הלבן. האיים מאפשרים נופש מיוחד, רגוע או פעיל, על רקע של חופים לבנים, שוניות עשירות ושמיים כחולים.

האזור בו ממוקמת "ממלכת אלף האיים" הוא גן-עדן לאוהבי ים. האיים הם אתר הנופש המושלם עבור הצוללן החובב. בכל צלילה ניתן לראות דגים מעניינים ותמנונים אשר חיים בין אלמוגים מרהיבים. לעיתים קרובות ניתן להבחין גם בכרישים ובצבי ים. במהלך הנופש שוהים הצוללנים על ספינה, וכאשר הם רוצים לצלול, הם עוברים לסירת עץ מיוחדת. הספינות משמשות גם כבתי מלון צפים.

ספנים ותיקים מספרים כי המעבר בין האיים הקטנים צר ומסוכן. לכן ספינות רבות עלו על שרטון בסמוך לאיים. מעברים אלו נחשבו למלכודות מוות לספינות שניסו למצוא מסתור מפני סערות. בשולי המעברים הצרים קיימות מערות קטנות וגדולות. מכיוון שהמערות הללו מוגנות מפני זרמי הים, הן עשירות במיוחד באלמוגים ובדגים נדירים.