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AN INVESTIGATION OF THE EFFECTS OF SPEAKERS' VOCAL
CHARACTERISTICS ON RATINGS OF CONFIDENCE AND PERSUASION

by

JOHN MONTREY

B.S. in B.A., Saint Louis University, 1982

B.A., Saint Louis University, 1982

M.B.A, University of Miami, 1984

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ABSTRACT

This experiment furthered previous research on perceptions of speakers as a function of various vocal characteristics. A low relevance passage was recorded by male and female speakers, simulating voices of orotund, thin, throaty, flat, breathy, as well as rate and pitch variations, so as to determine effects on persuasiveness and confidence. Main effects were found regarding gender across all vocal characteristics. While an orotund voice produced predominately positive effects on ratings of speakers' confidence and persuasiveness, a breathy effect elicited negative ratings. The male speaker was judged more harshly than the female speaker when the vocal characterization departed from the norm.

To family and friends
who supported the continuing research of
the magic of the human voice

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Thanks to Dr. Pryor, Dr. Barfield, and Dr. Costain as being one superb committee. Dr. Barfield continued to add tremendous support. Dr. Costain devoted long hours in the recording studio to add his broadcasting expertise to the validation of the many recordings. These fine words stated in this document were made much the more so by Dr. Pryor's extraordinary writing and editing talent. Maureen McCloskey added her fantastic speaking voice. Dr. Butler volunteered his classroom time, as did Professor Stephen Neel. The UCF Communication Department made the RTV studio available to allow the recordings of vocal characterizations. This detailed experiment required this elaborate team!

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INTRODUCTION

The human voice influences our successes and failures. It moves us, shows us, displays our inner being. If the eyes mirror the soul, the voice presents it. From the first primitive sound that the infant makes to the last whisper made before one's life ends, our voice identifies us.

While the energy and genuineness of one's vocal qualities may seem a subjective discernment, certainly criteria can be identified and measured that may state commonly accepted "good" or "bad" ways of applying this gift of sound, or this vibration of the larynx that facilitates our basic manner of communicating. Just as the craft of a talented public speaker can be assessed as a science and an art, or analogously, a great musician conforms to expected competencies in performing yet adds creative and innovative dimensions in playing, the effect of the voice may be appraised in such artistic and scientific ways of study.

The voice not only contains speech information; it allows us to recognize individuals and emotional states. Our voice identifies us in static features such as age and gender, and also in dynamic information such as emotion and identity (Belin, Fecteau, & Bedard, 2004). Though human babies cannot understand speech, they are able to recognize voice. Every person has the ability to extract "paralinguistic" information in voices. Whether we hear a baby cry, a cough, or a vocalization through a wall, we are able to ascertain important information about the identity and the affective state of the person who creates this utterance.

LITERATURE REVIEW

Research on voice and person perception has taken two main directions. Early studies measured the relationship of vocal distinctiveness to perceived personality (Addington, 1968; Addington 1969). More recently the predominantly measured dependent variable became vocal attractiveness (Berry, 1990; Berry, 1992; Zuckerman & Driver, 1989; Zuckerman, Hodgins & Miyake, 1990; Zuckerman & Miyake, 1993). The effect of personal presence and voice became the trend for research that measured the joint consequence of both (Larrance & Zuckerman, 1981; Miyake & Zuckerman, 1993; Zuckerman, Amidon, Bishop & Pomerantz, 1982; Zuckerman, Miyake, & Elkin, 1995).

Vocal Characteristics and Individual Perceptions of Voice

Several studies have measured stereotyped personality judgments from vocal readings. The studies examined how certain vocal characteristics create stereotyped responses. The research questions tested include whether male and female speakers are perceived differently when similar vocal sounds are made, which dimensions of voice elicit which personality perceptions, and to the extent to which different vocal characteristics alter stereotyped personality perceptions. (Addington, 1968; Addington, 1969; Zuckerman & Driver, 1989; Zuckerman & Miyake, 1993).

Addington (1968) identified seven vocal characteristics, including breathy, thin, flat, nasal, tense, throaty, and orotund; and also added rate and pitch variety. Then

perceptions of 40 personality characteristics, including maturity, neurosis, sexiness, and energy were measured from vocal recordings that represented each characteristic. Results indicated that there were frequently different perceptions as a function of gender. For example, male speakers who were breathy were perceived as being younger and more artistic, while females with breathy voices were perceived as being more feminine and petite, yet also somewhat “high strung” and shallow. The effect made with a “tense” voice was that men were perceived as being cantankerous, while women were perceived as being younger, more emotional, high strung and less intelligent (Addington, 1968). Addington’s similar study one year later measured perceptions of speakers’ credibility. Similar vocal characteristics were recorded, but ratings of competence, dynamism, and trustworthiness were assessed. This time gender had little impact on the ratings. Ratings of trustworthiness were negatively affected by orotundity. Ratings of dynamism were negatively affected by breathiness.

Vocal Attractiveness

More recently, research has assessed attractiveness in and of itself, or “perceived attractiveness,” from voice and face separately, and in combination. When single channels were measured, (face by itself or voice by itself) the effect was more pronounced than in the multiple channel measurements. (Zuckerman & Driver, 1989). Since more attractive voices are associated with more positive personality impressions, Zuckerman and Miyake (1993) researched which specific acoustical characteristics make a voice attractive. Correlations between vocal attractiveness and subjective measures of voice quality indicated that for both men and women moderate articulation correlated positively with ratings of attractiveness, as did moderate resonance, while nasality and

monotonousness produced low ratings of attractiveness. Comparisons with objectively measured voice qualities from a spectrogram showed that subjective ratings of voice quality better predicted perceived vocal attractiveness. It was postulated that attractiveness is a very important element of voice impact, though a voice's total effect has a myriad of consequences and results.

Several studies have also used simultaneous measurements of the vocal likeability and facial attractiveness. These studies indicate that facial attractiveness and vocal likeability increase sending accuracy of facial and vocal cues respectively. Though the joint effect of the two types of attractiveness is generally synergistic, vocal attractiveness was shown to strongly inhibit perceived neurotic tendencies, and physical attractiveness produced perceptions of extraversion. (Larrance & Zuckerman, 1981; Miyake & Zuckerman, 1993; Zuckerman, Hodgins, & Miyake, 1990; Zuckerman, Miyake & Elkin, 1995). Generally, the studies questioned whether the voice affects perceptions of a person's social skill and the perceived attractiveness of the person in the same way that the face does. The earlier study cautioned that conclusions that the attributes of the voice give rise to stable and positive perceptions exactly as the face does could not be stated for certain. (Larrance & Zuckerman, 1981).

Later studies examined five factors of personality, including calmness, "outgoingness," imaginativeness, perception of being good-natured, and conscientiousness. (Miyake & Zuckerman, 1993). Vocal attractiveness correlated positively with perceptions of conscientiousness, yet was weakly associated with ratings of imaginativeness and good-natured perception. Physical attractiveness correlated positively with ratings of outgoingness, yet did not generate positive ratings of

conscientiousness. In terms of effect size, the influence of physical attractiveness exceeded that of vocal attractiveness for four of the five variables, the exception being conscientiousness. (Miyake et al, 1993).

Berry (1992) examined the effects of vocal attractiveness and vocal maturity on person perception. The conclusion was that extremes in vocal attractiveness and vocal maturity do not always yield extremes in impressions. For example, high vocal attractiveness was most likely to lead to impressions of high power and competence when vocal maturity was high, yet attractive voices that were deemed “babyish,” meaning coming across as childish, infantile, immature or even puerile, tended to be perceived in a more neutral manner. Attractive voices were most likely to produce impressions of high warmth and honesty when they were also babyish. Attractive voices that were mature received less positive evaluations along these criteria.

Researchers have proposed that expectations that we form about others based on nonverbal cues such as appearance or vocal quality may have some validity due to a self-fulfilling prophecy or behavioral confirmation mechanism. While impressions based on nonverbal channels are generally consistent, it remains difficult to uncover the particular stimulus characteristics that mediate nonverbal cues and personality (Berry, 1992, Zuckerman & Driver, 1989). Ultimately this research verifies that effects of vocal attractiveness on person perception can be attenuated or augmented by variations in vocal maturity; and that the level of attractiveness similarly affects the vocal maturity of the impression made.

Voice experts identify undesirable vocal characteristics as being too breathy, husky, nasal, flat, or throaty. Conversely, an attractive voice appropriately uses pitch and

"impact" (resonance, articulation, and volume) (Zuckerman & Miyake, 1993). Proper use of pitch involves frequent pitch variation and resonance, often referred to as orotundity, arising from fullness of sound supported by the facial cavity. Such a voice is clear, moderately robust, expressive and full of life, and conveys so-called vocal attractiveness. (Zuckerman & Miyake, 1993).

Just as research on a person's physical attractiveness supports what is beautiful is seen as good, what sounds beautiful also produces a "halo effect." In the event that the visual channel is not present, such as in telephone conversations or voice mail, a person with a warm expressive voice is perceived as being more likable, trustworthy, dominant and competent. Even in face-to-face contexts, the attractive voice has been shown to enhance positive personality perceptions (Semic, 1999).

Vocal Age

Voice perception can be examined in terms of how old one sounds. (Mulac & Giles, 1996) Examinations were made of perceived chronological age of a person from phonatory control, or tremor, jitter, and slower speech rate, longer vowel durations, pauses, poorer breath management and restrictions on vocal maneuvers. One's chronological age can be measured accurately from these factors. Mulac and Giles also examined one's "subjective" age that evolves from one's contextual behaviors (health, mobility, social activity) and how it was perceived. To clarify, if one legitimately has superb health and vitality, his/her subjective age then is "younger" than his/her actual age. Even though the premise was that a speaker's perceived age (as evaluated by listeners) was more of a function of their so called subjective or contextual age than their

actual chronological age, results were that subjective and contextual ages were not better predictors of perceived age than chronological age. Also, how old one sounded, rather than how old one was or how old one felt, was more of a predictor of negative psychological judgments. Stated simply, the Mulac and Giles data suggest that perceived age from vocal cues is strongly heard from vocal strain, vowel elongation, lack of clarity and lack of coarseness. A younger person could thus display “vocal maturity” in certain situations and possibly seem older or more mature in non face-to-face situations. Interestingly, how old a person sounds was correlated positively with adverse psychological judgments regarding five traits, including frailness, ill-naturedness, levels of being subdued, incompetence and dependence.

In contrast to “old” perceptions, studies have examined the relationship between vocal attractiveness and vocal babyishness. Adult voices that contained childlike characteristics gave impressions of less power and more warmth and approachability than did more mature-sounding voices (Berry, 1990; Berry, 1992; Zuckerman & Driver, 1989). Berry’s studies verified that effects of vocal attractiveness and vocal babyishness on social perceptions are independent of one another. Berry (1992) also showed that increasing levels of vocal attractiveness yielded increases in the ratings of strength of male voices, but ratings of strength did not significantly increase in female voices. Ratings of warmth, honesty and kindness for female voices increased as vocal attractiveness increased. Just as physical attractiveness increases perceptions of men’s masculinity, as well as perceptions of females’ femininity, perceived vocal attractiveness in men and women heighten assessments of masculinity and femininity.

Vocal Cues and Persuasion

Broadcasters apply voice changes to generate cognitive awareness of their message so as to make it noticeable or “dramatic.” Several studies have identified an “orienting response,” which refers to receivers’ tendency to focus attention on changing stimuli in the environment (Chattopadhyay, Dahl, Ritchie & Shahin, 2003; Gelinas-Chebat & Chebat, 2001; Potter, 2000). Accordingly, vocal variety in broadcasting is used as a technique to gain and maintain attention, especially in radio. Yet, just as dramatics should not be overdone, cognitive recognition overload takes place if too many vocal changes are “forced!”

Several studies have identified qualities of successful announcers and why they are frequently sought out as voice over professionals. For example, results have shown that voices with faster than normal syllable speed and low pitch produce less negative cognitive responses and more favorable attitudes about both the brand and the advertisement. Interphrase pausation and other combinations of rate and pitch did not affect ad attitudes in a significant manner. (Chattopadhyay, et al, 2003; Gelias-Chebat et al, 2001). Syllable speed does influence consumer responses, with faster articulation causing a disruption of message processing. The findings suggest that advertisements that seek to persuade mostly by marginal elements, or peripheral cues, can improve advertising effectiveness by drawing relatively more attention than to message content through moderately accelerated syllable speed.

Variables such as rate and pitch have also been condensed into voice intonation and voice intensity, and studied from a framework of the elaboration likelihood model.

Peripheral cues include elements of a presentation outside of the message itself. From an ELM perspective, voice characteristics would be considered as peripheral cues and then should affect the receivers' attitudes primarily under low issue involvement situations (such as in commercials for low-desired products). (Petty & Cacioppo, 1981) Since high involvement naturally enhances receivers' focus on the message arguments, voice characteristics would be expected to enhance attitudes significantly more in low involvement situations than in high involvement situations (Gelinas-Chebat et al, 2001). Research has shown that when receivers were not interested in the message, the voice characteristics played the role of maintaining the consumers' attention (Gardner, Mitchell, & Russo, 1985).

Speech rate has also been shown to affect impression formation. Pitch variations added to a faster speech rate may increase the "competence" rating of a speaker. (Ray, 1986). Speech rate acts as a general inducement that augments credibility. (Miller, Maruyama, Beaber & Valone, 1976). Moderately increased speech rate is also associated with higher credibility and may enhance persuasion (Mehrabian & Williams, 1969, Miller et al, 1976). Mehrabian and Williams (1969) reported that high "responsiveness" of a speaker enhanced ratings of persuasiveness. This experiment employed encoding as well as decoding data so as to investigate nonverbal correlates of perceived and intended persuasiveness. Specifically, higher levels of vocal variety and faster speech rate were associated with perceived and intended persuasiveness. Other factors associated with both perceived and intended persuasiveness included greater intonation, more speech volume, higher facial activity, more gesticulation, and greater amounts of eye contact.

Proposed Research

The body of research on voice identifies the effects of vocal characteristics on a variety of dependent variables. Many studies measure perceptions of a speaker's social or collective characteristics (e.g., age, gender). Other studies examine perceptions of one's *trait* dimensions or personal identities. While perceived traits have been elaborated in some detail, no previous research has examined the effects of vocal characteristics on ratings of a speaker's confidence, and very limited research has examined persuasion in this context. The purpose of this study is to test the effects of various vocal characteristics on ratings of male and female speakers' confidence and persuasiveness

Research Questions

Since there is insufficient research to base hypotheses, this study will test research questions. The various vocal characteristics may affect ratings of male and female speakers differently. Accordingly, speaker gender will serve as second independent variable.

A brief persuasive message will be recorded that will simulate different vocal sounds: thin, throaty, flat, nasal, orotund by both a male and female reader, and the following research questions will be examined:

R1: What are the relative effects of thin, throaty, flat, nasal, and orotund male and female speakers' voices on ratings of their vocal confidence?

R2: What are the relative effects of thin, throaty, flat, nasal, and orotund male and female speakers' voices on ratings of their persuasiveness?

The same passage will be used in recordings of three levels of vocal variety and three levels of speech rate. Participants' ratings of the speakers' confidence and persuasiveness will facilitate testing of the following research questions:

R3: What are the relative effects of speech rate on ratings of vocal confidence and persuasiveness of male and female speakers?

R4: What are the relative effects of vocal variety on ratings of vocal confidence and persuasiveness of male and female speakers?

METHODOLOGY

Participants

Sixty undergraduate students in large classes at the University of Central Florida served as participants. The participants were from various majors, and the sample consisted of an equal representation of gender. Each participant evaluated all five vocal qualities as well as one level of vocal variety and one level of speech rate.

Design

The experiment assessed the effects of speaker gender, five vocal qualities, vocal variety, and speech rate on perceptions of vocal confidence and persuasiveness. The five vocal qualities included breathiness, meaning an airy, respiring sound; flatness, meaning a monotonous repetitive sound; throatiness, meaning a hoarse, husky sound; orotundity, representing resonance or full soundness; and thin, meaning “reedy” or unsupported, three variations of speaking rate, slow, normal and fast; and three variations of pitch variety, normal, less than normal, and more than normal. Speakers portrayed each quality as they read a brief message that was intended to persuade. Two factor ANOVAS were used to assess the main and interaction effects of gender and vocal quality, (2 X 5), gender and vocal variety, (2 X 3), and gender and speech rate (2 X 3) on ratings of vocal confidence and persuasiveness.

Validation of Vocal Portrayals

Two qualified speakers, one male and one female, simulated the seven approaches. They followed Paul Heinberg’s text, *Voice Training for Speaking and Reading Aloud*, which describes each of the voice qualities, so as to accurately replicate

these seven vocal characteristics. Exact application of these techniques as explained in this book were studied and applied so that the two speakers were properly trained. Recording equipment such as Cool Edit Pro, and a Marantz cassette recorder and microphone, were utilized to ensure proper recording. Then judges, faculty members of the Nicholson School of Communication, evaluated the validity of the recorded samples. They assessed the samples on seven-point equal interval scales. If the judges rated the sample as representative of the description given the speaker at the time the sample was recorded, then that sample was considered valid.

Procedure

Twenty participants listened to the 10 (2 X 5) recordings of breathy, flat, throaty, thin, orotund for both genders, plus one level of rate and one level of variety. Another twenty subjects listened to 2 X 5 recordings as stated above, plus another level of rate and level of variety, and an additional twenty listened to the 2 X 5 passages, plus the third level of rate and variety. The recorded passage was approximately 90 seconds in length, so participants needed several minutes to hear and evaluate the voice sample passages. Subjects rated the passages on nine Likert scales, four for assessments of persuasion and five for evaluations of confidence.

Participants were randomly assigned to one of the three treatment permutations. The order of exposure to the 5 vocal qualities and one version each of vocal variety and speech rate was counterbalanced so as to reduce possible order effects.

Attached appendices state the proposed approach for measuring the competence of the original recordings and then the Likert scales that confederates used to measure the dependent variables, plus the recorded passage utilized. Appendix A is scales for

validation of the recordings; Appendix B contains the scales used to measure perceived for confidence and persuasion, and Appendix C is the recorded passage read by the speakers.

RESULTS

Twenty-two recordings of the persuasive message were made for the male and female speakers, ten for the vocal characteristics, six for rate, and six for vocal variety. The recordings were made in Room 160, one of the RTV recording studios in the Nicholson School of Communication of the University Of Central Florida. Two members of the Nicholson School of Communication, one an experienced broadcaster, verified that the voice samples accurately depicted the intended vocal characteristics. If a recording was not considered valid, it was deleted and re-recorded until considered legitimate. One female sample of no pitch variation was recorded twice, and one male sample of orotund was recorded three times to legitimize and strengthen the voice sample.

The reliability coefficient analysis for the persuasion dependent measure produced a Cronbach alpha of .94. Therefore the four scales, persuasive, convincing, compelling, and influential, were combined to an aggregate perceived persuasiveness score. Similarly, the reliability coefficient for the confidence scales was .92, allowing the five scales of confident, emphatic, assertive, bold, and certain to be condensed to a total perceived confidence score. These total scores for persuasion and confidence ratings were used in all analyses that follow in this chapter. The total scale range was 4 - 28 for the persuasion measure, and 5 – 35 for the confidence measure.

A 2 (gender) x 5 (vocal characteristic) ANOVA was conducted to assess the data for research question 1. RQ1 examined the effects of gender and vocal characteristics on ratings of the male and female speakers' confidence. All three F-ratios, including the

gender and vocal characteristic main effects, and the gender by vocal characteristic interaction, were statistically significant ($p < .01$). The female speaker was rated significantly more confident than the male speaker ($p < .01$). The vocal characteristic main effect and interaction were probed with post-hoc Tukey tests. The means and results of the Tukey tests are shown in Tables 1 and 2.

Table 1

MEAN RATINGS OF MALE'S CONFIDENCE BY VOCAL
CHARACTERISTIC

MALE VOCAL	n	1	2	3
Male breathy	60	11.03*		
Male flat	60		14.57	
Male thin	60		16.35	
Male throaty	60		16.65	
Male orotund	60			22.45

*means in separate columns differ at $p < .05$; means in same rows do not differ significantly from each other

Table 2

MEAN RATINGS OF FEMALE'S CONFIDENCE BY VOCAL
CHARACTERISTIC

FEMALE VOCAL	n	1	2	3
Female breathy	60	18.82*		
Female throaty	60	20.33	20.33	
Female thin	60		21.77	
Female flat	60		22.07	
Female orotund	60			25.50

*means in separate columns differ at $p < .05$; means in same rows do not differ significantly from each other

The analysis shows that the breathy voice was most detrimental to the ratings of the male speaker's confidence. The flat, throaty and thin male voices produced significantly higher ratings than the breathy voice, while the orotund voice yielded the highest ratings of the male speaker's confidence. The post hoc analysis for the female speaker (Table 2) showed that breathy and throaty vocal styles were perceived as less confident than the other vocal characteristics. Again, the orotund style produced the highest mean rating.

The 2 x 5 ANOVA on persuasion (RQ2) also produced significant main effects for gender and vocal characteristics, and a significant gender by vocal characteristic interaction. For the gender main effect, the female speaker was rated as more persuasive than the male speaker ($F = 25.83$; $p < .01$). The significant vocal characteristic main effect and the significant gender by vocal characteristic interaction were probed with post hoc Tukey comparisons. The means and results of the Tukey tests are shown in Table 3 and Table 4:

Table 3

MEAN RATINGS OF MALE'S PERSUASION BY VOCAL
CHARACTERISTIC

MALE VOCAL	n	1	2	3
Male breathy	60	7.90*		
Male flat	60		10.42	
Male thin	60		11.27	
Male throaty	60		12.68	
Male orotund	60			16.45

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other

Table 4

MEAN RATINGS OF FEMALE'S PERSUASION BY VOCAL
CHARACTERISTIC

FEMALE VOCAL	n	1	2
Female breathy	60	14.03*	
Female thin	60	14.38	
Female throaty	60	15.27	
Female flat	60	16.20	16.20
Female orotund	60		17.97

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other.

The male breathy condition was rated as being least persuasive, with significantly higher ratings for the flat, thin and throaty styles. Once again, the orotund voice received the highest rating, this time regarding perceived persuasiveness. The female subsets for persuasion rated breathy, thin, and throaty voices as being least persuasive, with orotund rated as significantly more persuasive. The female flat voice (mean = 16.20) did not differ significantly in persuasiveness ratings from any other condition.

Research question 3 examined the effect of speech rate on ratings of vocal confidence and persuasion. A 2 (gender) x 3 (rate) ANOVA (RQ 3) was conducted to measure the effects of gender and rate on ratings of confidence. The ANOVA yielded significance for the gender and rate main effects, and the gender x rate interaction. The female speaker was rated more confident than the male. The vocal main effect and interaction were probed with post hoc Tukey comparisons. The means and results of the Tukey tests are shown in Table 5:

Table 5

MEAN RATINGS OF MALE AND FEMALE'S CONFIDENCE BY VOCAL RATE

GENDER RATE	n	1	2	3
Male slow	20	10.35*		
Male fast	20		15.95	
Male regular	20			21.40
Female slow	20			21.75
Female regular	20			23.05
Female fast	20			23.15

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other.

Three levels of ratings were obtained. As Table 5 shows, the male slow, female slow, female fast, and female regular voice produced higher ratings of confidence than the remaining conditions. The three female rate means did not differ from each other on confidence ratings. Two male speaker conditions produced lower ratings, with the male slow voice yielding lower ratings of confidence than any other condition.

A 2 (gender) x 3 (rate) ANOVA was conducted to measure the effects of gender and speech rate on ratings of persuasion. The ANOVA yielded significant main effects for gender, rate, and the gender by rate interaction. The gender main effect was that females were rated significantly more persuasive ($F = 11.94$; $p < .01$). The significant rate main effect and the significant gender by rate interaction were probed with post hoc Tukey comparisons. The means and results of the Tukey tests are shown in Table 6:

Table 6

MEAN RATINGS OF MALE AND FEMALE'S PERSUASION BY VOCAL RATE

GENDER RATE	n	1	2	3
Male slow	20	7.25*		
Male fast	20		12.00	
Male regular	20		15.35	15.35
Female slow	20		16.10	16.10
Female regular	20		16.15	16.15
Female fast	20			17.55

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other

Three levels of ratings were obtained. As Table 6 shows, the male slow rate produced significantly lower ratings than any other condition. The four highest mean ratings were the male regular and the three female rate conditions, with no significant differences among these four means.

A 2 (gender) x 3 (pitch) ANOVA (RQ 4) was conducted to measure the effects of gender and pitch on ratings of confidence and persuasiveness. The ANOVA yielded significant main effects for gender, pitch, and the gender by pitch interaction. The gender main effect shows that the female speaker was rated significantly more confident than the male speaker ($F = 13.42$; $p < .01$). The significant pitch main effect and the significant gender by pitch interaction were probed with post hoc Tukey comparisons. The means and results of the Tukey tests are shown in Table 7:

Table 7

MEAN RATINGS OF MALE AND FEMALE'S CONFIDENCE BY PITCH
VARIATION

GENDER PITCH	n	1	2	3
Male no pitch	20	9.45*		
Female no pitch	20		16.55	
Male regular pitch	20		18.85	18.85
Female lots pitch	20		20.60	20.60
Male lots pitch	20		22.00	22.00
Female regular pitch	20			23.20

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other

Three levels of ratings were obtained. As Table 7 shows, the male speaker with no pitch variation was rated lower on confidence than any other male or female speaker condition. The female speaker with regular pitch variation was rated significantly more confident than when she displayed no pitch variation

A 2 (gender) x 3 (pitch) ANOVA on gender and pitch was computed for perceptions of persuasiveness. The ANOVA yielded significant main effects for gender, pitch, and the gender by pitch interaction ($F = 9.81$; $p < .01$). The significant rate main effect and the significant gender by rate interaction were probed with post hoc Tukey comparisons. The means and results of the Tukey tests are shown in Table 8:

Table 8

MEAN RATINGS OF MALE AND FEMALE'S PERSUASION BY VOCAL PITCH

GENDER PITCH	n	1	2
Male no pitch	20	6.90*	
Female no pitch	20		12.35
Male regular pitch	20		15.05
Female lots pitch	20		15.55
Male lots pitch	20		16.45
Female regular pitch	20		16.80

*means in separate columns differ at $p < .05$, means in same rows do not differ significantly from each other

Two levels of ratings were obtained. As Table 8 shows, the male with no pitch variation produced significantly lower ratings on persuasiveness than any other condition.

DISCUSSION

The findings will be discussed within the framework of three main categories, including the gender main effects, and interpretations of the effects of the individual vocal characteristics on ratings of the male and female speakers' confidence and persuasiveness. As shown by the interactions, the effects of these vocal characteristics were different for the male and female speakers.

Gender Main Effect

The female speaker was rated significantly higher than the male (main effect) for every vocal characteristic (breathy, throaty, thin, flat, orotund, rate, and pitch variation). This was true for both the confidence and persuasion measures.

One explanation for this repeating main effect relates to Addington's (1968) finding that male voices are perceived in terms of their power, while female voices are perceived in terms of their social faculties. Any instance when a male speaker alters his natural speaking voice away from an orotund manner may cause a loss of his perceived power. Consistently, mass media casts male voices for enthusiastic or "hard sell" radio commercials, and female voices for imaginative or interpretive audio reads. Listeners' conditioning from media may acclimatize their beliefs in proper techniques for how a man should sound as compared to a woman's sound.

It must be noted that the current data were based on the ratings of just one male and one female speaker. It is possible that the findings would not generalize to other male and female speakers who display the voice characteristics examined in the study.

The gender main effects were qualified by the significant gender by vocal characteristic interactions on ratings of confidence and persuasiveness. These findings are interpreted in the following sections.

Gender by Vocal Characteristic Interactions on Confidence Ratings

The significant interactions meant that while the female speaker was consistently rated more confident than the male speaker, the relative effects of the individual vocal characteristics varied for the two speakers. Inspections of the means for the five vocal qualities allow interpretation of the interactions. Specifically the disparity in ratings of the female and male speakers was greater with some voice qualities than others. In relation to the female speaker's confidence ratings, the breathy (male 11.03; female 18.82), and flat (male 14.57; female 22.07) voices were more detrimental to the male's confidence ratings than the remaining voice qualities (e.g., orotund male voice, 22.45; female orotund voice, 25.50). When a man's voice is heard as breathy, he may appear as dissipated, tense, and unfocused. When a man sounds flat, he may appear lifeless or uninterested (Addington, 1968). A woman's breathy voice may be perceived as more energetic or aesthetically pleasing than a man's breathy voice. A woman's flat voice may come across as her assertive tone, or her direct tone of voice (Addington, 1968).

The interactions for speech rate and pitch variation on confidence ratings can be explained from the Tukey results from tables 5 and 7. Regarding speech rate, the male's confidence was rated equal to the female's confidence when rates were "regular, but departures from regular, either slow or fast, were detrimental to only the male speaker's ratings. The data suggest the female speaker was afforded greater latitude to violate expectations of normal vocal characteristics. Regarding pitch variation, the male's

confidence ratings approximated the female speaker's ratings, except when the male displayed no pitch variation. The male's mean confidence rating with no pitch variation (9.45) was significantly lower than the female's no pitch variation condition (16.55), and also significantly lower than any other male or female pitch variation condition. Again, the data suggest the male was afforded less latitude to depart from the norm on the vocal characteristic.

Gender by Vocal Characteristic Interactions on Persuasive Ratings

The significant interactions on persuasiveness meant that while the female speaker was consistently rated more persuasive than the male speaker, the relative effects of the individual vocal characteristics varied for the two speakers. Inspections of the means for the five vocal qualities allow interpretation of the interactions. The disparity in mean ratings of the female and male speakers was greater with some voice qualities than others. In relation to the female speaker's persuasiveness ratings, the breathy (male 7.90; female 14.03), and flat (male 10.42; female 16.20) voices were more detrimental to the male's persuasiveness ratings than the remaining voice qualities (e.g., orotund male voice, 16.45; female orotund voice, 17.97). If a male voice is breathy, he may come across as being unconvinced or uninspiring. The female flat voice may indicate her seriousness or belief in her message, yet the male flat voice comes across as skeptical or unmoved (Addington, 1968).

The interactions for speech rate and pitch variation on persuasiveness ratings can be explained from the means in tables 6 and 8. The male slow rate (7.25) was judged significantly less persuasive than the female slow rate condition (16.10). Regarding pitch variation, the male's persuasiveness ratings approximated the female speaker's rating,

except when the male displayed no rate variation, and no pitch variation. The male's no pitch variation (6.90) was rated significantly lower in persuasiveness than any other pitch variation. Again, the data suggest the male is given less latitude to depart from the norm on these two vocal characteristics.

Findings in Relation to Previous Research

Several points of comparison with previous research are noteworthy. First, Addington's 1968 work demonstrated the relevance of speaker gender in the effects of vocal characteristics on person perception. Yet, his 1969 research showed that gender had little impact in ratings of source trustworthiness and competence as a function of vocal cues. The current study demonstrates both main and interaction effects of gender on ratings of speaker confidence and persuasiveness for all vocal characteristic portrayals. A possible explanation for this apparent contradiction is available in previous research by Sereno and Hawkins (1968). The Sereno and Hawkins research shows fluctuations in ratings of source credibility are not always accompanied by corresponding changes in persuasion. Sereno and Hawkins reported that vocal nonfluencies adversely affected rating of source trustworthiness and competence, but has no impact on actual persuasion. As noted earlier, numerous ELM studies (see Petty & Cacioppo, 1981), have shown that receiver who process messages carefully, and with effort, are relatively unaffected by factors outside the message, such as source factors. It should also be noted that the current study assessed perceptions of persuasiveness, not actual attitude change.

Secondly, previous research has shown that ratings of voice attractiveness are enhanced by the use of moderate rate, moderate pitch variation, and moderate impact. The male speaker was rated most confident with this regular rate rather than his slow or

his fast condition. The male speaker was rated poorly with the no pitch variation condition, but was rated significantly higher for the regular pitch and “lots pitch” conditions. Extremes were not necessarily used, so the regular, lots pitch and fast rate conditions utilized in this study actually could be considered somewhat moderate to high. This would extend the previous finding that attractive voices are also seen as more confident and persuasive.

Finally, Mehrabian (1969) showed that higher levels of vocal variety and faster rate were associated with perceived persuasiveness. The results in this study strongly supported Mehrabian’s findings. The male slow condition was rated as least persuasive, with the male regular and male fast rated as significantly more persuasive. The female fast condition was rated as the most persuasive. The male no pitch condition was rated as least persuasive, while the male regular pitch and the male lots pitch conditions were rated as being significantly more persuasive. The female no pitch condition was the lowest rating for persuasion by the female speaker, with the regular and lots pitch conditions rated as significantly more persuasive.

LIMITATIONS

This study would have benefited from the use of several qualified male and female speakers, instead of just one male and one female speaker. Additionally, participants listened to multiple repetitions of the same passage. This repetition may have produced boredom and tedium. Still, the advantage of having each participant provide data for all conditions is that each participant served as their own comparison. Use of different participants to rate each vocal characteristic would not only require a vastly larger sample size, it would serve to increase error variation, thereby reducing statistical power.

It must be also noted that the quality of the recordings was ample, but not produced with elaborate recording equipment. Perhaps specialized acoustical rooms would also mediate varying perceptions among the listeners. Most of the participants were college freshmen and sophomores, and generalization of the findings to other populations is a question for replication.

Summary and Suggestions for Future Research

This study produced findings on how vocal characteristics affect ratings of speakers' confidence. Findings in the area have not been previously reported. Future studies may attempt to analyze this dependent variable of confidence in greater detail. Also, future studies may try to determine a so called ceiling effect for the effectiveness of orotund reads, or high rate/pitch speakers. That is, the vocal characterizations for the various vocal characteristics in this study were not representative of the extreme. Whether, for example, further increases in orotundity would continue to enhance ratings

of confidence and persuasiveness, or whether these ratings should “hit a ceiling” remains a question for future research. Other vocal simulations besides thin, flat, breathy and throaty conditions may be examined, such as highly articulated reads, or different vocal sounds like nasal, or variations on levels of volume. This study’s findings might be examined to see if they coincide with current trends in voice over recording commonly practiced in mass media.

In summary, the current data demonstrates that vocal characteristics significantly affect perceptions of male and female speakers’ confidence and persuasiveness. The data produced a consistent pattern of main and interaction effects such that vocal characteristics departing from the norm were more detrimental to the male than to the female speaker. This finding was discussed with reference to Addington’s (1968) interpretations and listener expectations based on mass media portrayals of male and female voices.

APPENDIX A

SCALE FOR EFFECTIVENESS OF RECORDINGS

Thin	—	—	—	—	—	—	—	full
Throaty	—	—	—	—	—	—	—	open
Unresonant	—	—	—	—	—	—	—	orotund
Breathy	—	—	—	—	—	—	—	supported
Flat	—	—	—	—	—	—	—	round
Slow rate	—	—	—	—	—	—	—	Fast rate
No pitch	—	—	—	—	—	—	—	High pitch

APPENDIX B

SCALES FOR CONFIDENCE AND PERSUASION

Persuasion

Based on the delivery of this passage, I would rate the speaker as

Not at all persuasive	0	1	2	3	4	5	6	very
persuasive								

Not at all convincing	0	1	2	3	4	5	6	very
convincing								

Not at all compelling	0	1	2	3	4	5	6	very
compelling								

Not at all influential	0	1	2	3	4	5	6	very
influential								

Confidence

Based on the delivery of this passage, I would rate the speaker as

Not at all confident	0	1	2	3	4	5	6	very
confident								

Not at all emphatic	0	1	2	3	4	5	6	very
emphatic								

Not at all assertive	0	1	2	3	4	5	6	very
assertive								

Not at all bold	0	1	2	3	4	5	6	very
bold								

Not at all certain	0	1	2	3	4	5	6	very
certain								

APPENDIX C

RECORDED PASSAGE READING BY SPEAKER

Graduate schools and law and medical schools are beginning to show clear and significant preferences for students who received their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Rutgers Business School said: “Although Rutgers has not and will not discriminate on the basis of race or sex, we do show a strong preference for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level.” Admissions officers of law, medical, and graduate schools have also endorsed the comprehensive exam policy and indicated that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institutions of comprehensive exams will be an aid to those who seek admissions to graduate and professional schools after graduation.

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