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Perceptions of Adults with Childlike Voices in Two Cultures

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Two studies tested the hypothesis that adults with childlike voices would be perceived as having childlike psychological attributes. In Study 1, United States undergraduates listened to either 16 male or 16 female speakers reciting the English alphabet, and they rated psychological traits and vocal qualities of each speaker. The results revealed that speakers with vocal qualities perceived as childlike were also perceived as weaker, less competent, and warmer than their mature sounding counterparts, and these effects were independent of speakers' feminine vocal qualities, sex, and perceived age. Study 2 replicated Study 1, employing Korean undergraduates as subjects. The results revealed significant agreement between United States and Korean subjects' ratings of the United States speakers' traits. Moreover, the impact on trait ratings of a childlike voice was very similar for Korean and United States subjects. The results are discussed within a theoretical framework which argues that perceptions of adults with childlike voices may derive from the species-wide adaptive value of analogous reactions to the young.

The existence of implicit beliefs about the psychological attributes of people with particular vocal characteristics is a well-documented phe-

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nomenon in nonverbal person perception research (Knapp, 1980; Seigman, 1978; Schneider, Hastorf, & Ellsworth, 1979). For example, Kramer (1977) surveyed 466 young adults about their "speech stereotypes" and found that people expected those with soft, high voices to be less demanding, less forceful, and more boastful than those with loud, deep voices. Research has also shown that when people make trait judgments about actual speakers, their impressions covary with speakers' vocal characteristics in a manner parallel to known speech stereotypes: Speakers with soft, high voices are judged to be more submissive and sincere than those with loud, deep voices (Robinson & McArthur, 1982; Montepare & Vega, 1987). Other vocal characteristics associated with perceptions of speakers' traits include speaking rate, variability, clarity, and tenseness, to name a few (Addington, 1968; Aronovitch, 1976; Brown, Strong, & Rencher, 1975). Although past research has told us a great deal about the existence and pervasiveness of speech stereotypes, there has been no conceptual framework to explain *why* individuals associate particular traits with particular vocal characteristics. McArthur and Baron's (1983) ecological approach to social perception provides a conceptual framework within which such associations may be understood.

According to ecological theory, directly perceptible characteristics of a person's face, voice, and style of movement provide useful knowledge about a person's behavioral affordances, which are the opportunities for acting or being acted upon that the person provides. It further holds that social perceptions serve an adaptive function either for the survival of the species or for the goal attainment of individuals. Thus, according to the ecological theory, trait inferences about people with particular vocal characteristics may derive from an adaptive detection of behavioral affordances that these voices actually reveal. The particular affordances that are detected are assumed to depend upon the perceivers' attunements, which may be innate or may depend upon the perceivers' social goals, behavioral capabilities, or perceptual experiences.

While the ecological theory assumes that social perception will typically be accurate, it also considers the issue of error. One reason proposed for erroneous perceptions is impoverished stimulus information. It is assumed that configural, dynamic, and multimodal information is often necessary for accurate social perceptions, and that errors may occur when such information is not available. Another proposed source of error is the overgeneralization of perceptions that are usually accurate. Such errors are assumed to derive from the greater utility of overdetecting than underdetecting certain affordances. Thus, the erroneous perception of particular traits in people with particular vocal characteristics may reflect the resemblance of these voices to others that do accurately communicate the traits.

Among the physical characteristics that d
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Vocal characteristics, like facial ones, covary
features that differentiate between members
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deeper in pitch and more rapid (Helfrich, 197
1976). Voice quality, which includes perceived
and harshness (Laver & Hanson, 1981), has
age information, although there is no resea
1979). Not only do vocal characteristics var
characteristics can be used by perceivers t
(Allport & Cantril, 1934; Ptacek & Sander,
1978)

The covariation of vocal characteristics w
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Among the physical characteristics that do accurately communicate socially useful information are those that covary with age. These include facial characteristics, and there is considerable research identifying the specific facial qualities that differentiate infants from adults, as well as establishing the role that these qualities play in eliciting adaptive behaviors toward the young (see Berry & McArthur, 1986, for a review of relevant literature). Also, consistent with predictions derived from the ecological theory regarding erroneous perceptions, research has shown that adults with a babyish facial appearance are perceived to have more childlike behavioral qualities than those whose appearance bears less resemblance to babies (Berry & McArthur, 1985; McArthur & Apatow, 1983–84; McArthur & Berry, 1987).

Vocal characteristics, like facial ones, covary with age, and paralinguistic features that differentiate between members of different age groups have been labeled "age markers" (Helfrich, 1979). Research on paralinguistic age markers has found that with increasing age, children's speech becomes deeper in pitch and more rapid (Helfrich, 1979; Weintraub, 1981; Wood, 1976). Voice quality, which includes perceived attributes such as tenseness and harshness (Laver & Hanson, 1981), has also been proposed to carry age information, although there is no research in this area (Helfrich, 1979). Not only do vocal characteristics vary with age, but also, these characteristics can be used by perceivers to identify a speaker's age (Allport & Cantril, 1934; Ptacek & Sander, 1966; Ryan & Capadano, 1978)

The covariation of vocal characteristics with age, together with perceivers' sensitivity to the age information provided in these attributes, suggests that just as "babyfaced" adults are perceived to have childlike psychological qualities, so may adults with immature voices. Thus, in accordance with ecological theory, it may be hypothesized that trait inferences about people with particular vocal characteristics are reactions to age-related qualities of their voices. Study 1 tested this hypothesis. More specifically, trait impressions and vocal characteristics of young adult men and women were assessed to address the following questions: (1) Do variations in the childlikeness of speakers' vocal qualities yield variations in perceptions of speakers' weakness, incompetence, and warmth? (2) Is the impact of childlike vocal attributes on trait impressions independent of the speakers' sex and perceived age, as well as gender-related attributes of speakers' voices? The latter question is important, inasmuch as there is some overlap in the vocal characteristics that serve as "age markers" and those that serve as "sex markers." Most notably, both the immature voice and the female voice have a higher pitch than their mature and male counterparts (Smith, 1979).

STUDY 1
Method

Subjects

Sixteen male and 16 female United States undergraduates enrolled in an introductory psychology course participated in this study for experimental credit. Subjects of each sex were randomly assigned to one of two sex of speaker conditions; one of two orders of presentation of speakers; and one of two orders of dependent measures.

Voice Samples

Sixteen men between 21 and 36 years of age (M = 27.5 years) and 16 women between 19 and 37 years (M = 26.6 years) served as speakers. Speakers' voices were recorded individually as they recited the alphabet for approximately 25 s while walking back and forth the length of a room.[1] Reciting the alphabet was chosen as the verbal task to equate speech content. This method has been employed successfully in past research investigating the paralinguistic communication of emotion (Davitz & Davitz, 1959; Sincoff & Rosenthal, 1985), and it retains both voice quality information, which is lost when the method of content-filtered speech is used, and sequence information, which is lost when the method of randomized splicing is used (Scherer, 1982).

Two orders of presentation of speakers' voices were prepared with a 5-s pause between each presentation. One order was that in which speakers' voices were recorded and the second order was the reverse of the first. During the testing sessions, voices were played back on a video monitor adjusted such that no picture was visible on the screen and only speakers' voices could be heard.

The equipment used to record voices included a VHS color video recorder (Model BR-6200U), and a Panasonic color video camera (Model WV-3230). Stimulus tapes were edited onto $\frac{3}{4}$-in. videocassettes and played back during the testing sessions on a Sony video recorder (Model VO-2600) and a Sony black and white video monitor (Model CVM-192w) with the screen occluded.

Dependent Measures

Trait ratings. Subjects rated speakers on nine, 7-point bipolar trait scales representing three trait dimensions similar to those along which research has found facial maturity effects and typical of those along which vocal characteristics have been found to influence trait impressions. The first dimension reflected social and physical weakness and the traits included submissive/dominating, vulnerable/invulnerable, and physically weak/physically strong. The second represented perceptions of competency and the traits included scatter-brained/seriousminded, naive/worldly, and lazy/industrious. The third reflected interpersonal warmth and the traits included warm/cold, very nurturant/not at all nurturant, and straightforward/deceitful.

To limit the experimental task to 1 h, trait scales were completed in three groups of three scales with one scale from each dimension in each group. After each speaker presentation, subjects made their ratings on one group of scales. Two orders of presentation of trait groups were created. The first order consisted of a random sequence of three trait groups and the second order was the reverse of the first.

[1] Voice and gait behaviors were simultaneously recorded on videotape because samples of both voice and gait were needed for another study investigating the relative impact of voice, gait, and facial information on trait impressions.

Voice characteristic ratings. Subjects rated speakers' vo representing vocal characteristics proposed to carry age in trait impressions. The characteristics included very high, loud voice, relaxed/tight voice, does not speak clearly/sp voice, and speaks very slowly/speaks very rapidly. Voice of three scales randomly selected from the six scales. two scale groups was counterbalanced across conditions

The use of subjects' subjective ratings as measures of justified on several grounds. First, research has found hig judgments of speakers' vocal attributes and expert pho acteristics (Scherer, 1982). Second, although some vocal have acoustical correlates which may be objectively meas intensity), other attributes do not. Indeed, subjective ra available to measure characteristics such as clarity and

Maturity and gender ratings. Subjects judged the childli voices on 7-point bipolar scales with endpoints labeled *feminine voice/masculine voice*. In addition, they estimate

Speakers' self-ratings. To assess the accuracy of subj 32 speakers rated themselves, and judged how they th the same 9-trait scales that the subjects completed.

Procedure

Subjects were told that the study concerned how phy ceptions of people and that they were to rate samples series of scales. Subjects were given detailed instructi which included an example of the rating scales and t completed the experimental task in groups of four with group.

During the testing sessions, subjects sat in a semicirc the audio source. After each presentation of the 16 v number, the tape was rewound for subsequent presenta trait scales, then the voice scales, and finally the maturity femininity, and age ratings were made last to reduce ratings due to age- and sex-stereotypic labeling.

Results

Data Base

Spearman–Brown reliability coefficients w ratings on each dependent measure and app

Mean ratings for each speaker were compu for measures with acceptable reliabilities.

[2] Reliabilities and other analyses in both studies wer preliminary analyses of variance on each dependent mea of subjects' sex. Preliminary analyses also failed to fi differences in perceived trait impressions and voice c these well-documented differences must reflect the fac within speakers' sex.

Voice characteristic ratings. Subjects rated speakers' voices on six, 7-point bipolar scales representing vocal characteristics proposed to carry age information and known to influence trait impressions. The characteristics included very high/very deep voice, very soft/very loud voice, relaxed/tight voice, does not speak clearly/speaks clearly, monotone/changing voice, and speaks very slowly/speaks very rapidly. Voice ratings were made in two groups of three scales randomly selected from the six scales. The order of presentation of the two scale groups was counterbalanced across conditions.

The use of subjects' subjective ratings as measures of speakers' vocal characteristics is justified on several grounds. First, research has found high agreement between laypersons' judgments of speakers' vocal attributes and expert phoneticians analyses of voice characteristics (Scherer, 1982). Second, although some vocal attributes (e.g., pitch, loudness) have acoustical correlates which may be objectively measured (e.g., fundamental frequency, intensity), other attributes do not. Indeed, subjective ratings are the only way presently available to measure characteristics such as clarity and tightness.

Maturity and gender ratings. Subjects judged the childlikeness and femininity of speakers' voices on 7-point bipolar scales with endpoints labeled *childlike voice/mature voice*, and *feminine voice/masculine voice*. In addition, they estimated the chronological age of speakers.

Speakers' self-ratings. To assess the accuracy of subjects' impressions of speakers, the 32 speakers rated themselves, and judged how they thought others would rate them, on the same 9-trait scales that the subjects completed.

Procedure

Subjects were told that the study concerned how physical characteristics influence perceptions of people and that they were to rate samples of male (or female) voices on a series of scales. Subjects were given detailed instructions about the rating procedures, which included an example of the rating scales and the voices to be judged. Subjects completed the experimental task in groups of four with two men and two women in each group.

During the testing sessions, subjects sat in a semicircle approximately 1.2 m away from the audio source. After each presentation of the 16 voices, which were announced by number, the tape was rewound for subsequent presentations. Subjects first completed the trait scales, then the voice scales, and finally the maturity and gender ratings. Childlikeness, femininity, and age ratings were made last to reduce potential biases in subjects' trait ratings due to age- and sex-stereotypic labeling.

Results

Data Base

Spearman–Brown reliability coefficients were calculated for subjects' ratings on each dependent measure and appear in Table 1.[2]

Mean ratings for each speaker were computed across subjects' ratings for measures with acceptable reliabilities. Although a factor analysis

[2] Reliabilities and other analyses in both studies were done across subject sex because preliminary analyses of variance on each dependent measure revealed no significant effects of subjects' sex. Preliminary analyses also failed to find any significant sex of speaker differences in perceived trait impressions and voice characteristics. The failure to find these well-documented differences must reflect the fact that subjects' ratings were made within speakers' sex.

TABLE 1
RELIABILITIES OF DEPENDENT MEASURES BY SEX OF SPEAKER

Dependent measure	Study 1 speaker sex		Study 2 speaker sex	
	Male	Female	Male	Female
Submissive	.84	.95	.96	.96
Physically weak	.68	.96	.96	.95
Naive	.88	.91	.63	.93
Warm	.74	.80	.90	.89
Vulnerable	.81	.96		
Scatterbrained	.72	.78		
Lazy	.71	.58		
Straightforward	.40	.25		
Nurturant	.14	.51		
Soft	.97	.97		
High	.85	.95		
Slow	.97	.96		
Unclear	.91	.94		
Tight	.80	.88		
Changing	.81	.84		
Age	.97	.93	.89	.95
Childlike voice	.86	.97	.90	.96
Feminine voice	.87	.97	.96	.94

Note. $N = 16$ for Study 1; $N = 32$ for Study 2. In Study 2 this measure was "feminine" rather than "feminine voice."

performed on these ratings indicated that weakness and incompetence ratings were intercorrelated, separate composite scores for each dimension were constructed for each speaker because these dimensions were conceptually distinct. Composite scores were computed by averaging across trait ratings for scales in the original groupings. Thus, weakness scores included submissiveness, vulnerability, and physical weakness ratings; incompetence scores included scatterbrained, naivete, and laziness ratings. The average within-group correlation was .93 for weakness ratings and .70 for incompetence ratings. Warmth scores included only warmth ratings, because straightforwardness and nurturance ratings had unacceptable reliabilities.

Associations between Vocal Characteristics and Trait Impressions

Consistent with past nonverbal person perception research, listeners systematically associated particular traits with particular vocal attributes (see Table 2). Specifically, speakers perceived to have soft, high-pitched, and unclear voices were perceived as weaker, more incompetent, and warmer than their loud, deep, and clear counterparts. In addition, speakers

TABLE 2
CORRELATIONS OF UNITED STATES AND KOREAN TRAIT RATINGS AND UNITED STATES VOICE RATINGS

Voice measure	Trait composite: Weakness		Incompetence		Warmth	
	United States	Korean	United States	Korean	United States	Korean
High[a,b]	.69***	.61***	.47***	.52***	.76***	.52***
Soft[b]	.74***	.90***	.45***	.70***	.69***	.61***
Slow	−.03	−.13	.16	.01	−.27	−.18
Unclear[a]	.79***	.87***	.59***	.64***	.60***	.65***
Tight[a,b]	.38***	.09	.43**	.24	−.19	.01
Changing	.12	.02	.09	−.13	.42***	.12
Feminine composite	.56***	.74***	.28	.53***	.77***	.56***
Childlike composite	.90***	.80***	.72***	[illegible]	[illegible]	[illegible]

TABLE 2
CORRELATIONS OF UNITED STATES AND KOREAN TRAIT RATINGS AND UNITED STATES VOICE RATINGS

	Trait composite					
	Weakness		Incompetence		Warmth	
Voice measure	United States	Korean	United States	Korean	United States	Korean
High[a,b]	.69***	.61***	.47***	.52***	.76***	.52***
Soft[b]	.74***	.90***	.45***	.70***	.69***	.61***
Slow	−.03	−.13	.16	.01	−.27	−.18
Unclear[a]	.79***	.87***	.59***	.64***	.60***	.65***
Tight[a,b]	.38***	.09	.43**	.24	−.19	.01
Changing	.12	.02	.09	−.13	.42***	.12
Feminine composite	.56***	.74***	.28	.53***	.77***	.56***
Childlike composite	.90***	.80***	.73***	.69***	.58***	.59***
Age[c]	.55***	.23	.33*	.32*	.73***	.27

Note. $df = 30$.

[a] These ratings were averaged to form the childlike composite.

[b] These ratings were averaged to form the feminine composite after reversing the values for tightness.

[c] Perceived age was estimated by both United States and Korean subjects.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

**** $p < .001$, two tailed.

with tight voices were perceived as weaker and more incompetent than those with relaxed voices, and speakers with changing voices were perceived as warmer than those with monotone voices. No other correlations were significant.

Paralinguistic Qualities of a Childlike Voice and a Feminine Voice

As a first step in ascertaining the ability of childlike vocal characteristics to explain the observed voice–trait associations, analyses were performed to determine what vocal features constituted a childlike voice. Specifically, partial correlations were computed between speakers' rated vocal childlikeness and ratings of their vocal characteristics, controlling for perceived vocal femininity. This was done to reduce the possibility of confounding childlike vocal characteristics with feminine ones with which they may overlap. Consistent with research indicating that children have higher pitched voices than mature persons, increases in the perceived childlikeness of voices were correlated with increases in ratings of pitch, $r(29) = .57$, $p < .001$. Increases in rated childlikeness were also significantly correlated with increases in tightness of the voice, $r(29) = .36$, $p < .05$, and marginally related to decreases in vocal clarity, $r(29) = -.31$, $p < .08$. No significant correlations were found between rated childlikeness and ratings of loudness, speed, or variability when vocal femininity was held constant (all $ps > .05$). Having identified the vocal characteristics that were perceived as childlike, a childlike voice composite was constructed for each speaker by averaging across these three vocal characteristics. This composite was strongly correlated with the perceived childlikeness of speakers' voices for all speakers combined as well as for male and female speakers considered separately, $r(30) = .75$, $p < .001$, and $rs(14) = .73$, and .77, both $ps < .001$, respectively.

Feminine voice composites were also constructed for use in later analyses assessing their potential impact on trait impressions. To this end, partial correlations were computed between vocal femininity ratings and voice ratings, controlling for perceived childlikeness. Increases in perceived femininity were significantly related to increases in pitch, $r(29) = .57$, $p < .001$, and decreases in tightness, $r(29) = -.36$, $p < .05$, and marginally related to increases in softness, $r(29) = .33$, $p < .07$. No other significant correlations were observed (all $ps > .05$). The feminine voice composite derived by averaging ratings of these three vocal characteristics was strongly correlated with perceived vocal femininity for all speakers and for both male and female speakers, $r(30) = .74$, $p < .001$, and $rs(14) = .87$, and .83, both $ps < .001$, respectively. It was also significantly correlated with the childlike voice composite for all speakers, $r(30) = .49$, $p < .01$, and for female speakers, $r(14) = .54$, $p < .05$, and marginally related to the childlike voice composite for male speakers, $r(14) = .46$, $p = .07$.

Impact of the Childlike and Feminine Voice Impressions

The childlike voice composite was positivel of weakness, incompetence, and warmth. T was also positively correlated with perceptic but not with perceptions of incompetence (

To determine the relative strength and in the childlike voice composite, the feminine v sex, and perceived age, these variables we predictors of trait composite scores in regre The childlike voice composite emerged a predictor of perceptions of weakness and voice composite was the strongest indepen of warmth, although the childlike voice com albeit nonsignificant, impact on warmth pe perceived age was also a significant predic

Accuracy of Trait Impressions

Contrary to what an accuracy hypothesis correlations were found between the subje the speakers' self-ratings or imagined othe

Discussion

The present results are consistent with t has found that paralinguistic features of a s impact on perceptions of a speaker's weakne However, this study goes beyond past res for such voice–trait associations. In particular of speakers' weakness and incompetence childlikeness of their vocal qualities.

The effects of a childlike voice parallel p of babyfacedness: Speakers with vocal chara were perceived to be low in physical and soci competence, just as babyfaced adults were

[3] To determine if the observed effects held true wi and regression analyses were also performed separa Results revealed a similar pattern of correlations be ratings both across and within speakers' sex. Moreov the strongest predictor of United States subjects' we both male and female speakers, just as it had been for voice composite was the strongest predictor of warmth the childlike voice composite was a stronger predictor A similar pattern of effects was also found for Korean speakers considered separately.

Impact of the Childlike and Feminine Voice Composites on Trait Impressions

The childlike voice composite was positively correlated with perceptions of weakness, incompetence, and warmth. The feminine voice composite was also positively correlated with perceptions of weakness and warmth, but not with perceptions of incompetence (see Table 2).

To determine the relative strength and independence of the effects of the childlike voice composite, the feminine voice composite, the speakers' sex, and perceived age, these variables were simultaneously entered as predictors of trait composite scores in regression analyses (see Table 3). The childlike voice composite emerged as the strongest independent predictor of perceptions of weakness and incompetence. The feminine voice composite was the strongest independent predictor of perceptions of warmth, although the childlike voice composite had a relatively strong, albeit nonsignificant, impact on warmth perceptions. Finally, a younger perceived age was also a significant predictor of perceived warmth.[3]

Accuracy of Trait Impressions

Contrary to what an accuracy hypothesis would predict, no significant correlations were found between the subjects' ratings of speakers and the speakers' self-ratings or imagined other-ratings (all $ps > .05$).

Discussion

The present results are consistent with those of past research, which has found that paralinguistic features of a speaker's voice exert a strong impact on perceptions of a speaker's weakness, incompetence, and warmth. However, this study goes beyond past research in identifying the basis for such voice–trait associations. In particular, it has shown that impressions of speakers' weakness and incompetence can be accounted for by the childlikeness of their vocal qualities.

The effects of a childlike voice parallel previously documented effects of babyfacedness: Speakers with vocal characteristics judged to be childlike were perceived to be low in physical and social power and low in intellectual competence, just as babyfaced adults were perceived to be submissive,

[3] To determine if the observed effects held true within speakers' sex, the correlational and regression analyses were also performed separately for male and female speakers. Results revealed a similar pattern of correlations between trait and vocal characteristic ratings both across and within speakers' sex. Moreover, the childlike voice composite was the strongest predictor of United States subjects' weakness and incompetence ratings for both male and female speakers, just as it had been for all speakers combined. The feminine voice composite was the strongest predictor of warmth ratings for female speakers, although the childlike voice composite was a stronger predictor of warmth ratings for male speakers. A similar pattern of effects was also found for Korean subjects' ratings of male and female speakers considered separately.

TABLE 3
RESULTS OF REGRESSION ANALYSES PREDICTING TRAIT COMPOSITES FROM THE CHILDLIKE VOICE COMPOSITE, THE FEMININE VOICE COMPOSITE, SPEAKERS' SEX, AND PERCEIVED AGE

Dependent Variable	R^2	Predictor variable	Partial correlation	Standardized Beta	T	p
Weakness (United States)	.92	Childlike voice	.87	.83	9.06	.0000
		Feminine voice	.24	.14	1.30	.21
		Sex	.14	.06	<1	
		Age	−.04	−.03	<1	
		$F(3, 12) = 36.95, p < .0000$				
Weakness (Korean)	.91	Childlike voice	.70	.51	5.14	.0000
		Feminine voice	.69	.63	4.93	.0000
		Sex	.21	.09	1.13	.27
		Age	−.35	−.23	1.99	.06
		$F(3, 12) = 31.34, p < .0000$				
Incompetence (United States)	.73	Childlike voice	.68	.76	4.77	.0001
		Feminine voice	.14	.14	<1	
		Sex	.03	.03	<1	
		Age	−.08	−.08	<1	
		$F(3, 12) = 7.89, p < .0002$				
Incompetence (Korean)	.75	Childlike voice	.62	.65	4.11	.0003
		Feminine voice	.06	.07	<1	
		Sex	.02	.01	<1	
		Age	−.24	−.23	1.28	.21
		$F(3, 12) = 8.46, p < .0001$				
Warmth (United States)	.85	Childlike voice	.29	.19	1.55	.13
		Feminine voice	.52	.45	3.19	.004
		Sex	−.04	−.03	<1	
		Age	−.42	−.38	−2.39	.02
		$F(3, 12) = 18.22, p < .0000$				
Warmth (Korean)	.68	Childlike voice	.44	.43	2.52	.02
		Feminine voice	.29	.35	1.56	.13
		Sex	.17	.13	<1	
		Age	−.01	−.01	<1	
		$F(3, 12) = 5.91, p < .002$				

weak, and naive (Berry & McArthur, 1985, McArthur & Apatow, 1983–84). Not only were these effects independent of speakers' sex and perceived age, but also a childlike voice was a stronger predictor of perceived weakness and incompetence than a feminine voice. The latter effect cannot be attributed to the fact that subjects rated voices of only one sex. Sherman (1986) recently completed a replication of the present study in which subjects rated speakers of both sexes, and the regression analyses revealed that a childlike voice was again the only significant predictor of perceived weakness and incompetence.

The effects of a childlike voice on perceptions of warmth were less powerful than the effects of a feminine voice. Although the childlike

voice composite was correlated with the pe
the regression analyses revealed that the fe
a stronger impact on perceptions of speake
voice composite. A possible explanation for
warmth may not adequately capture distinctly
Indeed, women have traditionally been vi
roles of nurturing the young, and children a
adults as they are more inviting of warmth

In addition to identifying the overall ef
trait impressions, the present study has
characteristics that make a voice sound c
that were higher pitched, less clear, or tight
childlike than their deep, clear, or relaxed c
a high-pitched adult voice is perceived as
evidence that the pitch of a person's voice
between infancy and maturity (Wood, 19
maturation on speech clarity has not been
perceive clearer adult voices as more ma
from childhood to maturity in articulatory c
Finally, although there are no data regardin
tenseness, the finding that tight adult vo
mature than more relaxed ones is consiste
(1981) suggestion that voice quality, whic
tenseness, may carry age information.

Although age changes in the tempo of a
noted in previous research (Helfrich, 1979; V
the present study did not find a relationsh
speed and vocal maturity. In addition, n
between the perceived variability and matu
although it has been reported that the fundar
to increase from adolescence to adulthood a
childhood (Helfrich, 1979). Furthermore,
were not related to trait impressions of speak
have been observed in past research (Addin
Montepare & Vega, 1987). Because the m
characteristics may depend on how voice sa
1979), the absence of effects for tempo a
study may be due to the verbal task speaker
using less structured speech than that produc
may better assess the impact of voice tempo
vocal maturity and trait impressions.

The ecological approach to social percept
of people based on their physical qualities
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voice composite was correlated with the perceived warmth of speakers, the regression analyses revealed that the feminine voice composite had a stronger impact on perceptions of speakers' warmth than the childlike voice composite. A possible explanation for these results is that the term *warmth* may not adequately capture distinctly childlike behavioral qualities. Indeed, women have traditionally been viewed as very warm in their roles of nurturing the young, and children are not so much warmer than adults as they are more inviting of warmth.

In addition to identifying the overall effects of a childlike voice on trait impressions, the present study has also identified several vocal characteristics that make a voice sound childlike. Young adult voices that were higher pitched, less clear, or tighter were perceived to be more childlike than their deep, clear, or relaxed counterparts. The finding that a high-pitched adult voice is perceived as childlike is consistent with evidence that the pitch of a person's voice becomes dramatically lower between infancy and maturity (Wood, 1976). Although the impact of maturation on speech clarity has not been documented, the tendency to perceive clearer adult voices as more mature may reflect an increase from childhood to maturity in articulatory control and speech precision. Finally, although there are no data regarding age-related changes in voice tenseness, the finding that tight adult voices were perceived as less mature than more relaxed ones is consistent with Laver and Hanson's (1981) suggestion that voice quality, which includes attributes such as tenseness, may carry age information.

Although age changes in the tempo of a person's speech have been noted in previous research (Helfrich, 1979; Weintraub, 1981; Wood, 1976), the present study did not find a relationship between perceived talking speed and vocal maturity. In addition, no relationship was observed between the perceived variability and maturity of the speakers' voices, although it has been reported that the fundamental frequency range seems to increase from adolescence to adulthood after remaining constant during childhood (Helfrich, 1979). Furthermore, talking speed and variability were not related to trait impressions of speakers, although such associations have been observed in past research (Addington, 1968; Aronovitch, 1975; Montepare & Vega, 1987). Because the manifestation of certain vocal characteristics may depend on how voice samples are obtained (Seigman, 1979), the absence of effects for tempo and variability in the present study may be due to the verbal task speakers performed. Future research using less structured speech than that produced when reciting the alphabet may better assess the impact of voice tempo and variability on perceived vocal maturity and trait impressions.

The ecological approach to social perception assumes that impressions of people based on their physical qualities will either be accurate or will reflect the overgeneralization of adaptive perceptual attunements. While

the impressions of adult speakers with childlike voices can be viewed as an overgeneralization of the adaptive attunement to information provided by children's voices regarding their behavioral capabilities, it is also conceivable that impressions of these speakers were accurate. This possibility is more plausible than accuracy of the parallel impressions of babyfaced adults, inasmuch as vocal characteristics are more controllable than facial structure. For example, boys speak in a more masculine tone than girls do long before anatomical sex differences affecting vocal attributes develop, possibly because boys perceive themselves as more "masculine" and try to speak accordingly (Sachs, Leiberman, & Erikson, 1974). Similarly, it may be that people who perceive themselves as having mature traits may speak in a more mature tone than those who perceive themselves as having immature traits. However, the failure to find significant correlations between subjects' ratings of the speakers and speakers' self-ratings indicates that, according to this criterion, impressions of speakers in the present study were not accurate. Before rejecting the accuracy hypothesis, however, it would be of interest to examine its viability using other criteria such as peer ratings, scores on established personality instruments, or behavioral indices.

STUDY 2

The failure to find evidence for the accuracy of impressions in Study 1 lends support to the suggestion that the perceptions of weakness, incompetence, and warmth in people with certain vocal characteristics may reflect the resemblance of their voices to those of children, which do accurately communicate such traits. While this explanation is consistent with the results of Study 1, the research did not explicitly test the ecological theory assumption that stereotyped impressions of adults with immature voices derive from the greater adaptive value of overdetecting than underdetecting children's attributes. Moreover, as McArthur and Baron (1983) have noted, there really is no direct way to test this assumption. However, the assumption of adaptive significance does lead to the testable hypothesis that perceptions of adults with childlike voices should be culturally universal. Since some of the maturational changes in vocal characteristics are the same for all humans, there should be cross-cultural agreement in the identification of childlike vocal qualities. Moreover, since the detection of attributes such as weakness and dependency in children serves a species-wide adaptive function, there should be pancultural generality in the overgeneralization of these impressions to adults with childlike voices. According to the ecological theory, such pancultural generality could derive either from innate, evolutionary-based reactions to children or from culturally universal perceptual experiences, which attune perceivers to the affordances of a childlike voice when this is personally adaptive.

While no research has addressed the ques
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in responses to babyish facial features. Th
investigate cross-cultural similarities in resp
ities. To this end, Study 1 was replicate
listeners.

Method

Subjects

Thirty-two male and 32 female Korean undergradu
University in Korea received W 1000 each (approxi
Subjects of each sex were randomly assigned to on
and to one of two orders of presentation of speakers

Voice Samples

The male and female voices and their orders of pres
in Study 1.

Dependent Measures

Subjects rated speakers on 7-point bipolar trait scale
adjectives. Due to time constraints, fewer ratings w
ratings were made, and there were four rather than
three, trait scales were included in the weakness dimen
(physically weak/physically strong) and the other
sive/dominant). The warmth dimension was assessed
achieved acceptable reliability in Study 1. Finally, t
the incompetence dimension had the highest reliabilit
in Study 1. As in Study 1, subjects estimated speake
of speakers' voices on 7-point biplor scales with endpoi
of *childlike voice/mature voice*. Due to an oversight in
subjects did not rate the femininity of speakers' voic
speakers on a general trait scale with endpoints labe

[4] Additional differences between the dependent m
subjects in Study 2 rated the speakers' attractivene
honest/dishonest scale are not reported, since its
ward/deceitful—was dropped due to the low reliabil

While no research has addressed the question of pancultural agreement in perceptions of adults with childlike voices, there is some evidence for cross-cultural generality in trait impressions based on vocal characteristics. In particular, Scherer (1972) found that American and German raters showed high agreement in their perceptions of both American and German speakers on dimensions reflecting incompetence, weakness, and warmth. While Scherer's research did not investigate what specific vocal characteristics yielded this cross-cultural agreement in impressions, the results of Study 1 suggest that cross-cultural similarities in responses to childlike vocal qualities could account for his results. Consistent with this argument, McArthur and Berry (1987) have documented cross-cultural similarities in responses to babyish facial features. The purpose of Study 2 was to investigate cross-cultural similarities in responses to childlike vocal qualities. To this end, Study 1 was replicated with a sample of Korean listeners.

Method

Subjects

Thirty-two male and 32 female Korean undergraduate volunteers from Seoul National University in Korea received W 1000 each (approximately $1.25) for their participation. Subjects of each sex were randomly assigned to one of two sex of speaker conditions, and to one of two orders of presentation of speakers.

Voice Samples

The male and female voices and their orders of presentation were identical to those used in Study 1.

Dependent Measures

Subjects rated speakers on 7-point bipolar trait scales with endpoints labeled with Korean adjectives. Due to time constraints, fewer ratings were made than in Study 1: No voice ratings were made, and there were four rather than nine trait ratings. Two, rather than three, trait scales were included in the weakness dimension, one reflecting physical weakness (physically weak/physically strong) and the other reflecting social weakness (submissive/dominant). The warmth dimension was assessed with the one scale (warm/cold) that achieved acceptable reliability in Study 1. Finally, the one trait (naive/shrewd) used for the incompetence dimension had the highest reliability of those included in this dimension in Study 1. As in Study 1, subjects estimated speakers' age and judged the childlikeness of speakers' voices on 7-point biplor scales with endpoints labeled with the Korean translation of *childlike voice/mature voice*. Due to an oversight in preparing the Korean questionnaires, subjects did not rate the femininity of speakers' voices as in Study 1. Rather, they rated speakers on a general trait scale with endpoints labeled *feminine/masculine*.[4]

[4] Additional differences between the dependent measures in Study 1 and 2 were that subjects in Study 2 rated the speakers' attractiveness and honesty. The effects on the honest/dishonest scale are not reported, since its counterpart in Study 1—straightforward/deceitful—was dropped due to the low reliability.

Trait adjectives were initially translated into Korean by a Korean visiting scholar at Brandeis University. They were subsequently translated back into English by a Korean professor at Seoul National University with a resultant change in the original Korean translation of one word—*naive*. Further evidence that the Korean and English trait adjectives were equivalent in meaning was provided by McArthur and Berry's (1987) comparison of relationships among the English trait terms to the relationships among their Korean counterparts. The correlation matrix for trait ratings by United States subjects was very similar to the one for Korean subjects, yielding a highly significant intermatrix correlation, $r(8) = .81$, $p < .01$ (Block, 1957).

Procedure

An American female experimenter ran the tape recorder and a Korean male experimenter read instructions and answered questions. Subjects were given a copy of the rating scales with a cover sheet containing a Korean translation of instructions similar to those used in Study 1. As in Study 1, subjects completed the rating scales in groups of three and ratings of childlikeness, femininity, and age were made last.[5]

Results

Reliability

Spearman–Brown reliability coefficients for Korean subjects' ratings are presented in Table 1. Mean ratings for each speaker were computed across subjects' ratings. Mean weakness scores were calculated by averaging across mean ratings of submissiveness and physical weakness.

Comparison of Korean and United States Ratings

Pearson correlations calculated between Korean and United States subjects' mean ratings of the speakers revealed strong agreement on all measures (see Table 4).

Impact of the United States Childlike and Feminine Voice Composites on Trait Impressions

Because voice characteristic ratings were not obtained from Korean subjects, the childlike voice composite derived from United States ratings was used to assess the impact of childlike vocal characteristics on Koreans' trait impressions. The United States childlike voice composite was marginally correlated with Koreans' perceptions of the childlikeness of all voices combined, $r(30) = .33$, $p < .08$, significantly correlated with their perceptions of childlikeness of males voices, $r(14) = .50$, $p < .05$, but not significantly correlated with the perceived childlikeness of female voices, although the relationship was in the same direction $r(14) = .29$, $p < .30$. Correlations were also computed between the United States

[5] All subjects in Study 2 participated in two experiments. The first was a replication of McArthur and Apatow's (1983–84) schematic face study, and the second was the present study.

TABLE 4
CORRELATIONS BETWEEN UNITED STATES

Dependent measure	All
Weakness	.85***
Incompetence	.68***
Warmth	.68***
Femininity	.92***
Vocal immaturity	.65***
Perceived age	.62***

Note. *df* for all speakers = 30, *df* for male and fen
* $p < .06$.
** $p < .05$.
*** $p < .001$, two tailed.

derived feminine voice composite and Kor
of the speakers' femininity. Results indica
composite was highly correlated with femir
combined, $r(30) = .64$, $p < .001$, and fo
considered separately, $rs(14) = .86$ and .72,

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To determine the relative strength and in
the childlike voice composite, the feminir
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for United States subjects, the childlike voice
impact on Koreans' perceptions of speakers'
The feminine voice composite was also a sig
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of warmth scores for Koreans, however, t
had a relatively strong, albeit nonsignifica
speakers' warmth, just as it had for Unite
3).

TABLE 4
CORRELATIONS BETWEEN UNITED STATES AND KOREAN RATINGS

Dependent measure	Speaker sex		
	All	Male	Female
Weakness	.85***	.73***	.93***
Incompetence	.68***	.51**	.77***
Warmth	.68***	.81***	.59**
Femininity	.92***	.89***	.97***
Vocal immaturity	.65***	.48*	.73***
Perceived age	.62***	.57**	.65**

Note. *df* for all speakers = 30, *df* for male and female speakers = 14.
* $p < .06$.
** $p < .05$.
*** $p < .001$, two tailed.

derived feminine voice composite and Korean subjects' general ratings of the speakers' femininity. Results indicated that the feminine voice composite was highly correlated with femininity ratings for all speakers combined, $r(30) = .64$, $p < .001$, and for male and female speakers considered separately, $rs(14) = .86$ and .72, both $ps < .001$, respectively.

Having established that the United States childlike voice composite had at least marginal validity for Korean subjects, correlation coefficients between Korean trait ratings and this composite were computed. The childlike voice composite was strongly related to Korean subjects' impressions of speakers' weakness, incompetence, and warmth, just has it had been for United States subjects (see Table 2). The United States feminine voice composite was also positively related to Koreans' impressions of the speakers' weakness, incompetence, and warmth.

To determine the relative strength and independence of the effects of the childlike voice composite, the feminine voice composite, and the speakers' sex and perceived age, these variables were entered as predictors of Korean trait ratings in regression analyses. Results revealed a pattern of effects similar to those obtained in Study 1. Consistent with the results for United States subjects, the childlike voice composite had an independent impact on Koreans' perceptions of speakers' weakness and incompetence. The feminine voice composite was also a significant predictor of speakers' weakness for Korean subjects, although it had not been for United States subjects. The childlike voice composite was the only significant predictor of warmth scores for Koreans, however, the feminine voice composite had a relatively strong, albeit nonsignificant, impact on perceptions of speakers' warmth, just as it had for United States subjects (see Table 3).

Discussion

Study 2 provides considerable evidence for cross-cultural generality in the impact of childlike vocal characteristics on trait impressions. Agreement between United States and Korean subjects regarding the relative childlikeness of young adult American voices was highly significant. There was also substantial United States–Korean agreement regarding the relative weakness, incompetence, and warmth of these adult speakers, which indicates that paralinguistic characteristics convey the same information regarding behavioral propensities to perceivers from the two cultures.

Not only did Korean and United States subjects show strong agreement in their ratings of the speakers, but also the impact of a childlike voice on their trait ratings was very similar. For both groups, speakers with vocal characteristics judged to be more childlike—high-pitched, unclear, and tense—were perceived as weaker, less competent, and warmer than those with vocal qualities judged as more mature. Moreover, when childlike vocal qualities were pitted against feminine ones in the regression analyses, the childlike voice emerged as a strong, independent predictor of weakness and incompetence ratings by both United States and Korean subjects. On the other hand, there was a tendency for warmth ratings to be influenced by both the childlike and the feminine voice composite, albeit with differential strength in the two samples. As suggested earlier, the latter effects may reflect ambiguity in the meaning of the term *warmth,* which allows it to be interpreted either as warmth-providing qualities afforded by a mature person or warmth-provoking qualities afforded by an immature person.

The finding that the United States subjects' childlike voice composite predicted Korean subjects' trait and vocal childlikeness ratings has two important implications for interpreting the present results. First, because different groups of subjects provided the two sets of ratings, it may be argued that the observed trait attributions derive directly from variations in vocal qualities rather than merely reflecting subjects' implicit theories about how voices and traits go together. Second, the fact that the childlike voice composite predicted Korean as well as United States subjects' childlike voice ratings supports the argument that the impact on trait ratings of a high-pitched, tight, unclear voice derives from the resemblance of these vocal characteristics to those that differentiate children from adults.

It is interesting to note that the significant United States–Korean agreement regarding the relative childlikeness of American speakers' voices was not as strong as the near perfect agreement regarding the relative babyishness of American faces reported by McArthur and Berry (1987). This suggests that vocal maturity may be more culturally specific than facial maturity, which would not be surprising

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of the three vocal characteristics comprising
voice composite, only high pitch is clearly
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The strong Korean–American agreement
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stimulus information provided in the speak
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to American speakers. Although Korean p
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in Seoul are strikingly devoid of Westerners
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Whereas some might argue that cross-cul
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facial maturity, which would not be surprising, inasmuch as the maturation of facial structure is more fixed than that of vocal characteristics. Indeed, of the three vocal characteristics comprising the United States childlike voice composite, only high pitch is clearly a physically determined age marker, and even pitch can be influenced by social factors (e.g., Helfrich, 1979; Montepare & Vega, 1987; Sachs et al., 1974). It is thus possible that Korean–American agreement in ratings of vocal maturity was attenuated by cultural differences in some of the qualities that differentiate childlike from mature voices. Further research comparing Korean and United States subjects' impressions of Korean and United States speakers is needed to determine if some components of a childlike voice are culturally specific.

The strong Korean–American agreement in perceptions of American voices is particularly impressive when one considers not only the minimal stimulus information provided in the speakers' recitation of the English alphabet, but also the relatively little exposure that Korean students have to American speakers. Although Korean products are very familiar to Westerners, Western people are not very familiar to Koreans. Streets in Seoul are strikingly devoid of Westerners, and the university campuses are no more cosmopolitan. The top-ranked institution in the country, where Study 2 was conducted, has no foreign students and few foreign faculty visitors. Indeed, the graduate student serving as the experimenter for this research, who was quite proficient at reading Engish, informed the second author that she was the first American with whom he had ever spoken.

It must be acknowledged that Korean students do see Western movies. However, the question remains as to how such exposure to Western voices could account for the present results. It seems unlikely that Koreans have learned from movies the kinds of voices Westerners' perceive as childlike and how Western people with such voices behave. For one thing, Koreans viewing Western movies probably focus more on the subtitles than the soundtracks. Moreover, there is no evidence that the soundtracks even portray people with high-pitched, tight, and unclear voices as weak, incompetent, and warm. It certainly seems more plausible to suggest that Koreans' impressions of Westerners with these vocal characteristics, like the impressions of Americans, derive from analogous perceptions of children, whose voices are high-pitched in Korea as well as in America.

Whereas some might argue that cross-cultural agreement in perceptions of people with childlike vocal characteristics reflects innate, evolutionary based reactions, it should be emphasized that McArthur and Baron's (1983) ecological theory allows additional possibilites. These perceptions could derive from perceptual experiences with young children. Such experience could attune perceivers to the affordances of a childlike voice

insofar as such an attunement is adaptive for their own goal attainment. To empirically differentiate between these two possibilities would require assessing reactions of people, such as infants, who have had little exposure to children.

Another interpretation compatible with the ecological theory is that perceivers' impressions of the speakers are accurate reflections of speakers' traits rather than an innate or learned overgeneralization of reactions to children. While the speakers' self-ratings employed in Study 1 did not support the accuracy hypothesis, Scherer (1972) did find evidence for the accuracy of raters' impressions of speakers using friends' ratings. It is thus possible that peer ratings would reveal accuracy in impressions of the speakers in the present research. Although such accuracy would be consistent with the ecological theory, it would differ from the overgeneralization explanation in leaving unanswered the question of why high-pitched and unclear voices elicit perceptions of weakness, incompetence, and warmth.

In providing an answer to the question of *why* particular vocal qualities create particular impressions, the present study makes a unique contribution to our understanding of speech stereotypes. In particular, the present findings demonstrate that variations in perceptions of speakers' weakness and incompetence can be explained by variations in age-related qualities of their voices, while variations in perceptions of speakers' warmth can be explained by age- and sex-related qualities of their voices. They further demonstrate cross-cultural generality in the paralinguistic qualities of a childlike voice and in the tendency for childlike adult voices to elicit reactions analogous to those elicited by the young. While the present research compared only two cultures, the fact that these two samples differ markedly in both cultural traditions and in linguistic background strongly suggests that the effects reported here will replicate in other cultures.

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