Sociocultural Aspects of Pitch Differences between Japanese and Dutch Women*

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KEY WORDS
Japanese
pitch
types
Dutch

ABSTRACT
Japanese women have been found to have higher pitches than Dutch women. This finding has been explained in the past by assuming that Japanese women raise their pitch in order to project a vocal image associated with feminine attributes of powerlessness. In the present study three hypotheses underlying such an assumption were tested experimentally: (1) the association of high pitch with attributes of physical and psychological powerlessness (short, weak, dependent, modest) in the Dutch and Japanese cultures, (2) a stronger differentiation between the ideal woman and man, in terms of powerlessness/power, in Japan than in the Netherlands, and (3) a preference for high pitch in women in Japan and for medium or low pitch in women in the Netherlands. All three hypotheses were confirmed. However, results also suggest a strong emphasis in Japan on masculinity in men, possibly leading to a lowering of pitch.

INTRODUCTION
Young Japanese women have consistently been reported as speaking with a higher pitch than Caucasian (American, Northern and Western European, Australian) women. Yamazawa and Hollien (1992) present an overview of three studies providing data for a total of 60 Japanese women between 23 and 31 years of age. The average pitches reported are 225 Hz (Hanley & Snidecor 1967), 225 Hz (Tsuge, Kakami, & Fukaya 1987), and 239 Hz (Terasawa, Kakita, & Hirano 1984). The mean of these studies, weighted for the number of subjects, is 232 Hz. The mean resulting from four studies measuring a total of 166 American English women of between 18 and 31 years is 214 (Fitch & Holbrook 1970; Hanley & Snidecor 1967; Hollien, Tolhurst, & McGlone 1982; Stoicheff 1981), whereas the mean pitch of 35 Swedish women of a similar age range was found to be 196 Hz (Krook 1988).

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This finding of a cross-cultural difference in pitch between Japanese and Caucasian women has been tentatively explained by assuming the influence of sociocultural factors on pitch. The underlying assumption is that the "natural," physiologically determined pitch of a speaker should be seen not so much as one particular value but rather as a range within which the speaker has some room to select a pitch of his or her own choice. This pitch would be chosen, probably largely subconsciously, so as to approximate a particular vocal image reflecting socioculturally desired personal attributes and social roles (Ohara 1992).

Personality characteristics such as modesty, innocence, dependence, subservience, and helplessness, related to physical and psychological powerlessness, are traditionally more highly valued in women in Japanese than in Western culture (Smith 1992). According to the "frequency code" formulated by Ohala (1983, 1994), powerlessness would be cross-species and cross-culturally associated with high pitch, because high pitch reflects small size (cf. the vocalizations of mice and bears, babies and adults). Young Japanese girls and women would raise their pitch to conform to gender stereotypes and project the desired feminine attributes of powerlessness. Accordingly, the tentative explanation of high pitch in Japanese women on the basis of sociocultural factors hypothesizes:

1. the existence of the frequency code in Japanese culture;
2. a strong differentiation in Japan between the ideal woman and man in the sense that the former would be characterized by high-pitch related attributes of powerlessness to a much higher extent than the latter, and, by combining (1) and (2),
3. the positive evaluation in Japanese culture of high pitch in women.

The outcome of a study by Loveday (1981) on the pitch of politeness formulae in Japanese and American English has been interpreted within the framework just described. Loveday measured pitch in three male and two female American English speakers and three male and two female Japanese speakers expressing politeness formulae such as "oh hello" (aa konnich wa) and "bye" (sayonara). It was found that the Japanese females adopted an extremely high pitch (with peaks between 310 and 450 Hz), clearly separating themselves from the Japanese males. English female pitch (with peaks between 160 and 320 Hz) was considerably less differentiated from English male pitch. The phonation ranges of the Japanese and English speakers were roughly comparable. According to Loveday high pitch in Japanese expresses a stereotypically female role, characterized by, among other things, politeness, associated with high pitch. He furthermore postulates (p.85) that "Japanese expectations of sexual and social role are much more rigid than those prescribed by English norms."

Further indications that Japanese women adapt their pitch to sociocultural expectations of femininity can be derived from a study by Ohara (1992). She asked twelve native speakers of Japanese studying at the University of Hawaii, six females and six males, to read 10 Japanese and 10 English sentences. All of the females employed a significantly higher pitch in the Japanese reading condition than in the English reading condition, the difference ranging between 16 and 49 Hz (the results for the male subjects did not reveal a systematic pattern: three employed a higher pitch in Japanese, three a lower pitch). This outcome is explained by assuming that the Japanese females adopt a higher pitch in order to convey the impression of femininity when speaking in Japanese. This behavior would
be triggered by the association of the Japanese language with Japanese society. According to Ohara (p.474) "to conform to Japanese society’s ideal of femininity is so crucially important for a female speaker that the feminine pattern of behavior becomes part of her personality. Displaying femininity is an automatic process in most cases. Controlling the larynx to produce higher-pitched sound may be a part of that automatic process.”

Pitch is but one of the many linguistic gender markers used by women in Japanese culture. For example, Smith (1992, p.540) states that “Japanese men are ‘privileged’ to use verb endings that mark their own superior social position, whereas women across a broad range of situations are ‘constrained’ to use polite and honorific verb-ending forms marking lower social position.” Sentence final particles associated with women’s speech would be soft, non-assertive, mitigating forms, whereas those associated with men’s speech have the opposite characteristics. Other gender related linguistic phenomena in Japanese culture include terms of reference, address forms, and pronouns (Lee 1976; Loveday 1986).

Although there exist gender related differences in the Netherlands, for example in the division of labor (more women taking care of the children than men, more men occupying high positions than women) Dutch culture is fairly egalitarian. Gender related differences in behavior seem to be stressed and codified much less than in Japan. The only linguistic gender marker systematically reported pertains to the pronunciation of standard variants, which are used more often by women than by men (Brouwer 1989). As far as pitch is concerned, we found a mean pitch of 191 Hz for 20 Dutch women between 20 and 30 years in a previous study (unpublished). This value is somewhat lower than the value mentioned above for Swedish women, namely 196 Hz, and considerably lower than the value found for American English women, namely 214 Hz. In the light of these observations we may tentatively hypothesize:

1. the existence of the frequency code in Dutch culture;
2. only a weak differentiation in the Netherlands between the ideal woman and man with respect to pitch related attributes of power(lessness), and, by combining (1) and (2),
3. the positive evaluation in Dutch culture of medium or low pitch in women.

In concrete terms, the purpose of our study was to test the validity of the three parallel hypotheses underlying the sociocultural explanation of the relatively high pitch of Japanese women as compared to the relatively low pitch of Dutch women.

In order to test the first hypothesis, that is that the frequency code would exist both in the Dutch and Japanese cultures, speech samples of eight Dutch and eight Japanese female speakers were presented each at three pitch levels (low, original, high) to Dutch and Japanese male and female listeners to be rated on four 7-point scales derived from the frequency code, namely short - tall, weak - strong, dependent - independent, and modest - arrogant. The first two scales relate to physical power(lessness), the last two scales to psychological power(lessness). The frequency code predicts that both the Dutch and Japanese listeners would associate high pitch with the scale attributes named first (i.e. short, weak, dependent, and modest) and low pitch with the scale attributes named second (i.e. tall, strong, independent, and arrogant). No interactions were expected between pitch and culture of speaker, nor between pitch and culture/sex of listener.
The second hypothesis predicts a strong differentiation in Japan between the ideal Japanese woman and man in the sense that the former would be characterized by high-pitch related attributes (short, weak, dependent, modest) to a much higher extent than the latter, and a weak differentiation between the ideal man and woman in the Netherlands. It was furthermore predicted that the ideal woman as rated by the Japanese subjects would be shorter, weaker, more dependent, and more modest than the ideal woman as rated by the Dutch subjects. In order to test these hypotheses the same four 7-point scales used to rate the speech samples were used by the Dutch and Japanese subjects to rate the ideal woman and the ideal man, to what extent he and she should be short or tall, weak or strong, and so forth. We were interested in a cross-cultural comparison of the ideal man as well, but did not feel able to formulate a specific hypothesis. The same holds for the possible effect of the sex of the subjects.

In order to test the third hypothesis, that is the positive evaluation in Japanese culture of high pitch in women and the positive evaluation in Dutch culture of medium or low pitch in women, subjects were asked to rate the Dutch and Japanese speech samples on a fifth scale, namely attractive - unattractive. We hypothesized an interactive effect of pitch and culture of listener in the sense that Japanese listeners would consider high pitch more attractive for female speakers whereas Dutch listeners would prefer the original or low pitch. In addition we expected an interaction of pitch with culture of speaker in the sense that high pitch would be considered more attractive for Japanese women, whereas low pitch would be considered more attractive for Dutch women. Finally, we did not exclude an effect of the sex of the listeners, but did not feel able to predict a specific direction.

METHOD

Speakers, recordings, and manipulations

Eight Dutch and eight Japanese women were selected as speakers; all were students or teachers at Dutch and Japanese universities. The mean ages (ranges in parentheses) for the two groups were 33 years (20 – 48) and 29 years (21 – 42), respectively; the mean heights were 166 cm (161 – 171) and 163 cm (155 – 174). The differences in age and height, tested by means of t-tests for independent samples, were not significant at the .05 level.

All speakers read out the same neutral narrative text (a description of a house) of about 13 seconds, the Dutch speakers in standard Dutch and the Japanese speakers in standard Japanese. Of each recorded speech sample three pitch versions were made: a lowered one, an intermediate one at the speaker's original mean pitch level, and a raised one. The three versions were identical in all respects (tempo, intonation, pronunciation, etc.), except for the mean fundamental frequency. The pitch manipulations were carried out using the PSOLA (Pitch Synchronous Overlap and Add) technique (Charpentier & Moulines 1989), which generally affects the speech quality less than other pitch manipulation techniques.

First, the original pitch contours were stylized, using about 100 pivot points for each

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1 In addition, eight Flemish Belgian speech samples were originally included in the experiment, but they will not be considered here.
speech sample. The stylized pitch versions were included in the stimulus material as the original text realizations ("original pitch"). The original pitches of the eight Dutch speakers ranged from 147 Hz for the person with the lowest mean pitch to 209 Hz for the person with the highest mean pitch, with a mean of 180 Hz averaged over all speakers; the original pitches of the eight Japanese speakers ranged from 164 Hz to 209 Hz with a mean of 185 Hz. The difference in pitch, tested by a t-test for uncorrelated samples was not significant \( t(14) = 0.56, p = .58 \). Note that, contrary to what is generally reported in the literature, the pitches of the Japanese women were not higher than those of the Dutch women. We have no explanations for this finding; it could be due to the particular characteristics of the speakers, who were all highly educated.

The stylized speech samples served as a basis for the two other pitch versions: one in which the pitch contour was uniformly raised by .65 ERB ("high pitch"), and one in which the pitch contour was uniformly lowered by .65 ERB ("low pitch"). The ERB (Equivalent Rectangular Bandwidth) measure is intermediate between a linear representation of fundamental frequency in Hz and a logarithmic representation in semitones. It has been found (Hermes & van Gestel 1991) to be the best approximation so far of the way in which differences in fundamental frequency are perceived in a speech context. This means that the differences between the pitch manipulated samples and the original samples should be perceptually equivalent for all speakers. The particular value of .65 ERB was selected on the basis of informal listening by a small panel of experienced listeners, including the author. It was found to result in perceptually clear differences among the three versions of each speaker without leading to artificiality for the fragments with the most extreme pitches in the stimulus material or noticeable discrepancies between pitch and formant frequencies (which were left intact).

Applying the lowering of .65 ERB to the speech sample with the lowest mean pitch in the material led to a shift from 147 Hz to 120 Hz, whereas applying the raising of .65 ERB to the speech sample with the highest mean pitch in the material led to a shift from 209 Hz to 244 Hz. Thus, the total pitch range present in the material was expanded from 62 Hz (147 – 209 Hz) to 124 Hz (120 – 244 Hz). The average pitch levels in the three pitch versions were 150 Hz (low), 180 Hz (original), and 212 Hz (high) for the Dutch speakers, and 155 Hz (low), 185 Hz (original), and 218 Hz (high) for the Japanese speakers.

Subjects and procedure

Thirty Dutch students from the University of Nijmegen, 15 male and 15 female, and 30 Japanese students from Dokkyo University, 15 male and 15 female, served as subjects; they were paid for participating. The experiment comprised two parts.

In the first part, subjects were asked to rate the 48 speech samples (8 (speakers) × 2 (cultures) × 3 (pitch versions)) on the following bipolar 7-point scales (with the Dutch and Japanese terms in parentheses): short - tall (klein - groot, 背が低い - 背が高い), weak - strong (zwak - sterk, 弱い - 強い), dependent - independent (afhankelijk - zelfstandig, 他人に依存 - 自立), modest - arrogant (bescheiden - arrogant, 持えむ - 押しが強い), and attractive - unattractive (aantrekkelijk - onaantrekkelijk, 魅力的 - 魅力がない) (from now on the scales will be referred to by the attribute named second). In addition to these five scales, nine more scales (not directly related to the present topic) were originally included
TABLE 1
Cronbach's alpha, separately for the two listener groups (averaged over men and women) and the two speaker groups

<table>
<thead>
<tr>
<th></th>
<th>Dutch listeners</th>
<th>Japanese listeners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dutch speakers</td>
<td>Jap. speakers</td>
</tr>
<tr>
<td></td>
<td>Dutch speakers</td>
<td>Jap. speakers</td>
</tr>
<tr>
<td>Tall</td>
<td>.94</td>
<td>.94</td>
</tr>
<tr>
<td>Strong</td>
<td>.92</td>
<td>.79</td>
</tr>
<tr>
<td>Independent</td>
<td>.91</td>
<td>.81</td>
</tr>
<tr>
<td>Arrogant</td>
<td>.89</td>
<td>.78</td>
</tr>
<tr>
<td>Unattractive</td>
<td>.84</td>
<td>.80</td>
</tr>
</tbody>
</table>

...in the experiment; these will not be discussed here. The groups of 30 subjects were randomly divided into two groups of 15, each of which received a different random stimulus order.

Depending on speech tempo, each speech sample was presented either three or four times in a row so as to obtain a total stimulus duration on the order of 45 sec. With the original number of 14 scales, this gave the listeners about three seconds for each rating scale. In order to accustom the listeners to the task, they were first presented with speech samples of a Japanese and a Dutch speaker not included in the test. The experiment was interrupted by two breaks of 10 minutes each.

In the second part of the experiment, which took place after the first part was completed, subjects were asked to rate what they saw as the ideal man and the ideal woman on the scales tall, strong, independent, and arrogant. There was only one scaling form for both ratings, so that subjects were forced to focus on the positions of the ideal woman and ideal man relative to each other.

RESULTS

We will first present the results for the auditory ratings of the speech samples, pertaining to the first and third hypotheses. Next the results for the ratings of the ideal man and woman, which are relevant to the second hypothesis, will be presented.

Auditory ratings of the speech samples

As a first step in the data analysis of the auditory scale ratings, the inter-rater reliability was assessed, using Cronbach's alpha (Rietveld and van Hout 1993, p. 202). In Table 1 it may be seen that most coefficients exceed .80. This means that in general the listeners agreed well on the distribution of the ratings over the stimuli. Only one coefficient is lower than .70, namely that for unattractive rated by the Japanese listeners in relation to the Dutch speakers. The corresponding reliability of unattractive for the Japanese speakers is .95,
reflecting a tendency for the ratings to be more reliable when given by the listeners to in-group speakers than when given to out-group speakers.

In order to give an impression of the relationships among the scales, the intercorrelations are presented in Table 2, separately for the Dutch and Japanese listeners. It can be seen that the patterns of relationships are strikingly similar for the two groups of listeners. In both cases tall, strong, independent and arrogant appear to form a cluster, whereas unattractive is unrelated.

The ratings on the five scales were subjected to separate analyses of variance. A repeated measures design was used (split-plot) with two cultures of speaker (Dutch and Japanese) and eight speakers nested within culture of speaker, each speaking at three pitches (high, original, low). The within-subject factors were culture of listener (Dutch and Japanese), sex of listener (male and female), and 15 listeners, nested within the last two factors. The level of significance was set at .01. In the case of significant main effects, post hoc comparisons (Tukey’s HSD) were performed to assess which levels differed significantly (p < .05) from each other. Only those factors and interactions will be considered here which bear directly on the hypotheses formulated in the introduction, that is, only the results for the factor pitch and the second, third, and fourth interactions of pitch with culture of speaker, culture of listener, and sex of listener will be presented and discussed.

Inspection of the results made it clear that none of the second, third, and fourth order interactions involving sex of listener were significant for any of the scales. The main statistical data for the remaining interactions and for the factor pitch are listed in Table 3. The data in Table 3 reveal that the factor pitch had a significant effect on all five scales. In Table 4 the mean ratings for the three pitch levels are given. It may be seen that for all four scales related to physical and psychological power, namely tall, strong, independent, and arrogant, the ratings for the low pitch versions are higher than those for the high pitch versions. The contrasts were significant in all cases. In the case of unattractive, the original pitch level evoked the most positive (least unattractive) ratings. The contrast between the original and low pitch levels was significant, as well as the contrast between the high and low levels.

Further inspection of Table 3 reveals two significant interactions, namely one of pitch with culture of speaker and one of pitch with culture of listener, both pertaining to
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TABLE 3

$F$-ratios ($df = 2, 12$) and significance (*$p = .01$) for the factor pitch and the interactions of pitch with culture of speaker (cultspeak) and culture of listener (cultlisten)

<table>
<thead>
<tr>
<th></th>
<th>Pitch</th>
<th>Pitch × cultspeak</th>
<th>Pitch × cultlisten</th>
<th>Pitch × cultspeak × cultlisten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall</td>
<td>84.93*</td>
<td>0.11</td>
<td>3.86</td>
<td>4.06</td>
</tr>
<tr>
<td>Strong</td>
<td>92.75*</td>
<td>4.41</td>
<td>4.19</td>
<td>2.46</td>
</tr>
<tr>
<td>Independent</td>
<td>117.35*</td>
<td>4.33</td>
<td>1.38</td>
<td>1.22</td>
</tr>
<tr>
<td>Arrogant</td>
<td>67.85*</td>
<td>1.33</td>
<td>1.67</td>
<td>1.47</td>
</tr>
<tr>
<td>Unattractive</td>
<td>14.49*</td>
<td>6.89*</td>
<td>6.01*</td>
<td>0.16</td>
</tr>
</tbody>
</table>

TABLE 4

Mean scale ratings for the three pitch levels

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Orig.</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall</td>
<td>4.2</td>
<td>4.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Strong</td>
<td>4.8</td>
<td>4.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Independent</td>
<td>4.8</td>
<td>4.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Arrogant</td>
<td>4.2</td>
<td>4.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Unattractive</td>
<td>4.2</td>
<td>3.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

unattractive. The relevant data are shown in Figure 1. It can be seen (Figure 1a) that the interaction with culture of speaker is due to the fact that high pitch is considered about equally (un)attractive for both Japanese and Dutch speakers, whereas a clear differentiation is made for the original and especially the low pitch: Original and low pitches are considered less attractive (more unattractive) for Japanese than for Dutch speakers. The interaction with culture of listener (Figure 1b) is caused by a crossover: Whereas the Dutch listeners consider the low and original pitches more attractive (less unattractive) than the Japanese listeners, the Japanese listeners consider the high pitch more attractive (less unattractive) than the Dutch listeners.

Ratings of the ideal woman and the ideal man

The ratings of the ideal woman and man were subjected to three series of analysis of variance, applied to the separate scales. The first series was based on the difference scores, which means that for each subject the scale ratings for the ideal woman were subtracted from the ratings for the ideal man. There were no significant effects of the factor sex of subject, nor of the interaction of sex of subject with culture of subject. However, there were
three significant effects of culture of subject: for strong, independent, and arrogant the difference between the ideal man and the ideal woman (see Table 5) was significantly larger for the Japanese subjects than for the Dutch subjects. For the Japanese subjects the ideal difference is always more than one and a half scale positions, whereas for the Dutch subjects it is never more than half a scale position, except for tall. It can furthermore be seen in Table 5 that all difference scores are positive, which means that the ideal woman is invariably shorter, weaker, more dependent, and more modest than the ideal man.

The second series of analyses of variance was run to test the effect of sex of subject and culture of subject on the ratings for the ideal woman. There were no significant interactions of sex of subject with culture of subject. However, there was one significant effect of sex of subject and one of culture of subject. The effect of sex of subject pertained to strong: Female subjects, both Japanese and Dutch, rated the ideal woman as significantly stronger than male subjects (5.7 versus 4.5). The effect of culture of subject pertained to independent: Dutch subjects view the ideal woman as more independent than Japanese subjects (see Table 5).

The third series of analyses of variance pertained to the ratings for the ideal man. There were no significant effects of sex of subject, nor of the interaction of sex of subject with culture of subject. However, all scales showed a significant effect of culture of subject: Japanese subjects rated the ideal man as significantly taller, stronger, more independent, and more arrogant than Dutch subjects (see Table 5).

DISCUSSION

The present study tested the validity of three hypotheses underlying a sociocultural explanation of the relatively high pitch of Japanese women compared to that of (Caucasian) Dutch women.
The first hypothesis was related to the frequency code of Ohala (1983, 1994). Assuming a culture independent basis of the frequency code, we hypothesized that both Dutch and Japanese listeners would associate low pitch with tall, strong, independent, and arrogant and high pitch with short, weak, dependent, and modest. No interactions were expected between pitch and culture of speaker, nor between pitch and culture/sex of listener. Analyses of variance revealed an effect of pitch on all four scales, with ratings showing the expected relations with pitch. There were no significant interactions. So all data agree with the predictions: When speaking at a high pitch, speakers from both cultures are perceived by listeners of both sexes and from both cultures as shorter, weaker, more dependent, and more modest than when speaking at a low pitch. Apparently the perception of extralinguistic pitch is not obscured by listeners and speakers speaking mutually unintelligible and phonetically widely differing languages. As hypothesized by Ohala, the association of different pitch levels with differences in physical and psychological power may indeed be universal.

Our second hypothesis predicted a strong differentiation in Japan between the ideal woman and man, in the sense that the former would be characterized by high-pitch related attributes (short, weak, dependent, modest) to a much higher extent than the latter, and a weak differentiation between the ideal man and woman in the Netherlands. This hypothesis was confirmed for three of the four scales: for strong, independent, and arrogant the distance between the Dutch ideal man and woman was equal to or less than half a scale position, whereas the corresponding distances for the Japanese ideal woman and man amounted to more than one and a half scale position. The cross-cultural differences in distance were significant and always in the predicted direction. With respect to tall, the hypothesis was partly confirmed: there was a strong differentiation (of 2.4 scale positions) for the Japanese ideal man and woman in the predicted direction, however there was a strong differentiation (of 1.7 scale positions) for the Dutch ideal man and woman as well. Apparently, the egalitarian principles do not include physical attributes that are purely nature given and cannot be influenced.

Furthermore, as part of the second hypothesis we expected the Japanese ideal woman to be shorter, weaker, more dependent, and more modest than the Dutch ideal woman. This
hypothesis was confirmed for independent; it was rejected for tall, strong, and arrogant, where the mean ratings did not differ. No hypotheses were formulated with respect to the ideal man. However, systematic cross-cultural differences were revealed. The ideal man as rated by the Japanese subjects was found to be significantly taller, stronger, more independent, and more arrogant than the Dutch ideal man. In all cases the Japanese ratings are more extreme, that is further removed from the neutral scale position 4 than the Dutch ratings. So, contrary to expectation it is not so much the ideal woman who differs between the Japanese and Dutch cultures, but rather the ideal man. And both sexes agree on this.

Perhaps the stronger emphasis on masculinity has always existed. There may also be a shift in Japanese culture from an emphasis on femininity in women towards an emphasis on masculinity in men. This might be a recent development, which is perhaps confined to educated people. It might explain why we did not find the expected high pitches in our female speakers in the first place. It would be very interesting to relate our findings to the pitch of Japanese males. Unfortunately, there are very few data available. Loveday (1981) conducted a small study in which he measured pitch in politeness formulae spoken by a few Japanese and English male and female speakers. As mentioned in the introduction he found much higher pitches for the Japanese than for the English females. However, he reports (p. 82) some interesting facts about the male speakers as well: “the Japanese males’ preferred top pitch is much lower than the English males’, in spite of the fact that both groups of males have a broadly similar phonational range. Furthermore, the English males’ performance certainly reaches and sometimes equals the English females’ top range, while this is never the case with Japanese males in relation to Japanese females.” These data are in line with our finding of an emphasis on low-pitch related attributes in the ideal man.

Ohara (1992) compared the pitch of six Japanese men speaking Japanese and English sentences. She did not find a significant effect (no mean pitch values are provided, only ranges). However, she had expected a different result, since she states (p. 473): “Based on casual observation, my impression had been that Japanese males generally employ lower pitch when they speak in Japanese.” One wonders why there has been so much more emphasis on the pitch of Japanese females compared to the pitch of Japanese males. It might have something to do with the feminist context within which the attention to pitch was placed.

In order to test the third hypothesis, that is the positive evaluation in Japanese culture of high pitch in women and the positive evaluation in Dutch culture of medium or low pitch in women, subjects were asked to rate the Dutch and Japanese speech samples on the scale attractive - unattractive. We hypothesized an interactive effect of pitch and culture of listener in the sense that Japanese listeners would consider high pitch more attractive for female speakers whereas Dutch listeners would prefer the original or low pitch. Also, we expected high-pitch preferences for the Japanese female speakers and low-pitch preferences for the Dutch female speakers. Finally, we did not exclude an effect of the sex of the listeners.

The hypothesized interaction of pitch with culture of listener was largely confirmed. Dutch listeners do consider medium and low pitch more attractive than high pitch, whereas Japanese listeners consider medium and high pitch more attractive than low pitch. No interaction with sex of listener was found. In addition, part of the predicted interaction of pitch with culture of speaker was found: Original and low pitches are considered less
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attractive for Japanese than for Dutch speakers. The two significant interactions seem to reinforce each other: Low pitch in women is part of the Dutch culture, high pitch is part of the Japanese culture.

The three hypotheses underlying a sociocultural explanation of the relatively high pitch in Japanese women compared to that of Dutch women are therefore confirmed in almost all respects: (1) the frequency code as formulated by Ohala (1983), operationalized by means of the attributes tall, strong, independent, and arrogant, has been shown to exist both in the Netherlands and in Japan, (2) there is a stronger differentiation between the ideal woman and man, in the predicted direction, in Japan than in the Netherlands, and (3) the preferred pitch for women is relatively high in Japan and low in the Netherlands. All conditions seem to be met therefore to make it plausible that Japanese women raise their pitch, along with employing other linguistic means, in order to conform to sociocultural expectations stressing femininity. The evidence would have been even stronger if the Japanese ideal woman had differed more from the ideal Dutch woman. However, they differed only with respect to independence; as expected the Japanese ideal woman is more dependent than her Dutch counterpart. No significant differences were found for the other scales.

The fact that the Japanese ideal man differs on all four attributes from the Dutch ideal man – he is taller, stronger, more independent, and more arrogant – suggests that it would be worthwhile to repeat part of the present experiment, namely the rating of the auditory stimuli, with male speech at different pitch levels. In this way it could be assessed whether the (rather weak) interaction between pitch and culture of listener found in the attractiveness ratings for female speakers would be stronger for male speakers. The predicted interaction would of course be in the opposite direction, that is a stronger preference for low pitch in Japan than in the Netherlands. At the same time it would be useful to have recent pitch measurements of Japanese male speech, for cross-cultural comparison with western data, but also of recent Japanese female speech, for intracultural comparison to assess whether female pitch has been lowering. The latter finding would fit in with the linguistic study by Okamoto and Sato (1992), who compared the use of male and female speech registers among Japanese women of different ages. They report that the younger women used more masculine forms (e.g. of sentence final particles) than the older women.

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