

# THE ROLE OF PITCH IN PERCEIVING POLITENESS IN KOREAN

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## ABSTRACT

It has been found that Korean speakers lower their average voice pitch when speaking politely [16, 17], contradicting the idea that high pitch is polite across *all* cultures, as proposed by Ohala's Frequency Code hypothesis [e.g., 12]. This study looks at pitch as a perceptual cue to politeness in Korean. Ten Korean listeners heard short utterances from eight different speakers and judged whether each utterance was spoken in a polite (*contaymal*) or informal (*panmal*) register. Results indicate that F0 manipulation did affect politeness perception, but with an unexpected gender effect: High pitch was perceived as polite by Korean females and as informal by Korean males. These findings suggest a mismatch of politeness production and perception, and they reveal important gender differences in how the same acoustic cues are imbued with different kinds of politeness meanings.

**Keywords:** sociophonetics, politeness, fundamental frequency, Korean

## 1. INTRODUCTION

In languages such as Japanese or Korean, most research on politeness focuses on grammatical and lexical honorifics. Indeed, well-developed grammatical and lexical inventories in these languages express often intricate and multi-layered levels of politeness and relationships between interlocutors. However, recent research indicates that besides these grammatical markers, vocal characteristics of politeness may also play an important role. Ofuka, McKeown, Waterman and Roach [9] found that utterance final pitch rises lead to increased politeness ratings in Japanese. Campbell [6] found that Japanese speakers used breathy phonation when talking to strangers. Winter and Grawunder [16, 17] demonstrated that for Korean, a large number of phonetic variables co-vary with polite versus informal speech levels, including pitch, loudness, voice quality and speech rate. These phonetic cues seem to help Korean listeners to accurately identify polite and informal speech levels solely based on phonetic features [4].

Examining phonetic characteristics of politeness is important for the better understanding of politeness as a multi-dimensional phenomenon.

Given the emerging findings that native speakers and listeners seem to possess phonetic knowledge in relation to politeness, an analysis of politeness that purely focuses on lexical and grammatical markers may in some cases be insufficient to explain how an utterance is intended and perceived. Multiple linguistic dimensions –lexical, grammatical, gestural and phonetic– are likely to interact in the expression of a range of complex (im)politeness meanings [3, 4, 17].

Within the phonetic domain, it has repeatedly been stated that high pitch is associated with politeness, such as in Tzeltal [5] and Japanese [9, 13]. Ohala's [11, 12] Frequency Code hypothesis explains the association between high pitch and politeness as a cross-linguistic phenomenon via a link between high pitch and perceived subdominance. However, in Korean [4, 17] (and perhaps also Mursi [8]), the opposite association has been reported: Speakers lowered their voice pitch when speaking politely. Korean may present a potentially interesting situation where a different underlying meaning of politeness, other than subdominance, may explain the association of low pitch and politeness.

The current study builds on a politeness perception study [4], which demonstrated that Korean listeners can perceive politeness levels based on acoustic cues alone. However, the acoustics were not manipulated, hence, the different acoustic dimensions naturally co-varied. The present study singles out one particular cue, pitch, and examines its effect on the perception of politeness in Korean.

## 2. METHODS

### 2.1. Participants

Ten adult native Korean listeners (6 female and 4 male) participated for a small payment. At the time of testing, they were on average 30 years old (range 20-45). Their birthplaces included Seoul (7 listeners), Jeonju (1 listener), Daejeon (1) and Busan (1) in Korea. One participant was born in the U.S.; however, he returned to Korea at age 5 and spent the next 12 years in Korea. He reported to use Korean frequently and was thus included in the analysis. All participants were recruited in the U.S.; the average time they lived outside Korea was approximately 7

years. Even though all were residing in the U.S., they reported that about half of their daily communication was conducted in Korean.

## 2.2. Speech materials

Korean speech samples from [4] served as the baseline stimuli here (“original”). The original speech samples were productions of pre-determined sentences issuing a request in 10 different contexts (“scenarios”). Eight native Korean speakers (4 female and 4 male) produced the utterances in two social situations: in one, they simulated speaking to an unfamiliar professor, eliciting polite utterances (Korean *contaymal*), and in the other, they simulated speaking to their best friend, eliciting informal utterances (*panmal*).

The polite version of one of the 10 scenarios is shown here as an example:

- (1) kyoswu-**nim**, cinan pen-ey **malssumha-si-n** khemphyuthe, phulokulaym-ul kwuha-yss-**supnita**, kulentey sayongpep-i elyew-ese kule-nuntey, pappu-**si**-kyess-ciman camkkan-man kaluchy-e cwu-**si-l** swu iss-na-**yo**?

“Professor, I’ve bought that computer program you mentioned last time. But the instructions are difficult. I know you must be busy, but can you teach me how to use it?”

While Korean utterances are typically sprinkled with grammatical and lexical politeness markers, indicated by bold segments in (1), the underlined clause does not include any such markers. Thus, these middle clauses allow investigating the role of the acoustic manifestation of politeness uncontaminated by any morphological markers.

In the current study, we selected only those clauses that were spoken in *contaymal*/polite utterances. Using Praat [2], we manipulated the overall pitch of these clauses so that the overall F0 was raised and lowered by 8% and 16%. This resulted in five versions of each clause: +16% F0, +8%, the original, -8%, and -16%. All stimuli were then amplitude normalized to 75 dB.

Our choice of 8% and 16% as manipulation levels stems from the fact that in previous production studies, the difference between polite and informal speech was 17Hz [17] and 16 Hz [4]. Changing F0 upward and downward by 8% approximates this empirically established production difference. 16% allows us to explore exaggerated levels that go beyond what was observed in the production data. The F0 manipulation resulted in 640 stimuli (8 speakers x 8 scenarios x 2 politeness styles x 5 pitch levels). Eight out of the original ten

scenarios from [4] were selected to keep the total number of stimuli manageable.

## 2.3. Procedure

Seated in front of a computer monitor, participants heard each stimulus once through headphones and judged whether the utterance was spoken to “someone above the speaker” or “someone below the speaker.” This is a culturally meaningful description of what determines politeness levels in Korean [18]. Participants responded by pressing the number 8 key (someone above) or the number 2 key (someone below) on the number pad.

Participants had 3 seconds to respond. The inter-stimulus-interval was 1 second. The 640 stimuli were blocked by speakers (see [4]). Speaker blocks as well as all stimuli within each speaker block were presented in random order. Participant had a chance to take a break between speaker blocks. All participants completed the task in approximately 30 minutes.

## 2.3. Statistical analysis

Using R [15] and the *lme4* package [1], a mixed logistic regression model was fitted to Korean listeners’ polite versus informal decisions (binary dependent variable). The predictors were “F0 manipulation” (5 levels), Reaction Time, and Gender (i.e., the gender of the listener). The fixed effects component of the model had the following structure:

- (2) Listener Response ~ F0Manipulation + F0Manipulation\_Squared + ReactionTime + Gender + Gender\*F0Manipulation + Gender\*F0Manipulation\_Squared

The F0 manipulation variable was coded as a continuous factor, with an additional squared term to account for nonlinear effects of F0 manipulation. We included this based on the a priori reasoning that response curves may be U-shaped, for example, if lower pitch values were perceived as polite, but exaggerated low pitch as impolite. This analysis choice is also justifiable based on previous U-shaped response curves in politeness phenomena [9]. Reaction time was included because [4] found different response behaviors for fast and slow responses.

The random effects component included random intercepts for Speaker, Listener, and Scenario, as well as by-listener and by-speaker random slopes for the effect of F0 Manipulation (for both the linear and quadratic component). To simplify the fit, we used a

de-correlated random effects structure (no slope/intercept correlations were estimated).

In line with standards of reproducible research [14], the scripts and data are made available with this publication and can be retrieved on the authors' webpages.

## 2. RESULTS

The fitted model indicated a number of significant effects. Important for this study, the linear and squared terms of F0 Manipulation were significant (Wald's  $Z = 2.27$ ,  $p < 0.03$  for linear;  $Z = -3.65$ ,  $p < 0.001$  for quadratic; overall F0 effect:  $\chi^2(1) = 7.83$ ,  $p = 0.02$ ). This confirms that there was an overall effect of F0 on the polite versus informal decision. However, there also was a significant Gender\*F0 Manipulation interaction (linear:  $Z = -2.19$ ,  $p < 0.03$ ; quadratic:  $Z = 1.7$ ,  $p = 0.085$ ; overall:  $\chi^2(1) = 6.59$ ,  $p = 0.037$ ). This indicates that the effect of F0 Manipulation on Korean listeners' politeness decision was different depending on whether the listener was male or female. This gender effect is illustrated in Figure 1, which plots the proportion of polite vs. informal responses that the model predicts for male and female listeners for different F0 Manipulation levels.

Broadly, female Korean listeners' polite responses *increased* whereas male Korean listeners' polite responses *decreased* as F0 rose. The perceptual pattern of female listeners was the opposite of the pattern previously found in production [16, 17].

As Figure 1 illustrates, female Korean listeners perceived low-pitched utterances as mostly informal (75% of the time at -16% F0), but high-pitched utterances as mostly polite (74% of the time at +16% F0). On the other hand, male Korean listeners perceived high pitch as more informal (55% of the time at +16 F0) than low pitch (29% at -16 F0). There is less variation in male listeners' choices, particularly for low pitch differences. Male listeners changed their judgment only by 4% between the -8% condition and the -16% condition. However, the association between pitch and politeness observed for male listeners is consistent with the pattern found in previous production studies.

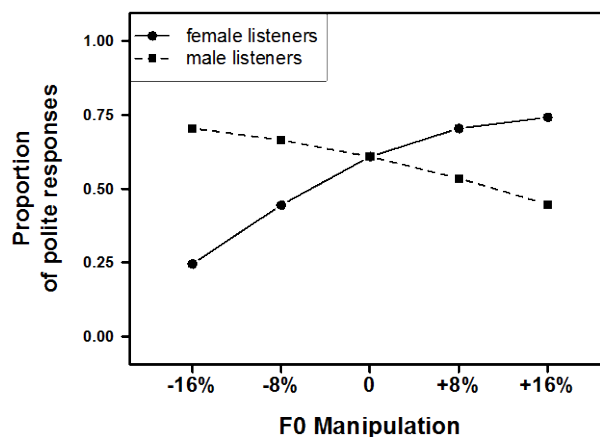
Notice that female participants appeared to be overall more affected by pitch than male listeners. Within the "naturalistic range" of +8% and -8%, the male proportion of politeness judgments change by about 13%, female judgments by about 26%.

It is also important to note that even though there were significant effects across listeners, there is considerable variation between the 10 different listeners. This is indicated, for example, by

significant by-listener slopes ( $\chi^2(1) = 247$ ,  $p < 0.0001$ ). On the other hand, the results for by-speaker slopes were less strong ( $\chi^2(1) = 4.17$ ,  $p = 0.04$ ), i.e., there was more random effects variance for listeners than for speaker voices. Compared to the consistency of the speech production results reported in [17], it seems that while the production of Korean politeness may be highly systematic (and includes lower pitch), the perception of Korean politeness may be more variable.

To summarize, for female Korean listeners, lower pitch signals the informal style and higher pitch signals the polite style. For male Korean listeners, higher pitch signals the informal style, and lower pitch is more likely to be associated with the polite style.

**Figure 1.** Proportion of polite responses as a function of F0 manipulation, plotted separately for female (line) and male (dotted line) Korean listeners. Dots and lines are based on predictions from the mixed logistic regression model.



## 3. DISCUSSION

These results are intriguing on many accounts and present some findings contradictory to those of previous research. Most importantly, the hypothesized association between F0 and politeness in Korean [4, 17], i.e., "low pitch is polite," was not confirmed in perception. Female Korean speakers perceived low-pitch utterances as informal and high-pitch utterances as polite, i.e., "high pitch is polite." This is consistent with the pattern observed in speech production for Japanese [13], and the opposite of the pattern observed in Korean production [16, 17]. Although male Koreans perceive higher-pitched utterances as informal and lower-pitched utterances as relatively more polite, pitch seems to affect them less overall. The association "low pitch is polite," consistent with prior production studies, is only found for male Korean listeners in this perception study.

Our results suggest an important gender difference in Korean politeness. This would not be the first report of gender-specific politeness effects in languages such as Korean and Japanese. Traditional descriptions of honorifics in Japanese claim that the frequent use of honorific language is an important marker of women's speech [7]. In contrast to this, accounts of honorific language in Korean tend to describe the highest levels of honorific language as sounding masculine [10]. These perceptions of politeness as being a feminine domain in Japanese but a masculine domain in Korean could be a factor behind the "high pitch is polite" association reported for Japanese production and the "low pitch is polite" connection reported for Korean production.

So why did the "low pitch is polite" association only extend to male listeners? Here, the fact that it was the female Koreans who showed the opposite pattern to the previous production studies (i.e. who perceived high pitch as polite) seems to be crucial. It may be that women associate high pitch with politeness due to universal associations between subdominance and politeness, as claimed in the Frequency Code. For men, however, language-specific "low pitch is polite" associations may be playing a larger role. It seems that the associations between pitch, dominance/subdominance, and politeness are not straightforward, even within a given language.

It is also likely that other perceptual cues alongside pitch participate in politeness perception. Notice that the proportion of polite responses never reached 0 or 1 for either female or male listeners. It may be that when utterances lack morphological marking, i.e., the primary linguistic cue to the polite versus informal distinction in Korean, Korean listeners' perceptual responses will always include some ambiguity. Alternatively, it may be that when more relevant perceptual cue(s) collectively signal polite versus informal classes, listeners' responses show more robust differentiation. Future research needs to address the question of what other perceptual cue(s) define the polite and informal styles, and how they combine together (i.e., what is the weight of each cue) for male and female Korean speakers/listeners.

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