Lexical access and stereotypical 'word age' in Korean
Jonny Kim (University of Hawai‘i at Mānoa, jonnykim@hawaii.edu)

There is a growing body of work demonstrating that listeners' perceptual categorization of speech segments is affected by social information attributed to the speaker, such as age [4], gender [3], region of origin [1, 2, 6] and ethnicity [8]. In exemplar models of speech perception, e.g. [7], the influence of the talkers' social information on speech perception is treated as a consequence of listeners' frequent exposure to associations between variables and social groups. Once the voice characteristics of a speaker in a particular social group are perceived, associated exemplars of people in that group producing the variable are activated. If dense clusters of such episodic memories have been formed by frequent use of the variable by people in that group, recognition is facilitated or even biased by the activation of the talker's social information when the variable is spoken by a person who matches that group. This prediction in lexical processing is less investigated, but Walker and Hay's [9] lexical decision test found faster lexical decisions when the voice age (listeners' perceived age of the speaker) matched the word age (age of the social group who uses the word most frequently), as determined by word frequency in New Zealand English corpora. It is argued, therefore, that lexical representation is shaped by a lifetime of exposure to the statistical distribution of phonetic realizations of different social groups [9].

This paper examines this issue further with Korean words that are stereotypically associated with age groups, pursuing how linguistic stereotypes can fit in the context of exemplar-based models. Linguistic stereotypes refer to variables that individuals in the speech community are consciously aware of and can discuss their relation to particular social groups [5]. The awareness of sociolinguistic variation strengthens the effect of social information on segment perception [6, 8]. The indexing between linguistic variables and social categories are reinforced by stereotypes, and there is evidence that mere exposure to the social concept involved in a linguistic stereotype activates the indexed social exemplar and the activation spreads to the distributional properties of the phonetic exemplars (cf. [1], [2]). However, the effect of stereotypes in lexical access is not established in the literature, either. A lexical decision experiment reported in this paper demonstrates that, in addition to the known effect of frequency, recognition is also affected by stereotypical associations between words and age groups.

In the experiment, 35 Korean-native college students heard 384 real words and 384 non-words, spoken in isolation by two older and two younger speakers, and pressed a button to indicate whether the stimulus was a word in Korean. The mean perceived ages of the voices (rated by the participants in an exit survey) were 56.59 for the older speakers and 26.32 for the younger speakers. Among the real words, 288 critical items were selected and divided into three 'word age' groups (young, old, and age-neutral, N=96 for each category) based on the stereotype score (ST score). The ST scores were obtained from a preliminary survey, where 80 Korean-native respondents rated the likeliness of each word to be used by either older or younger people. Only younger respondents’ (N=38) responses were included to obtain the ST scores. In addition, 96 filler items were added from the most frequent words in the Sejong spoken corpus.

Table 1. Summary of results of mixed effects model fit to reaction times with ST score as a fixed effect. A high ST score indicates that the word is highly associated with older speakers.

<table>
<thead>
<tr>
<th>Model Term</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>713.774</td>
<td>23.145</td>
<td>30.839</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Speaker age = young</td>
<td>-7.607</td>
<td>4.783</td>
<td>-1.591</td>
<td>.112</td>
</tr>
<tr>
<td>ST score</td>
<td>20.010</td>
<td>4.597</td>
<td>4.353</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Word duration</td>
<td>0.612</td>
<td>0.024</td>
<td>25.671</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Speaker age = young : ST score</td>
<td>3.068</td>
<td>1.542</td>
<td>1.990</td>
<td>.047</td>
</tr>
</tbody>
</table>

A linear mixed effects model was fit to reaction times (RTs) from correct responses to critical items. Fixed effects in the model were word duration (as a control variable) and an interaction between binary speaker age (older or younger, deviation coded) and ST score (treated as continuous). By-item intercepts, by-participant intercepts, and by-participant slopes of the interaction between speaker age and ST score were included as random effects. As shown by the positive estimated coefficient for the interaction
between speaker age and ST score in Table 1, when words were heard in younger speakers' voice, in comparison with older speakers' voice, RTs were significantly increased when the ST score of the word is high (p<.05). In other words, participants took longer to respond when the perceived age of the voice and the stereotypical word age did not match. A separate model was fit to RTs with a frequency-based word age, the usage-age score (UA score), which was obtained by comparing the older (age 50 to 71) and younger (age 18 to 25) survey respondents' subjective ratings for the frequency of their own verbal production for each lexical item. The effects tested in this model were identical with the model fit to the ST score, except that the UA score was tested as a fixed effect (instead of the ST score). The interaction between speaker and word age was only marginal (p=.053).

Although the ST scores and UA scores of the lexical stimuli are highly correlated (τ = .71, p<.001), the interaction between voice age and word age was significant when word ages were evaluated by a stereotype-based rating, while the effect was marginal when a frequency-based rating was used. This provides evidence that lexical recognition is facilitated when words that are stereotypically associated with a particular age group are produced by speakers from that age group. This finding expands the understanding of the perceptual mechanism of spoken words in light of stereotypical associations between words and social groups. Because the stereotypical word ages were based on native speakers' conscious metalinguistic judgments on linguistic stereotypes, the results imply that recognition is closely related to explicitly idealized stereotypical associations. Listeners' stereotypes about words enhance the activation of social information, which spreads to the lexical representations via social indices, and thus lexical access is facilitated when the words are heard in a voice of the stereotypically associated age group.

However, the effect of stereotypes does not stray away from the predictions of exemplar-based models, in that listeners were also sensitive to the relative distributions of usage-frequency across age groups. It should be noted that the distributional properties, too, were measured by subjective ratings based on individuals' experience, rather than actual occurrences. The core of the exemplar models is concerned with representations composed of episodic memories, which build up individual's experience. Therefore, the finding that lexical access is predicted by the subjective ratings also supports the models. The results also indicate that the distributional properties of lexical use in episodic memories are apparently a crucial factor in construction of linguistic stereotypes. However, this study suggests that models of speech perception should take into account the interaction between the distributional factor and the ideological distinctions of social groups as well, which is in no way negligible amid the formation of linguistic stereotypes. Lastly, this study also verifies the effect of social information in lexical-level processing [9] by exploring Korean, the social constructs of which are considerably different from those of English.

References