# The Effect of Language Familiarity on Age Perception

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## Introduction

- Previous research has shown that listeners can estimate a talker's age quite accurately by listening to speech sounds alone (e.g. Ptacek & Sander, 1966; Shipp & Hollien, 1969).
- Literature is mostly based on American English (cf. Table 1 below).

**Table 1. Correlation values between perceived age and chronological age.**

| Source | Correlations | Age range of speakers | language |
|---|---|---|---|
| Shipp & Hollien (1969) | 0.88 | 20-89 | AE |
| Ryan & Burk (1974) | 0.77 | 40-80 | AE |
| Horii & Ryan (1981) | 0.76 | 40-80 | AE |
| Baker (1981) | 0.68 (Caucasian listeners)<br>0.69 (Afro-Am. listeners) | 40-95 | AE(Afro-Am) |
| Ramig et al. (1985) | 0.17 | 25-75 | AE (Vowels) |
| Neiman & Applegate(1990) | 0.91 | 20-75 | AE |
| Braun (1996) | 0.68 | 25-59 | German |
| Cerrato et al.(2000) | 0.77 | 18-66 | Italian |
| Kido & Kasuya (2004) | 0.66 | 20-60 | Japanese |

- No cross-language study has been reported.
- It is not known whether listeners exhibit the same accuracy when they estimate the age of talkers who speak in an unfamiliar language (i.e. foreign language).

**Aim:**

**To explore the effects of sociologically determined aspects of speech on age perception in a cross-language study between Japanese and American English.**

## Research Questions

1. Does language familiarity affect listeners' performance of age perception?
2. Does the amount of information (isolated vowels, phrases, & sentences) affect age perception?
3. Does the age of talker affect age perception?

**Hypotheses**

1. If listeners can judge the age of talkers regardless of their native language, English and Japanese listeners should estimate the age of talkers equally well.
2. If language familiarity does affect age perception, listeners' age estimation should be more accurate for the familiar language talkers than the unfamiliar language talkers.
   [Familiar language > Unfamiliar language]
3. If the amount of information influences age perception, then listeners' age estimation should be more accurate when the stimuli include more information.
   [Vowels < Phrases < Sentences]

## Methods

***Talkers***

- 2 language groups (English and Japanese) recorded in home country.
  - 30 native speakers of American English
  - 30 native speakers of Japanese
- 3 age groups (Young, Middle-aged, and Elderly)
- Equal number of men and women

**Table 2. Talker demographics.**

| Talker Language | Age group | Age range | N (F, M) |
|---|---|---|---|
| English | Young | 24-30 | 10 (5, 5) |
| | Middle-aged | 54-60 | 10 (5, 5) |
| | Elderly | 80-86 | 10 (5, 5) |
| Japanese | Young | 25-30 | 10 (5, 5) |
| | Middle-aged | 55-60 | 10 (5, 5) |
| | Elderly | 80-86 | 10 (5, 5) |
| | | **Total** | 60 (30, 30) |

***Speech materials***

- **Vowels**: 500 msec from the sustained vowel /i/
- **Phrases**: The target phrase (BCC /bisisi/) was edited from each utterance.
  [The target phrase is spoken similarly in both languages.]
  English: "The answer was BCC [bisisi] Corporation."
  Japanese: "Kotae wa BCC [biʃiʃi] kooporeeshyon dattayo."
- **Sentences**: 2nd sentence from the reading of *The North Wind and the Sun.*
  English: "They agreed that the one who could make the traveler take his coat off would be considered stronger than the other one. "
  Japanese: "Tabibito no gaitoo wo nugaseta hoo ga kachi to iukoto ni kimete mazu kita kaze kara hajimemashita. "
- Additional speech materials were included, but that data will be reported elsewhere.

***Listeners***

- 24 native English adults (Mean age = 21 years old).
- 24 native Japanese adults (Mean age = 19 years old).
- Listeners participated in the perception experiment in their home country.

***Task***

- Direct age estimation of each talker under computer control.
- No instructions about expected age range or the non-native language were given.
- Age responses in years: integers 1 to 100.

***Analysis***

- Accuracy of age estimation: Differences between PA and CA(|PA-CA|).
- Correlations between chronological age (CA) and perceived age (PA).

Poster presented on October 10, 2005 at the International Research Conference on Aging and Speech Communication, Bloomington, Indiana

## Results

***Overall Results***

- Japanese listeners were better judges than English listeners overall.

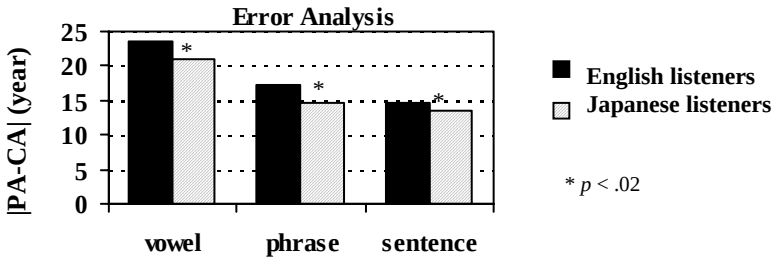


**Figure 1. Age estimation errors by English and Japanese listeners in each context.**

***1 Effects of language familiarity***

- Better age estimation was found for the familiar language talkers.
- This language familiarity effect was not found for the vowel stimuli.

**Table 4. Pearson correlation b/w PA and CA in each context in terms of language familiarity.**

| Context | Familiar | Unfamiliar | *p, two tailed* |
|---|---|---|---|
| Vowel | 0.42 | 0.35 | ns |
| Phrase | 0.71 | 0.53 | < .01 |
| Sentence | 0.85 | 0.69 | < .01 |

***2 Effects of the amount of information***

- Age estimation improved as the contextual information became richer.

**Table 3. Pearson correlation between PA and CA in each context.**

| | Vowel | Phrase | Sentence |
|---|---|---|---|
| All listeners | 0.38 | 0.62 | 0.76 |

***3 Effects of talker age***

- Age estimation errors increased as the age of talkers became older.

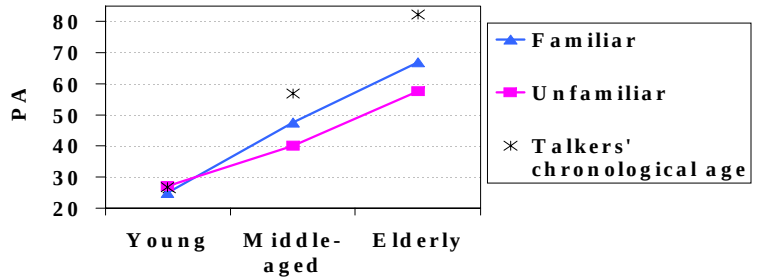


**Figure 2. Mean perceived age for familiar and unfamiliar talkers in the sentence context.**

## General discussion

**Social differences**

- Better age estimation results for Japanese listeners could be due to their more frequent interactions with the elderly. Fourteen out of 24 Japanese listeners lived with at least one grand parent, while none of English listeners lived with their grandparents.

**Peer group effect**

- More accurate age estimation for the young talkers could be due to a peer group effect because all the listeners are about same age as the young talkers.

## Conclusions

1. Age estimation was more accurate for familiar language than less familiar language.
2. Age estimation accuracy improved as the amount of information became richer regardless of listener's linguistic backgrounds.
3. Perception of a talker's age was based on age-related changes in speech common to both languages.
4. However, listener's linguistic experiences also affected perception of a talker's age.

## Acknowledgments

This work is supported by an Indiana University Graduate & Professional Student Organization Research Award, an Indiana University Speech & Hearing Sciences Departmental Research Support Program Award, a Fred W. Householder Memorial Award, and an Indiana University Grant-in-Aid Research Award. I appreciate Prof. Haruo Kubozono and Ms. Miho Mano at Kobe University and the Hyogo High School Alumni Association for their help to locate Japanese participants in the recording experiment. I also appreciate Prof. Miyako Muto at Kobe Women's Junior College for her generous support in arranging the perception experiment in Japan.

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