# 10 Elderly-friendly speaking styles

## Abstract

We investigate both word and voice selection to clarify elderly-friendly speaking styles. Previously, there has been no recommendation beyond "speak loudly and slowly" nor any explanation of where and how to make such changes. We select exemplar speakers, whom the elderly consider easiest to understand, from among elderly service workers and qualified personnel. Through the interviews with the exemplar speakers and analysis of elderly directed speech data uttered by the exemplar speakers, we clarify some of the detailed features of elderly-friendly speaking styles. This work provides important new insight into the practice of elderly-friendly speaking. We aim to clarify knowledge about elderly-friendly speaking styles that might be tacit knowledge among the exemplar speakers and open the knowledge to everyone for practical use. Moreover, we aim to realize richer communication between the elderly and the artificial intelligence (AI) that has learned elderly-friendly speaking styles.

## Issues and Goals

- Speech-based assistive technologies for the elderly are limited to hearing aids, uniform speed elongation etc..
- Reports on how to speak to the elderly (as a speech-based assistive technology) have only recommended "speak loudly and slowly," as unorganized or tacit knowledge

### Goals

Formulate "elderly-friendly speaking styles" and make them specific and practical

## Approach

1) Select exemplar speakers whom the elderly consider easy to understand: Elderly subjects compare pairs of speeches uttered by two speakers among elderly service workers and qualified persons and give scores to the winner to select the highest-scoring male and female speakers (M1 & F1 marked with ☆ in figure below)
2) Obtain tips that the exemplar speakers consciously make in practice through post-experiment interviews
3) Find subconscious tips for the easy-to-understand speech by analyzing speech, such as comparing between-sentence pause lengths



Scores for each speaker
when selecting exemplar speakers
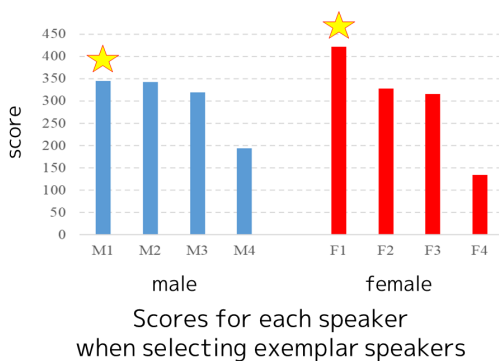
## Current status and Future work

**Gradually clarified elderly-friendly speaking styles**
(blue: conventional; underlined: new)

*From interviews*

**On the linguistic side**

Rephrasing into concise syntax in familiar and unambiguous words

**On the acoustic speech side**

loudness: enough for the listeners to hear

frequency: generally at lower pitch, higher when conveying emotion

speed: basically slow and constant, and even slower in important areas

separation: no need for as much separation as that for the hearing impaired or in noise

⇒ Much of "where?" and "to what extent?" the elderly-friendly style emerged is subconscious

thus analyzed

*From speech analysis*

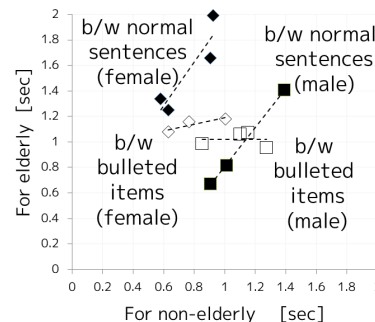pause length: differences found according to document structure and expression



Figure shows how the length of pauses between bulleted items (◇□) in speech for the elderly aligns around 1 second on the vertical axis (dashed line is regression line, ◆/■ denotes length of pause between normal sentences)

*Future work*

- Describing concretely the remaining observations of "where?" and "to what extent? the elderly-friendly speaking style emerges
- Clarifying similarities and differences of elderly-friendly speaking style with other styles (for infants and non-Japanese, etc., or made in practice by announcers)

## References

[1] H. Nakajima, Y. Aono, "Collection and analyses of exemplary speech data to establish easy-to-understand speech synthesis for Japanese elderly adults," in *Proc. 23rd Conference of the Oriental COCOSDA International Committee for the Co-ordination and Standardisation of Speech Databases and Assessment Techniques (O-COCOSDA)*, pp. 145–150, 2020 (https://ieeexplore.ieee.org/document/9295000).
[2] H. Nakajima, N. Miyazaki, S. Sakauchi, "Pause length analysis between utterances to elderly people," in *Proc. 2015 Autumn Meeting Acoustical Society of Japan*, pp. 399–400, 2015.

## Contact

Hideharu Nakajima / Interaction Research Group, Innovative Communication Laboratory
Email: cs-openhouse-ml@hco.ntt.co.jp