

Listener judgments of age in a single-talker 48-year longitudinal sample

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Background

Speech changes with age. Degenerative processes include laryngeal neuromuscular degeneration through atrophy and dystrophy, and edema in the vocal fold cover. Because voice production structures share physiological territory with the aerodigestive tract, age-related degeneration of the voice may signal degeneration of other key functions such as breathing, swallowing, and airway protection.

Numerous studies have examined whether listeners perceive these age-related physiological and production changes as well as whether they can accurately judge a talker's age from hearing his or her voice. Studies have included a variety of talker and listener characteristics (e.g., gender, age, number, group membership) as well as a range of speech materials (e.g., sustained vowels [phonated and whispered], sentences, passages of discourse). Studies have used from 4 to 150 talkers, but nearly all used a single speech sample from each talker.

The present study used materials produced by a single talker over a period of nearly 50 years. The talker had no formal training as a public speaker and maintained a lifestyle which included abstinence from smoking, coffee, and alcohol. He was also a lay religious leader who gave biannual religious addresses which were widely listened to by the worldwide membership of the church. The makeup of the population from which listeners were recruited for the present study made it likely that some participants would be familiar with the speaker. Such familiarity might affect age judgments, adding a variable not present in previous cross-sectional studies.

Participants

Listeners aged 17 to 50 years with self-reported normal hearing were recruited from the Participant Pool maintained by the University of Utah Department of Psychology. 22 listeners took part in Experiment 1; 25 took part in Experiment 2.

Materials

Segments lasting 5 to 10 seconds were extracted from 20 recordings of speeches delivered in a university auditorium. Speeches were selected at 2- to 3- year intervals over a period of 48 years. Three segments were extracted from each speech, yielding a total of 60 segments. Segments were selected to minimize content that would either identify the talker or connect the 3 segments within a speech to each other. Segments were also chosen to contain at least one audible breath and no disfluencies. All segments were scaled to the same average RMS intensity.

Procedures

Segments were presented diotically at a comfortable level via Sennheiser circumaural earphones. After each segment was presented, the message, "How old do you think the person talking is?" was displayed. In Experiment 1, subjects clicked on one of 3 boxes labeled (1) Between the ages of 50 and 66, (2) Between the ages of 67 and 83, or (3) Between the ages of 84 and 100. In Experiment 2, subjects were asked to guess the speaker's age in whole years and to write their guess on an answer sheet. Listeners in both experiments performed the test block two times.

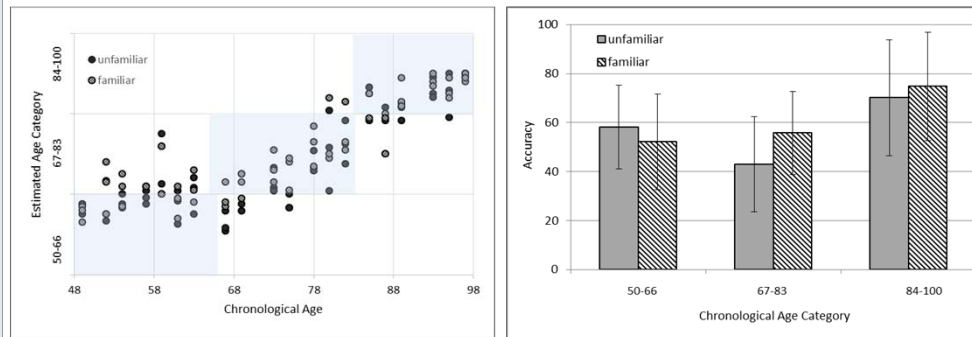
Discussion

Both experiments showed a piecewise relationship between chronological and perceived age. When the talker was younger than 68 years, age estimates were essentially flat and generally higher than his actual age. Above this point, however, age estimates began to trend with chronological age, albeit underestimating it by about 5 years. Speech production analyses for this talker also showed data patterns that changed around age 68, including breath group length and voice fundamental frequency (Hunter et al., 2012).

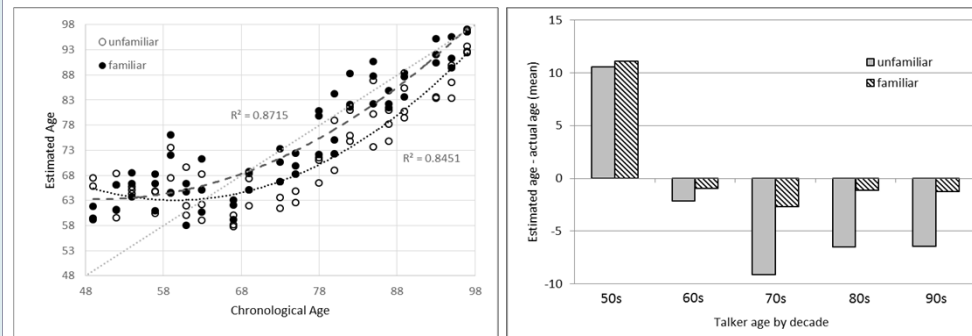
Previous, cross-sectional studies of have shown a similar tendency for listeners to overestimate the age of younger talkers and underestimate the age of older talkers. A meta-analysis of these studies showed a lower crossover point, however (around 50 years). This may be related to the age ranges studied, to talker variability in previous studies, or to familiarity effects in the present study. Although the two listener groups made similar age category judgments, listeners who recognized the talker made significantly more accurate direct age estimates than those who did not. These differences were significant only when the talker was in his 70s and older, perhaps because this is the age the talker would have been when the listeners started hearing his biennial addresses. The consistent accuracy shown during the talkers' 60s-90s by the listeners who recognized him argues against

Results

Experiment 1: Age Category Estimation



Experiment 2: Direct Age Estimation



Reference

Hunter, E. J., Kapsner-Smith, M., Peard, P., Engar, M. Z., and Brown, W. R. (2012). "Age and speech production: a 50-year longitudinal study," J. Am. Geriatr. Soc. 60, 1175-1177.

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