Speech Perception Across the Lifespan: Using a Gaussian Mixture Model to Understand Changes in Cue Weighting Between Younger and Older Adults

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Abstract: In order to understand speech, listeners must weight and combine multiple acoustic cues. For example, voice onset time (VOT) is a reliable cue to stop consonant voicing, while onset F0 provides information, but is much less reliable. Consequently, we would expect listeners to weight VOT higher than F0. This is the pattern observed for most listeners. However, these cue weights also change over time, and older adults tend to rely less on VOT than young adults, even in listeners without hearing loss. One hypothesized mechanism for this change is a decreased ability to detect temporal differences in sounds, which renders temporal cues (e.g., VOT) less reliable and leads to a greater reliance on spectral information (F0). We simulate this using a weighted Gaussian mixture model and find evidence in support of this mechanism: decreased temporal cue reliability leads to the same pattern of differences observed between younger and older listeners.