Supplemental Material S5. Rationalized arcsine transformed data.

Analysis of rationalized arcsine transformed intelligibility data

To assess the degree to which we were successful at this, we analyzed our intelligibility data using a 3 (acoustic clarity: quiet, +15 dB SNR, +5 dB SNR) × 2 (age: young, older) ANOVA on rationalized arcsine transformed intelligibility scores. There was a main effect of clarity, $F(2, 116) = 8.02$, partial $\eta^2 = 0.12$, $p < .001$, indicating that intelligibility was poorer in the more difficult SNR conditions. There was a main effect of age as a result of older adults' overall poorer performance, $F(1, 58) = 14.67$, $\eta^2 = 0.20$, $p < .001$. There was also a significant interaction of clarity and age, $F(2, 116) = 10.28$, $\eta^2 = 0.15$, $p < .001$, due to older adults' differential difficulty at +5 SNR.

Recognition memory (d') for participants with perfect intelligibility scores

Recognition memory results for young and older adults with perfect intelligibility scores are shown in Supplemental Material S3. Degrees of freedom are Greenhouse-Geisser correct to correct for nonsphericity. As with the full data set, we submitted these data to a 2 (ambiguity: high-ambiguity, low-ambiguity) × 3 (acoustic clarity: quiet, +15 dB, +5 dB) × 2 (age: young, older) ANOVA. There was a main effect of ambiguity, $F(1, 39) = 16.39$, partial $\eta^2 = 0.30$, $p < .001$, such that high-ambiguity sentences were more poorly recalled than low-ambiguity sentences. There was no effect of acoustic clarity, $F(1.95, 75.91) = 2.36$, partial $\eta^2 = 0.06$, $p = .103$, but as in the full dataset the effect of ambiguity differed as a function of acoustic clarity, indicated by a significant Acoustic Clarity × Ambiguity interaction, $F(1.98, 77.31) = 7.51$, partial $\eta^2 = 0.16$, $p = .001$. There was not a significant effect of age, $F(1, 39) = 1.96$, partial $\eta^2 = 0.05$, $p = .18$. However, there was a significant interaction between Age × Ambiguity, $F(1, 39) = 2.43$, partial $\eta^2 = 0.27$, $p < .001$. There was no significant interaction between Age × Noise, $F(1.95, 75.91) = 2.71$, partial $\eta^2 = 0.07$, $p = .07$. The three way Ambiguity × Acoustic Clarity × Age interaction was significant, $F(1.98, 77.31) = 3.45$, partial $\eta^2 = 0.08$, $p < .05$.

Follow-up ANOVAs run separately on each age group revealed that the effects of ambiguity, clarity, and the interaction between Ambiguity × Acoustic Clarity were selective to only the older adults. For the young adults, ANOVA reveal insignificant effects of ambiguity, acoustic clarity, and the interaction of Ambiguity × Acoustic Clarity, all Fs < 1.3, *ns.* For older adults, effects of ambiguity, $F(1, 24) = 23.38$, partial $\eta^2 = 0.66$, $p < .001$, acoustic clarity, $F(2, 24) = 3.84$, partial $\eta^2 = 0.24$, $p < .05$, and the interaction of Ambiguity × Acoustic Clarity were all significant, $F(2, 24) = 7.91$, partial $\eta^2 = 0.40$, $p = .002$. As shown in Supplemental Material S3, interaction of Ambiguity × Acoustic Clarity revealed little change in older adults' *d*' as a function of acoustic clarity when the target sentences were nonambiguous, and a large increase in older adults' *d*' as a function of acoustic clarity when target sentences were ambiguous.