Results
All three analyses yielded similar results, suggesting that the independence assumption was valid, at least for speech bands that are separated by an octave and yield low performance (~15% correct) in isolation. For AO speech, all four bands contributed equally to performance. For AV speech, the lowest one or two frequency bands had significantly higher weights than the two highest bands. None of the band-interaction coefficients were significant.

Discussion
These results corroborate previous findings for individual narrow bands and extend them to broadband speech. AV conditions shifted the frequency-importance function for consonant perception toward lower frequencies, consistent with the idea that high-frequency speech information is redundant with place-of-articulation information available from lipreading. A different set of frequency-importance functions may be required to accurately predict AV speech intelligibility. [The views expressed in this article are those of the authors and do not reflect the official policy of the Department of Army/Navy/Air Force, Department of Defense, Department of Veterans Affairs, or U.S. Government.]

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Behavioral and electrophysiological evidence of incidental learning across continuous speech

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Language learning requires that listeners generalize across acoustically variable speech sounds to recognize linguistically-relevant units like words and phonemes. Although a growing literature on auditory category learning guides understanding of the mechanisms available to support this learning, most studies have examined learning across isolated sound exemplars like individual phonemes or words. In contrast, real-world learning typically takes place across fluent, continuous speech. How do listeners learn across acoustically variable continuous speech when they do not have *a priori* information about the temporal window across which learning must occur? We hypothesized listeners discover temporal 'islands of reliability' in highly variable, continuous speech signals that are consistently associated with behaviorally relevant actions and events. Further, we predicted that listeners learn to treat the acoustics in these temporal windows as functionally equivalent, leading to behavioral and representational change consistent with category learning. Here, native English participants played a videogame in which actions directed at alien creatures were consistently associated with acoustically-variable Mandarin Chinese target words embedded in continuous Mandarin speech spoken by 4 native talkers (2 female). Control words were also embedded in the continuous speech and were presented equally as often as target words; but control words were not associated with any particular action or event. Participants played the videogame for 3.5 hours across 5 days, with no prior knowledge of Mandarin. Neither overt categorization decisions nor overt feedback were involved in the videogame. Following training, an overt post-training categorization test revealed robust learning of target words that persisted at least 10 days and generalized to novel utterances and talkers. Comparison of pre- versus post-training electroencephalography responses to continuous Mandarin revealed that target words, but not control words, elicited an enhanced auditory evoked N100 response in central electrodes associated in prior research with word segmentation. This suggests that incidental learning under conditions in which behaviorally relevant actions and events align with functional units in continuous speech leads to more robust speech category learning than passive distributional learning through mere exposure.

Age-Related Changes in Humans & Mice

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Hearing Disability in the United States Adults Results from the American Community Survey 2012-2016

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Background: Serious hearing loss (disability) limits the ability of many individuals to function independently. In 2013, the National Center for Health Statistics (NCHS) revised and updated their Urban–Rural Classification Scheme of Counties, based on population density, to examine health disparities. We used this classification to analyze the Census Bureau';s American Community Survey (ACS), which is uniquely capable of generating small area estimates of reported disabilities to document disparities at local administrative levels.

Methods: The ACS collects data from a rolling sample of 250,000 households each month on over 40 topics, including disability, in the civilian non-institutionalized U.S. population. Since 2008, the ACS has asked about difficulties with hearing ("deaf or have serious difficulty hearing"). By aggregating five years of data collection, the ACS can generate reliable estimates for small geographic areas. Prevalence of hearing disability was estimated from the 2012-2016 ACS by sex, age, race/ethnicity, the economically-depressed Appalachian area, and the 2013 NCHS Urban–Rural County Classification. ArcGIS hot spot analysis tool was used to identify clusters with high or low prevalence of hearing disability.

Results: Prevalence of hearing disability in adults was 4.6%; 5.4% for males and 3.7% for females (p<0.001). Prevalence increased with age: 1.1%, 3.5%, and 15.2% for 18-44, 45-64, and 65+ years (p<0.001). Prevalence was highest in rural micropolitan (5.8%) and noncore (5.6%) areas, decreasing with increasing population density; lowest prevalences were in small metro (5.2%), medium metro (4.7%), large fringe metro (3.9%), and large central metro metropolitan (3.5%). Prevalence was higher in Appalachia (4.7%) compared to elsewhere (4.0%, p<0.001). American Indians/Alaska Natives (6.9%) and non-Hispanic whites (5.5%) had higher prevalence than non-Hispanic African Americans (2.8%) or Hispanics (2.8%). States in the East South Central region had the highest (5.7%) and the Middle Atlantic region the lowest (3.9%) prevalence of hearing disability. West Virginia had the highest prevalence (7.7%) of hearing disability among all states.

Conclusion: Hearing disability disparities in the U.S. exist for males, selected racial/ethnic groups, impoverished (Appalachia) and low-density rural geographic areas.

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Evidence for Age-related Cochlear Synaptopathy in Humans Unconnected to Speech-in-Noise Intelligibility Deficits

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Cochlear synaptopathy (or the loss of primary auditory synapses) remains a subclinical condition of uncertain prevalence. Here, we investigate whether it occurs in humans, and whether it contributes to suprathreshold speech-in-noise intelligibility deficits. For 94 human listeners with normal audiometry (aged 12-68 years; 64 female), we measured click-evoked auditory brainstem responses (ABRs), self-reported lifetime noise exposure, and speech reception thresholds (SRTs) for sentences (at 65 dB SPL) and words (at 50, 65 and 80 dB SPL) in steady-state and fluctuating maskers. Based on animal research, we assumed that the shallower the rate of growth of ABR wave-I amplitude versus level, the higher the risk of suffering from synaptopathy. We found that wave-I growth rates decreased with increasing age but not with increasing noise exposure. SRTs were not correlated with wave-I growth rates, and mean SRTs were not statistically different for two subgroups of participants (N=14) with matched audiograms (up to 12 kHz) but different wave-I growth rates. Altogether, the data are consistent with the existence of age-related but not noise-related synaptopathy. In addition, the data dispute the notion that synaptopathy contributes to suprathreshold speech-in-noise intelligibility deficits. [We thank James M. Harte, Niels H. Pontoppidan and Filip Rønne for useful discussions. Work supported by the Oticon Foundation (ref. 15-3571), Junta de Castilla y León (ref. SAP023P17), MINECO (ref. BFU2015-65376-P), and the European Regional Development Fund].

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Age-Related White-Matter Integrity Declines in the Auditory "Where" Pathway Predict Greater Spatial Hearing Difficulty in Older Listeners

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Interaural differences in the intensity and timing of audible speech provide important information for detecting, locating, and selecting a talker from among other talkers in noisy listening environments. Older listeners typically experience more difficulty in such "cocktail party" scenarios, thought to be associated in part with declines in interaural information processing. The neural mechanisms that underlie auditory spatial perception in young normal-hearing adults are fairly well understood. However, how these neural mechanisms change with age and affect the spatial perception of older adults requires further investigation. Here we examined the extent to which age-related differences in the fractional anisotropy (FA) of interhemispheric white-matter tracts of the corpus callosum predicted age-group differences in the ability to identify spoken digits spatially cued by interaural timing differences and speech-in-noise identification when interaural timing provided no spatial information (Quick Speech-in-Noise Test). FA is a metric of white-matter integrity, the higher values of which have been associated with better cognitive and perceptual processing. Native-English-speaking younger (N = 27, 19-30 years of age) and older (N = 35, 56-83 years of age) listeners with pure-tone audiometric thresholds less than or equal to 35 dB HL at conventional audiometric frequencies between 250 Hz and 3,000 Hz participated in this study. Audiometric thresholds were unrelated to our speech and white-matter metrics. Replicating pervious work, younger listeners correctly identified more spatially-cued speech than older listeners, but

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