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On the Tolerance of Spectral Blur in the Perception of Spoken Words

How does a listener resolve linguistic properties conveyed by speech? Many descriptions of perception attribute a causal role to brief spectral details in narrow frequency ranges. Perceptual standards allow far more variety, revealed by the robustness of perception of many kinds of distorted speech. The present study considered the effects of spectral blur on the recognition of spoken words. Listeners heard successive presentations of noise-vocoded easy and hard words. In Experiment 1, listeners heard two repetitions of each word at 9 spectral bands. In Experiment 2, listeners heard three presentations of each word. The number of spectral channels composing the word increased with each presentation, reducing blur within a trial. Two conditions varied the degree of initial blur, either 1 or 5 spectral bands. In both conditions, the final presentation had 9 bands, yielding a net blur reduction of 4 or 8 bands. Participants recorded their word identifications after the three presentations. In Experiment 3, the procedure of Experiment 2 was repeated but participants were instructed to identify and record the word after each of the three presentations. Experiment 2 was used to determine word recognition under conditions of free attention, Experiment 3 recognition under directed attention. Across experiments, exposure to spectral blur impaired the recognition of easy and hard words alike, regardless of attentional state. Directed attention significantly benefited the identification of hard words across blur conditions. The pattern of results exposes the role of attention, uncertainty and spectral resolution in the phonetic contribution to word identification.