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Speech-Reading Comprehension in Impaired Audiovisual Environments

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The purpose of this investigation was to examine the accuracy of speech comprehension when presented with stimuli of degraded auditory and/or visual quality. Thirty-nine college-aged students from Washington University in St. Louis watched a series of nine videos in a counterbalanced within-groups 3x3 research design. Each video contained a certain auditory quality (Normal Hearing, Mild Hearing Loss, or Moderate Hearing Loss) and a certain visual quality (No Blur, Gaussian Blur of 22 units, or Gaussian Blur of 44 units), constant background white noise, and a series of 12 sentences, each with three target words. Subjects were asked to repeat each set of three target words to the researcher. By ranking the different characteristics of the American English speaker's speech sounds, including voicing, nasality, affrication, duration, place of articulation, hearing threshold, and frequency, phonemes and visemes were ranked by hypothesized difficulty of perception. Spearman Rank tests showed that frequency was inversely related to phoneme comprehension. Significant interactions were found between the hearing loss and blur variables, but further studies comparing these results to findings from auditory-only and visual-only conditions will further elucidate the relationship of hearing and vision in yielding audiovisual benefit.