

Title: The ability to make multiple auditory judgments about non-speech stimuli

Principal Investigator: Frederick J. Gallun, PhD

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Objectives: Listeners in constantly changing noisy environments often experience more difficulties than when the same noise level is present but the environment is not changing so rapidly. This is a particular problem for those with even mild hearing loss. Improving understanding of the processes by which a rapidly changing auditory environment is analyzed by listeners with impaired hearing will lead to improved creation of appropriate therapies and devices to reduce the difficulties such listeners experience.

Research Plan: Normally-hearing and hearing-impaired listeners from across the age range will make judgments about brief (50 ms) changes in the amplitude (increase vs decrease) of easily distinguished narrowband noise bursts. Pre-trial and post-trial information will be varied to examine the impacts of memory processes on performance and interactions with age, controlling for degree of hearing loss.

Methods: Sequences of three or four 50-ms narrowband noise bursts are presented to listeners, whose task is to determine whether or not the intensity of one of the bursts has changed. Performance is compared for situations in which the standard level is presented either before or after the test sequence, or is never explicitly presented and must be derived based on feedback during initial training. Performance for bursts presented within a sequence is also compared to performance when only a single burst is presented and listeners compare it to a single standard that is also presented on each trial.

Findings: Performance suffered when three bursts were presented compared with the presentation of only a single noise burst, despite the use of burst separated in frequency in time to such a degree that energetic overlap at the periphery was minimized. In addition, presenting the standard before the trial led to better performance than presenting it afterwards. The ability of listeners to use the post-trial standard was a function of age, but not hearing loss, implicating a decreased ability to rapidly encode information with increasing age. Similar impacts of age were revealed by the experiment in which the presented sequence had to be compared with a standard stored in long-term memory as a result of the initial training phase of the experiment. These data are consistent with a memory-based explanation (proposed for similar visual results) in which subsequent stimuli interfere with the encoding and subsequent retrieval of information, but only when each stimulus must be encoded.