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Objective determination of backward masking.

Silas Smith
silas.smith@umontana.edu

Al Yonovitz
University of Montana, al.yonovitz@umontana.edu

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Silas Smith, MS
University of Montana

Abstract:

Auditory processing disorders (APDs) affect a diverse range of people. These types of disorders impair auditory function, despite the outer, middle and inner ear maintaining proper function and health. APD is not necessarily related to auditory thresholds. When people with APD have difficulty discriminating sounds in connected speech, it may be due in part to an effect called Backward Masking (BM). Masking occurs when one stimulus inhibits another, which can lead to a variety of impairments. The neural locus of APDs is for the most part unknown, including the specific conditions which cause BM. A better understanding of these processes would lead to a greater ability to provide an intervention and therapy for APD. Electrophysiological responses have been well documented in a forward-masking paradigm, but not so in a backward masking paradigm. The significance of these responses is yielded through electrode signal input, a large degree of amplification and summation analyses of brain wave data. In this research a latency and amplitude deviance was detected in the early and middle stages of the auditory evoked response. Our data has revealed that the backward masking effect is observable at approximately the 90-250 msec range given the appropriate stimulus parameters. The temporal conditions of this effect lead to the conclusion that the BM effect occurs in the midbrain to the auditory cortex.
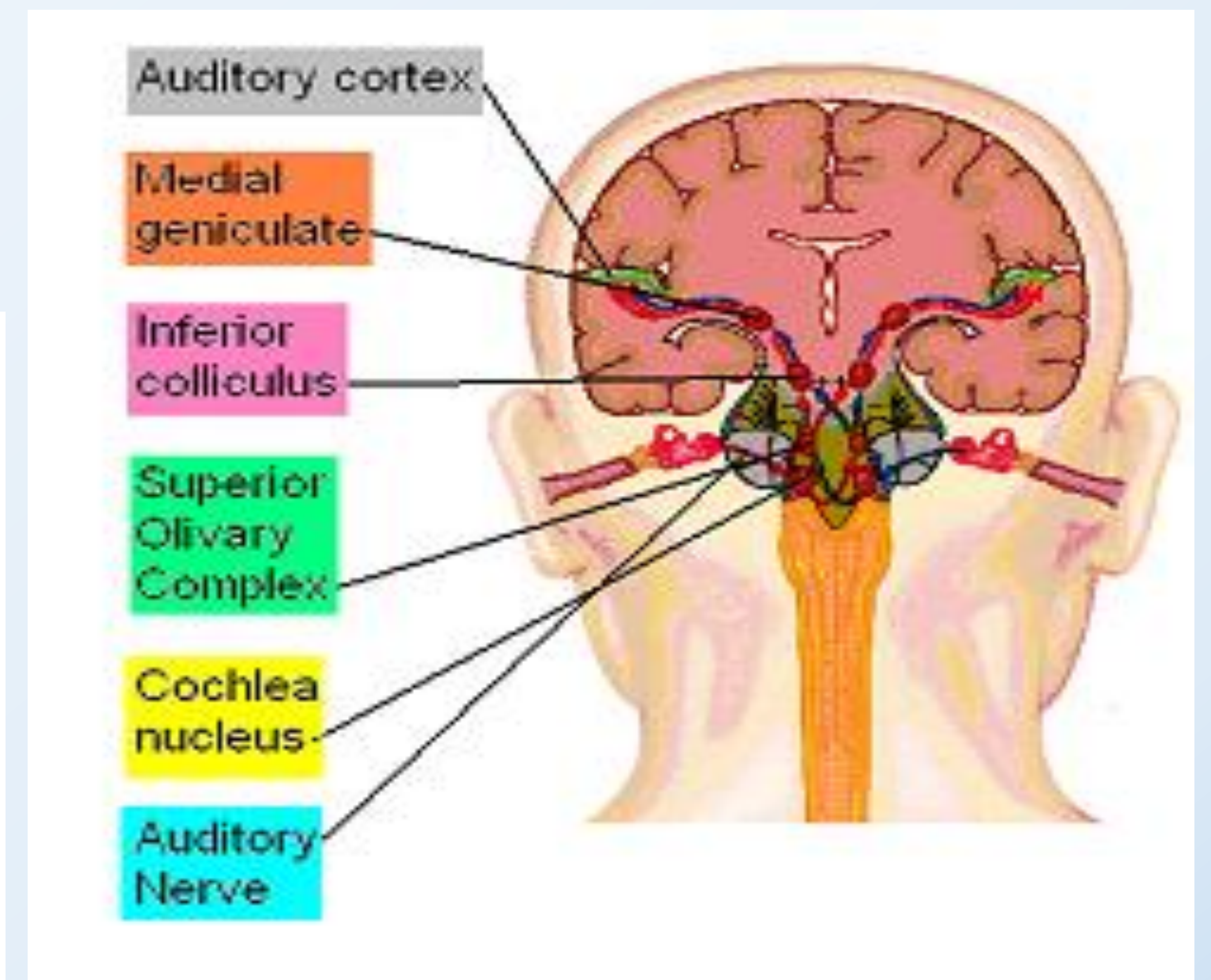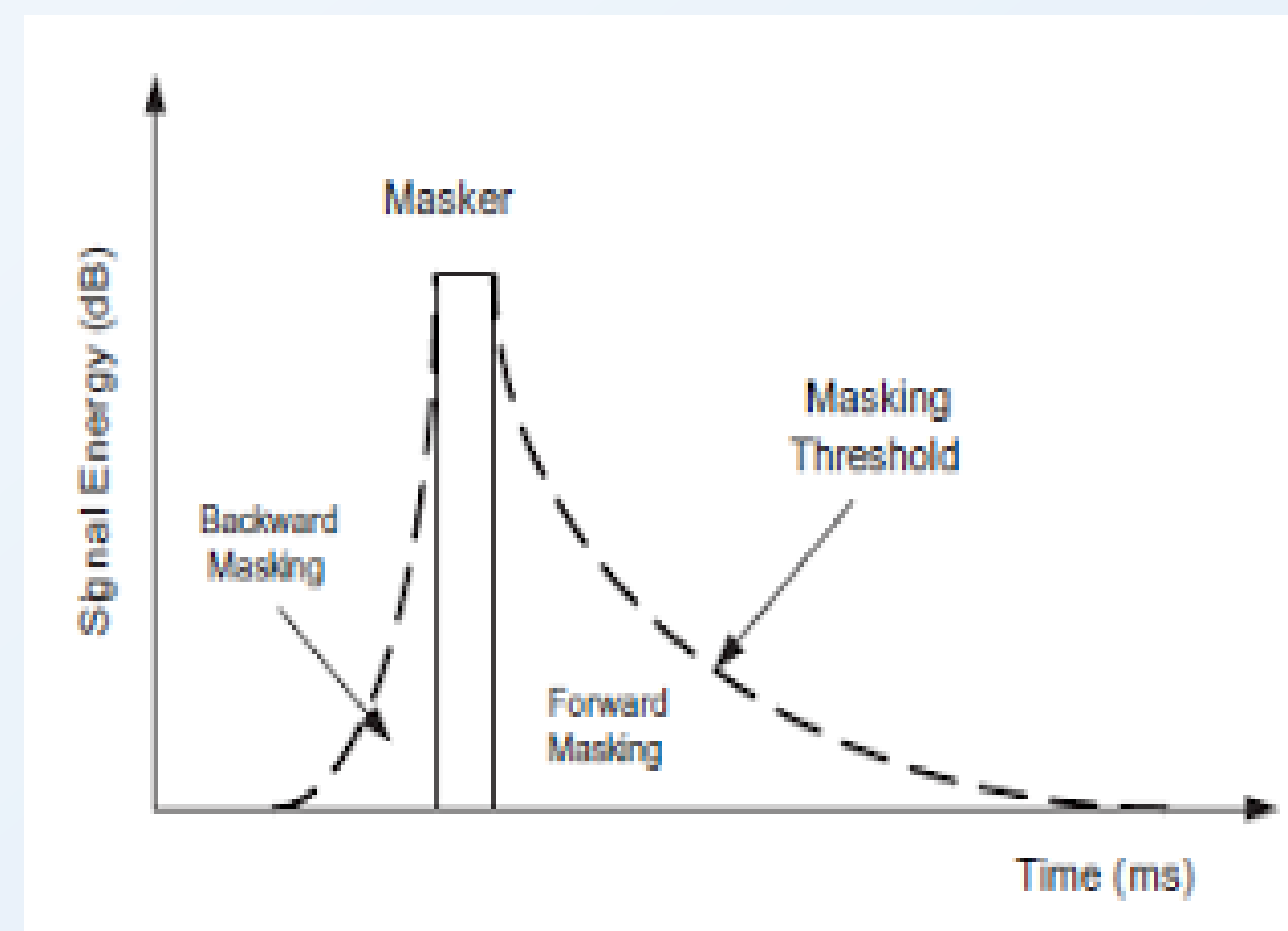
Conclusion:

Through experimentation, the effects of the backward masking yielded differential electrophysiological measurements with the manipulation of stimuli. After analysis of data, using summation techniques with over 1,000 time epochs of single-electrode recordings, we have shown the electrophysiological variations are dependent on the backward masking condition in comparison to baseline activity. The backward masking effect manifests approximately in the 90-250 msec range, with stimulus of appropriate amplitude and ISI length. According to the current models of the auditory pathway, this places the location of the disruption in midbrain to the auditory cortex. This study is the preliminary step in exploring the neurological role backward masking plays in auditory disorders, and will be further researched to hopefully yield the spectrum of knowledge from etiology to treatment of such disorders.