

Kristen Nunn – Abstract

The Noisy Channel Model and Sentence Processing in Individuals with Broadened Auditory Filters

Noise is abundant in every day communication. This high prevalence of noise means we need a language processing mechanism that can recover intended meanings when given noisy input. Research suggests that one way we do this is by maintaining uncertainty about linguistic input and interpreting sentences in a way that is unfaithful to the literal syntax (Gibson, Bergen, & Piantadosi, 2013; Levy, 2011; Levy, Bicknell, Slattery, & Rayner, 2009). People with communication disorders such as aphasia or hearing loss have an even higher prevalence of noise. Research has shown that both groups show higher degrees of uncertainty than controls (Gibson, Sandberg, Fedorenko, Bergen, & Kiran, 2015; Nunn, 2016, & Warren, Dickey, & Liburd, 2015). The present study aims to examine how different aspects of cochlear hearing loss influence certainty about a linguistic signal. While having their eyes tracked, 40 individuals were administered the Gibson Task with sound files simulating broadened auditory filters (BAF). The Gibson Task is a forced choice picture task that requires participants to select which image best represents a sentence they heard. One illustration represents the literal syntax and one represents an alternate interpretation that may be obtained through edits to the literal syntax. Sentences of different structure (double object, prepositional object, active, passive) require different types and amounts of edits to switch between interpretations. Sentences of different plausibility (plausible, implausible, possible, impossible) are more or less likely to be interpreted literally. Using previously collected data, comparisons were made between groups with simulated BAF, simulated low-pass filtered speech (LPF), and no simulated hearing loss (NoHL). Participants with BAF were less accurate and showed higher degrees of uncertainty than the NoHL group. The BAF group had higher accuracy than the LPF group only for the double object and prepositional object condition.