

In this study, we examined how the intelligibility of a distracting masker affected selective auditory attention to a target sound, and how this manifested in neural responses as measured in electroencephalography or EEG. In each of two experiments, participants attended to a sporadically timed target sound and responded to color words amongst object words. Simultaneously, they ignored an ongoing isochronous masker sound. That masker either comprised words drawn from the same set, or a spectrotemporally scrambled version. In experiment 1, the scrambled masker was not amplitude modulated, but in experiment 2, we amplitude modulated the scrambled masker to match the temporal envelope of a word masker. Importantly, the scrambling process resulted in similar local spectrotemporal density between word and scrambled maskers, allowing for a fair acoustic comparison. Behavioral results overall suggest that participants were better at attending to the target sound when the masker was scrambled than when it was words. Participants had higher hit rates in this case, and lower within stream false alarm rates. This effect was exaggerated when the masker was spoken by the same talker. Additionally, between stream false alarm rates (responses to color words in the masker stream) were overall low, but higher when the masker was spoken by the same talker. ERPs to the masker stream were small in amplitude and rhythmic in nature, except for the scrambled masker in experiment 1, which did not have amplitude modulation. Experiment 2 addressed this confound. Sensory P1N1 responses in the EEG showed larger magnitudes when the word was a color in the target stream than when it was an object. Also, P1N1 was larger to the target sound when the masker was scrambled than when it was words. Finally, as in the behavior, P1N1 results were exaggerated when the masker was spoken by the same talker. Finally, we examined P300 target recognition responses. P300 was elicited strongly by color words in the target stream, but not by object words. Importantly, we did not see differences in P300 magnitude between when the masker was words or scrambled, or when it was spoken by the same or different talker. Taken together with the P1N1 results, this suggests that attention worked as a sensory filter, resulting in modulation of the sensory P1N1, but not the target recognition P300. Overall, this study adds to the literature suggesting that an unintelligible sound is easier to ignore than an intelligible one, and that attention acts as a sensory filter.