ELECTRICAL ENGINEERING
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Auditory Measurements of Speech Intelligibility

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INTRODUCTION

It has been hypothesized that a more precise measurement of the intelligibility of speech (articulation index) could by designed. By basing the measurements on algorithms that model the human auditory system, the articulation index would more closely represent how humans hear sound. The index could be used to measure speech transmission through various channels e.g. lecture halls, intercom systems, and telephone lines.

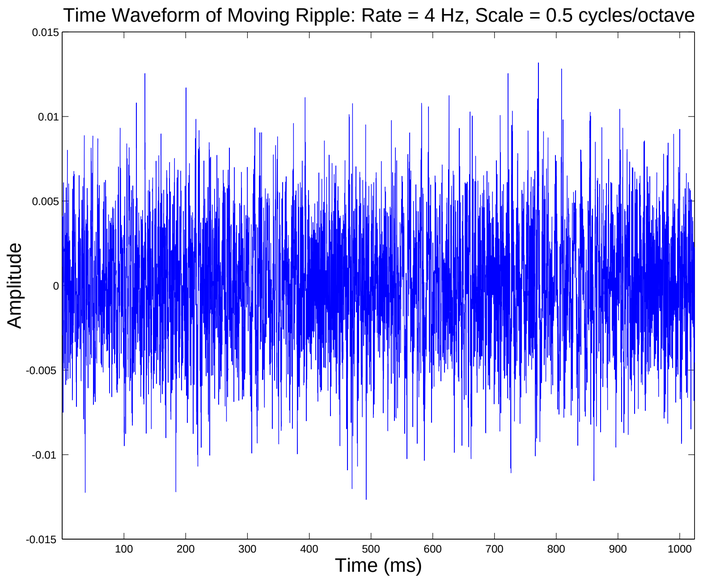


Figure 1: Time waveform of moving ripple shown. All sounds can be decomposed into a set of moving ripples.

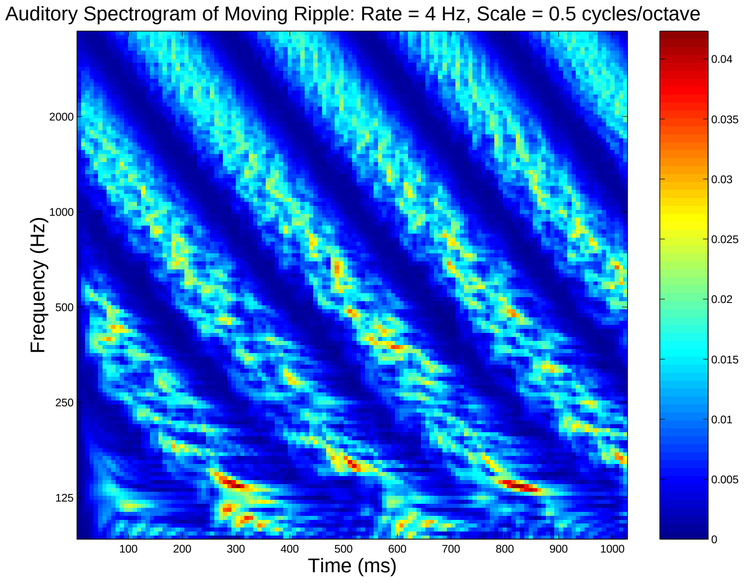


Figure 2: The software model of the cochlea uses bandpass filters to separate the input waveform into different frequencies. As can be seen above, a moving ripple is made up of a set of tones which "slide" in the time-frequency domain.

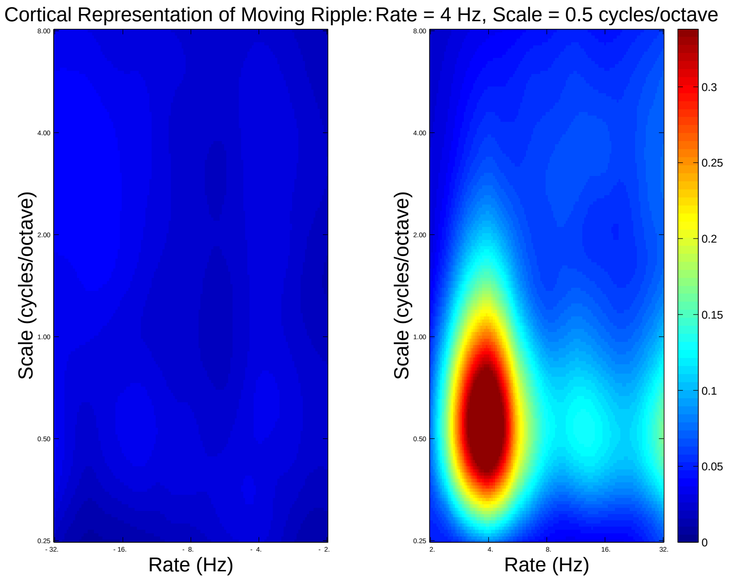


Figure 3: The software model of the auditory cortex uses cortical filters to separate the input spectrogram into ripples of different rate and scale. The output for a pure moving ripple is shown.

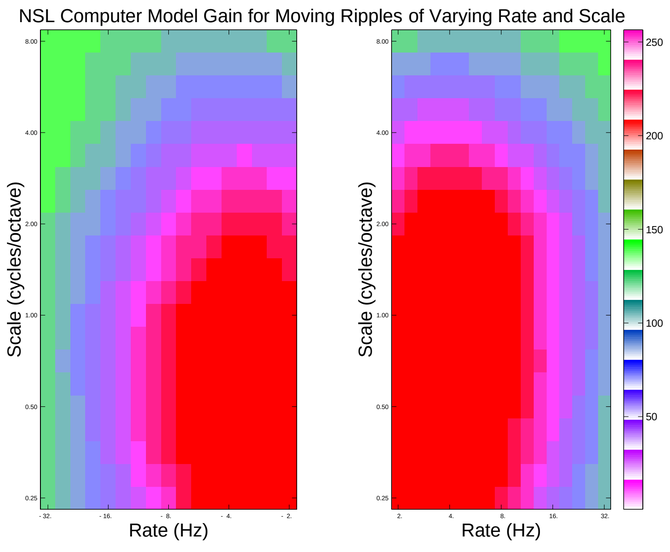


Figure 4: Psychoacoustics experiments were done to find which types of moving ripples the human auditory system can most easily identify. As shown, low thresholds indicate a high "gain" for those types of ripples.

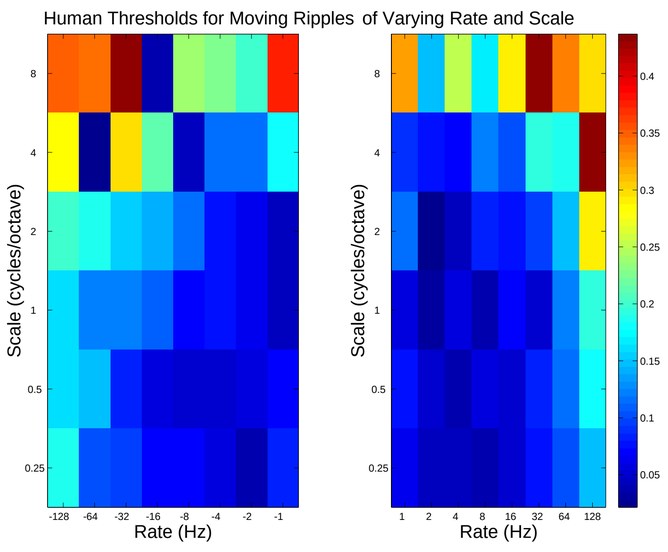
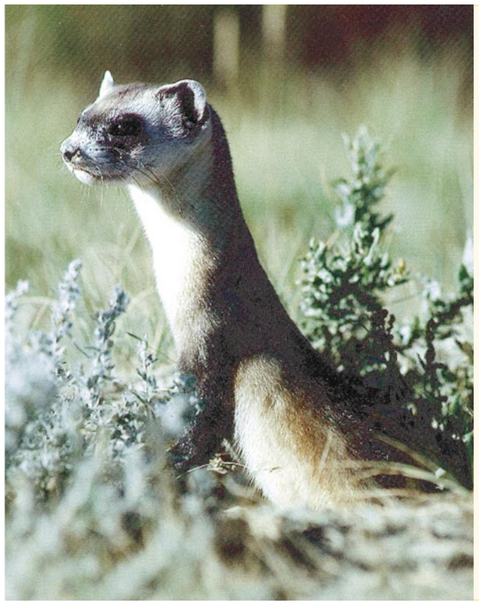


Figure 5: The data from the psychoacoustics experiments was compared to similar experiments completed by the computer model. As can be seen, the model closely corresponds with the human data.



CONCLUSION

An auditory model has been created to model the human auditory system. Also, it has been shown that the model correlates closely with the human auditory system. Future work must be done to study the ripple content of human speech.