Introduction

Vocoder simulations of cochlear implants have become increasingly popular in the past decade; however, few studies have assessed how well such models replicate the perceptual experiences of cochlear implant users.

Goal 1: Evaluate the performance of cochlear implant users on these popular materials that have been previously tested and generalized to speech, but training on speech did not generalize to environmental sounds.

Goal 2: Evaluate the performance of cochlear implant users on these materials in a set of materials to identify target areas for auditory rehabilitation.

Little is known about the perception of anomalous sentences and environmental sounds by cochlear implant users.

Anomalous sentences – cannot rely on sentence context

Environmental sounds – attention to the acoustic information in the signal for identification

Goal 3: Evaluate the perception of nontraditional testing materials by cochlear implant users.

Anomalous sentences

Environmental sounds

Correct identification of environmental sounds

Scored by number of words/keywords correctly identified

Open-set verbal responses/descriptions, lapel microphone

Methods

Subjects

• 118 profoundly deafened adult cochlear implant users

Protocol

• Pure tone presentation of sound (65 dBA SPL), IAC chamber

• Open set verbal descriptors/descriptions, lapel microphone

• Digital recordings of responses

• Sound by number of words/keywords correctly identified

Materials

Words (Piszkisz and Spaun, 1979)

• High discriminability, low frequency, and low neighborhood density

• “bad,” “wave,” “have,” “vain,” “fill,” “full”

CVGs (H. Kryter, 1963)

• Low discriminability, high frequency, and high neighborhood density

• “bad,” “back,” “bass,” “bat,” “bass”

Meaningful Sentences (Harvard Sentences, IAE, 1969)

• Thematic relationship between words, high context

• “The deep cut goes deep into the night.”

Anomalous Sentences (Herman & Pisoni, 2001)

• No thematic relationship between words, low context

• “Trust is suicide and they sleep there.”

Environmental Sounds (Munro, Berbils, Greene, Kerr, & Rogers, 2000)

• Complex non-speech sounds including: animal sounds, insect sounds, machinery, simulated musical instruments, etc.

• “basketball bouncing,” “cloak ticking,” “baby crying”

Correlation of performance across materials for all cochlear implant users. Only significant correlations are shown. Demographic factors were NOT significantly correlated with performance on the speech and nonperch stimulus materials.

*p < 0.05, **p < 0.01

Correlations for CI Users

Meaningful Sentences

Anomalous Sentences

Words

CVGs

Environmental Sounds

*p < 0.05, **p < 0.01

Demographic Information for CI Users

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Normal Hearing Subjects

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References


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