Event Related Electrical Potentials Recorded From The Brain Prior To The Initiation Of Speech

Hannah N. Hansen
University of Montana, Hannah.hansen@umconnect.umt.edu

Ethan Germann
University of Montana, ethan.germann@umconnect.umt.edu

Samantha McNeely
samantha.mcneely@umconnect.umt.edu

Let us know how access to this document benefits you.
Follow this and additional works at: https://scholarworks.umt.edu/umcur

https://scholarworks.umt.edu/umcur/2018/pmposters/3

This Poster is brought to you for free and open access by ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Conference on Undergraduate Research (UMCUR) by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.
Event Related Electrical Potentials Recorded From The Brain Prior To The Initiation Of Speech
Hannah Hansen, Samantha McNeely, and Ethan Germann

Abstract
This research will explore the neurologic pathways that occur before the initiation of speech. The basis for this project and the research component will include the electrical potentials along the speech production pathway. The subjects will be given a target consonant-vowel (CV), and their speech production will be recorded simultaneously with their neural activity. We will be attempting to record the electrical signals from the cortex. Benefits of this research will include an increased understanding of normal neuro-electrical properties of the speech production pathway. The clinical benefit will include understanding variations from the norm with application to neuro-motor disorders.

Background
In 1993, Wohlert aimed to find a baseline of pre-speech Readiness Potentials (RPs), which could potentially be used in clinical application for diagnosing disorders such as apraxia. Pre-speech RPs are neural activity that occur prior to speech. This neural activity can be recorded using electrophysiological tests such as EEG, EMG, and EOG.

Methods

Future Goals
Future goals for this research include increasing the number of neurotypical subjects in the data collection as well as applying the method to subjects with motor-speech disorders. This method of analysis will aid in analyzing the electrical changes prior to speech production. Examining the electrophysiology of speech production is important to contributing to the general understanding of speech.

Conclusion
Using a novel method based upon the use of a two-channel audio recording system, CV speech was repeated (lower right figure) and the EEG was extracted from the opposite channel at the exact initiation of speech. The EEG was extracted one second prior and one second after speech. Extracted EEG was summed for 100 CV occurrences and is shown in the Results figure. The results are in agreement with Wohlert (1993). The “Speech” mark on the figure was the point taken from the vocal onset. The benefit of this method will allow a more detailed analysis of the electrical changes in shorter time intervals before speech initiation.

Figure 1: The readiness potential at electrode Cz for the four conditions: left finger extension (green), right finger extension (yellow), lip pucker (red), and production of /p/ words (blue).

References