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KENT STATE UNIVERSITY
College of Education, Health, and Human Services

DOCTORAL DISSERTATION DEFENSE

Of
Hamada Alzoubi

For the degree of Doctor of Philosophy
Audiology

USING EYE-TRACKING AND PUPILLOMETRY TO UNDERSTAND THE IMPACT OF AUDITORY AND VISUAL NOISE ON SPEECH PERCEPTION

Tuesday, June 27, 2023
1pm-3pm

Teams
Click here to join the meeting
Meeting ID: 262 730 833 117
Passcode: r2cMvx

Kent State University
Hamada Alzoubi, M.S.

M.S., Physiology & Neuroscience
Wright State University, 2019

M.S., Mental Health
Texas Southern University, 2016

B.S., Audiology
Jordan University of Science and Technology, 2010

Hamada began his academic career studying hearing science at Jordan University. He then moved on to a career in mental health at Texas Southern University, in which he earned his first Master’s degree. This program led to him developing a strong interest in human physiology and neuroscience, in which he moved on to earn an additional masters at Wright State University. Upon completion of his second Master’s, Hamada sought to pursue a Ph.D. in an area of hearing science, in which he could integrate his knowledge from each degree program he has completed.

His training allowed him to develop an expertise in diagnostics and treatment of hearing-related disorders in Jordan, with other developed expertise in mental health disorders, the brain (including neural networks and brain function), and perception. This has led to four peer-reviewed manuscripts and three conference presentations in the areas of neuroscience and perception. His unwavering pursuit of knowledge about the brain, perception, and human behavior, led him to gain advanced expertise in eye-tracking technology. Upon completion of his dissertation, Hamada will complete a post-doctoral fellowship with Dr. Isabelle Baurd, at the NeuroMagnetic Laboratories at the University of Colorado, Anschutz Medical Campus.

Abstract

Although speech recognition is often experienced as relatively effortless, there are a number of common challenges that can make speech perception more difficult and may greatly impact speech intelligibility (e.g., environmental noise). However, there is some indication that visual cues can be also used to improve speech recognition (Baratchu et al., 2008)—especially when the visual information is congruent with the speech signal (e.g., talking faces; Massoro, 2002). However, it is less clear how noisy visual environments may impact speech perception when the visual signal is not congruous with the speech signal. In fact, adding incongruous visual information will likely detract precious cognitive resources away from the auditory process, making speech perception in noise a more cognitively difficult task. Therefore, the purpose of this dissertation was to examine cognitive processing effort by measuring changes in pupillary response during the processing of speech in noise paired with incongruous visual noise. The primary hypothesis was that noisy visual information would impact the processing of speech in noisy environments and that would result in a greater pupil diameter. To test this I used a common eye-tracking measure (i.e., pupillometry) to assess the cognitive processing effort needed to process speech in the presence of incongruous visual noise. The results indicated that visual noise recruits cognitive processing effort away from the auditory signal. Results also indicated that different combinations of auditory and visual noise have a significant impact on cognitive processing effort, which led to an increase in pupil dilation response during speech perception.