

Neural Correlates of Linguistic Demand and Domain-General Demand in an Auditory-Based
Task

By
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Thesis

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Graduate School of Vanderbilt University
in partial fulfillment of the requirement
for the degree of

MASTER OF SCIENCE

In
Speech-Language Pathology

May 3rd, 2021

Nashville, Tennessee

Approved:

Date:

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Abstract

Researchers have used language mapping paradigms in functional imaging studies (i.e. fMRI) to identify which regions of the brain support language processing. Previous work has identified brain regions that belong to the multiple demand network as being involved when task difficulty increases in domain-general cognitive tasks. In a recent study conducted by Quillen et al. (2021), researchers manipulated task difficulty in semantic and perceptual decision paradigms to explore what brain regions would be active when task difficulty was increased. They found that linguistic demand modulated a small subset of the multiple demand network and some left frontal region, and domain-general demand modulated an extensive set of the multiple demand network. However, several of these activated regions in the multiple demand network are known to contribute to visuospatial functioning. The present study sought to determine if Quillen et al.'s (2021) results were influenced by the visual modality of his experiment by completing the same experiment in the auditory modality. Eight neurotypical participants performed auditorily-presented easy and hard versions of semantic and perceptual decision tasks in an fMRI scanner. In the present study, linguistic difficulty modulated activation in somewhat bilateral left frontal and temporal regions. Unlike Quillen et al.'s linguistic difficulty contrast, there is very little multiple demand network activation. The current study's domain general demand contrast revealed a strikingly different pattern when compared to that of Quillen et al. (2021) with right frontal regions displaying the most activity. The lack of multiple demand network activation in the present study suggests that the multiple demand network may, in part, be modality dependent. These findings indicate that linguistic and domain-general demand modulate distinct brain networks, a result that remains somewhat true across the visual and auditory domain.

1. Introduction

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Thu 5/27/2021 4:53 PM

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On Thu, May 27, 2021 at 7:03 AM De riesthal, Michael R (University) <michael.r.de.riesthal@vanderbilt.edu> wrote:

Dear Mackenzie,

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