



Effects of Handedness on Verbal and Written Language Memory

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Introduction

The left cerebral hemisphere houses brain structures responsible for the production and comprehension of language in most individuals. Specifically, Broca's and Wernicke's areas are located in the left cerebral hemisphere for about 95 % of right-handed people and about 70% of left-handed people. Since the left cerebral hemisphere also controls movement of the right side of the body, including movements required for written language, the possibility of unique language processing networks in left-handed individuals exists. (Chaudhary et al, 2009; Price, 2010). Using the existing, but severely limited, literature as a guide, we examined performance differences between left- and right-handed individuals on the California Verbal Learning Task (CVLT). This instrument has been used by other labs who have found performance differences related to white matter tract structure in language networks (Catani et al, 2007). We sought to extend our knowledge of these performance differences by specifically testing left- and right-handed individuals.

Methods

Participants:

- Recruited from the university (i.e, students, faculty, staff) and community
- Total of 27 left-handed participants and 27 age-matched right-handed participants (mean age = 22.49 years, range 18 to 40)
- All participants had completed high school and were current college students or had completed a college or graduate degree
- Participants were assigned to a handedness group based on the hand used to sign consent forms.
- Participants with more than 1 diagnosed concussion were eliminated from the current analyses
- A manual age-matching procedure was applied to create equal samples

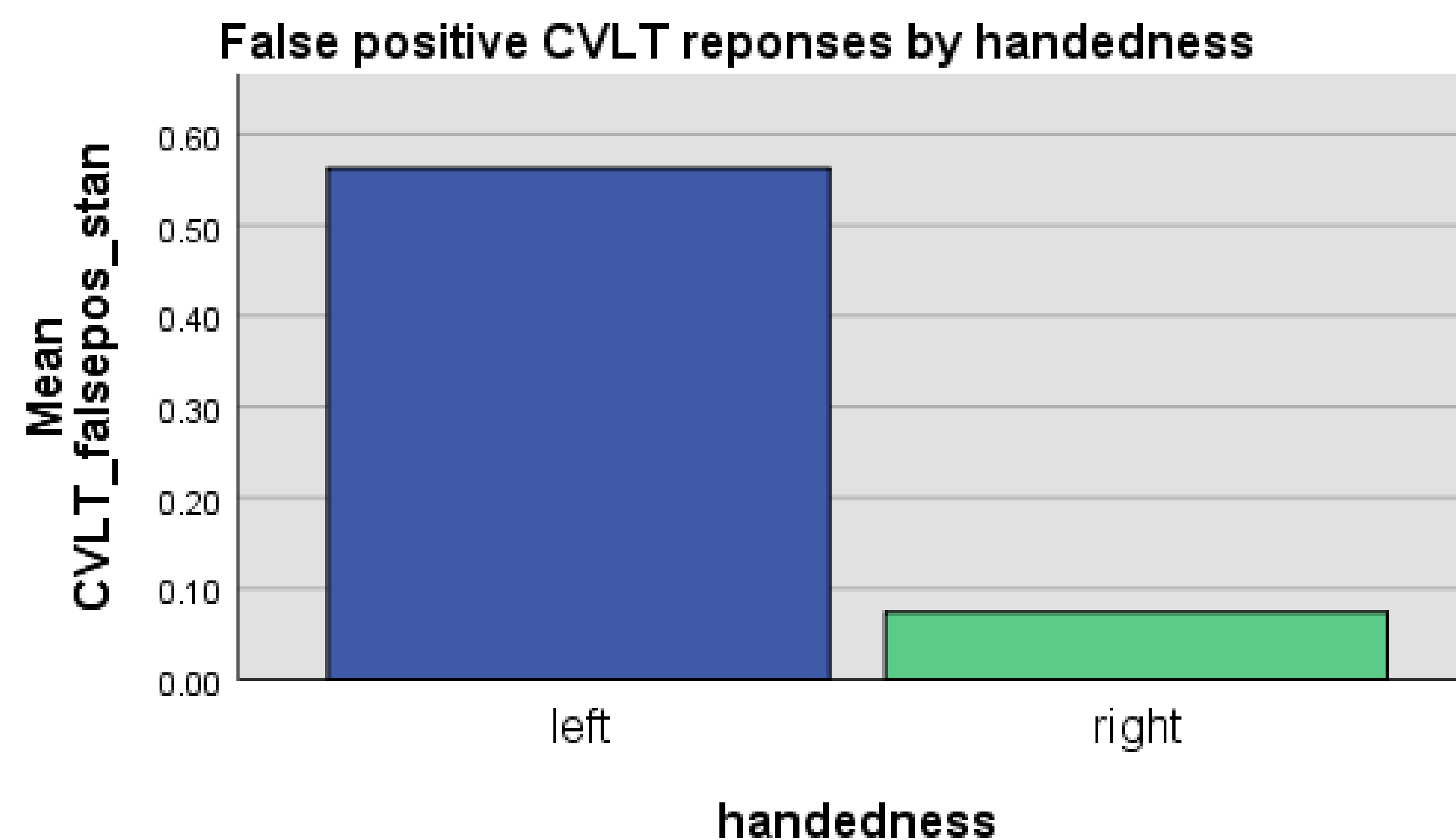
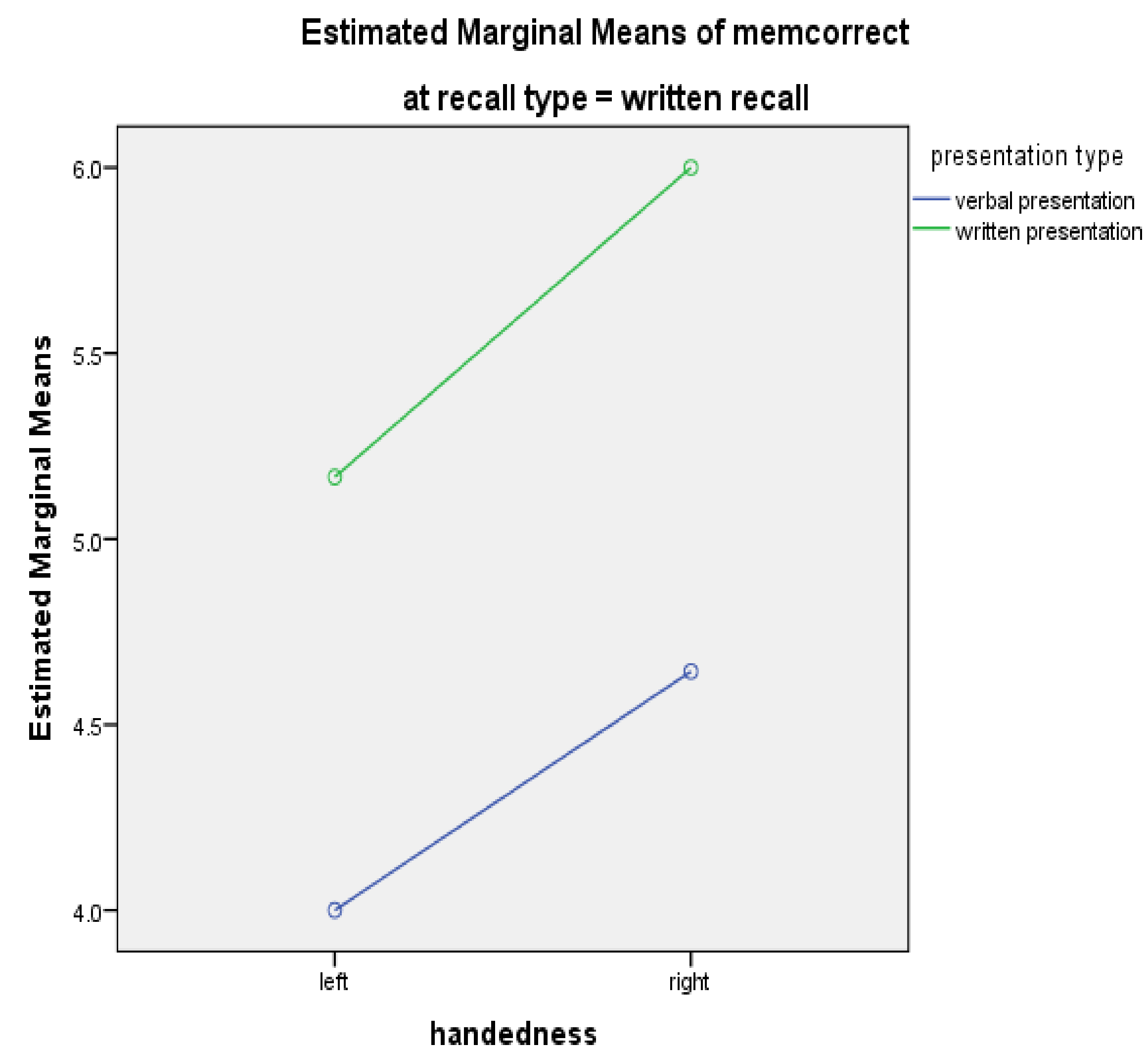
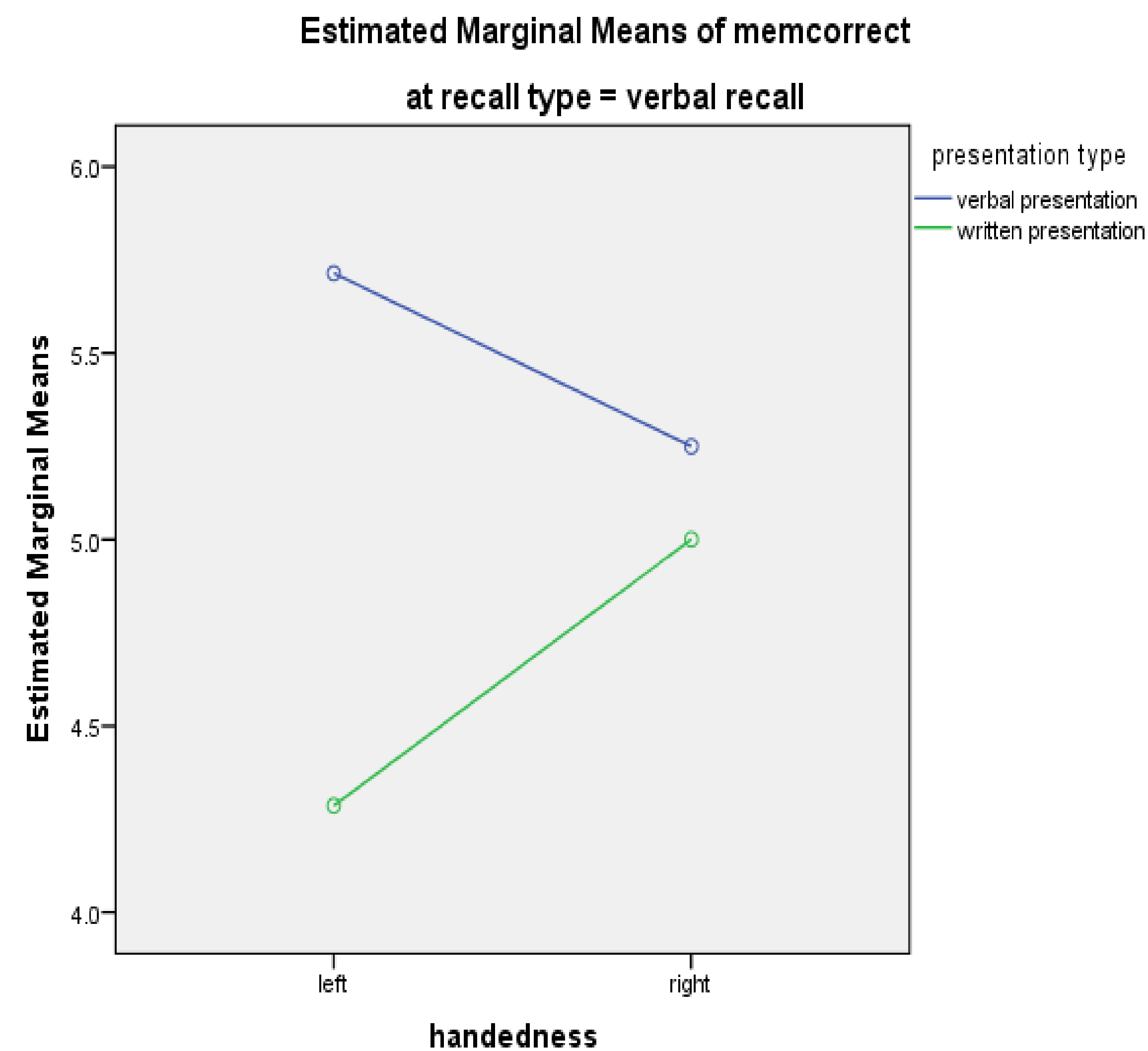
Measures:

- California Verbal Learning Test-short form (CVLT II), a 3-back working memory task, and a language memory task, a modified Edinburgh Handedness Inventory, demographic information including counts of left-handed relatives
- Information was presented to participants through an audio recording or using written materials. Recall of information was through verbal or written means

Analysis

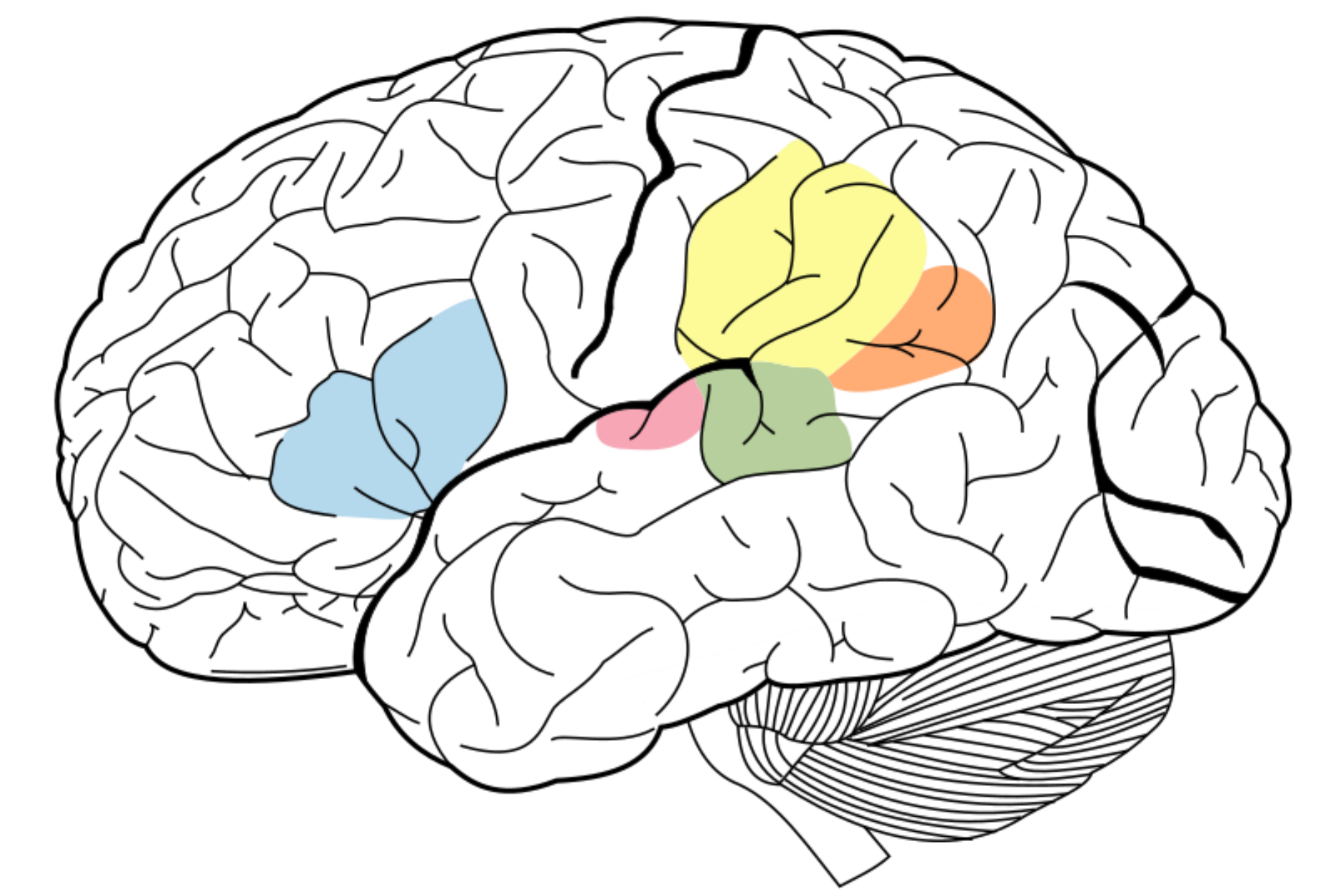
- All statistical analyses were performed using SPSS (IBM Corporation)

Results



Findings

- Significant differences in overall CVLT performance were not present in this data set. However, taken as a whole, the current analyses indicate a difference performance, and perhaps underlying circuits, in left- and right-handed individuals.
- A significant difference was present between handedness groups for false positive responses to CVLT prompts. This indicates that left-handed individuals were more likely to "recall" a word that was not present in the original list. The nature of these errors of commission is the subject of future projects.
- Left-handed participants reported significantly more left-handed parents than did right-handed participants (.52 and .30, respectively)



Highlighted regions are those involved in language processing.

Conclusion, Limitations, and Future Directions

- Due to limitations in sample size, the lack of significant differences in overall CVLT performance between left- and right-handed individuals should be interpreted with caution
- Using a larger sample of both left- and right-handed participants would allow better insight into the differences in verbal learning regarding handedness. With this in mind, we plan to move forward and pull data draw a larger sample.
- This study highlights the gap in knowledge regarding brains of left-handed individuals and the difficulty recruiting sufficient participants for analysis

References

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