



THE UNIVERSITY OF TEXAS
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Prospective Memory Deficits and their Neural Correlates in Epilepsy: an fMRI Investigation

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Introduction: Epilepsy

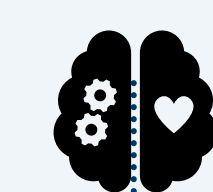
- **Epilepsy** is a neurological disorder characterized by recurrent seizures, affecting nearly 50 million people worldwide
- In addition to seizure-related impairments, people with epilepsy (PWE) frequently experience cognitive deficits, with retrospective memory impairments being well-documented.
- However, prospective memory (PM) has been rarely studied in children with epilepsy.
- Children with epilepsy are at risk for PM deficits due to seizures, medication effects, and executive dysfunction.



Introduction: Prospective Memory

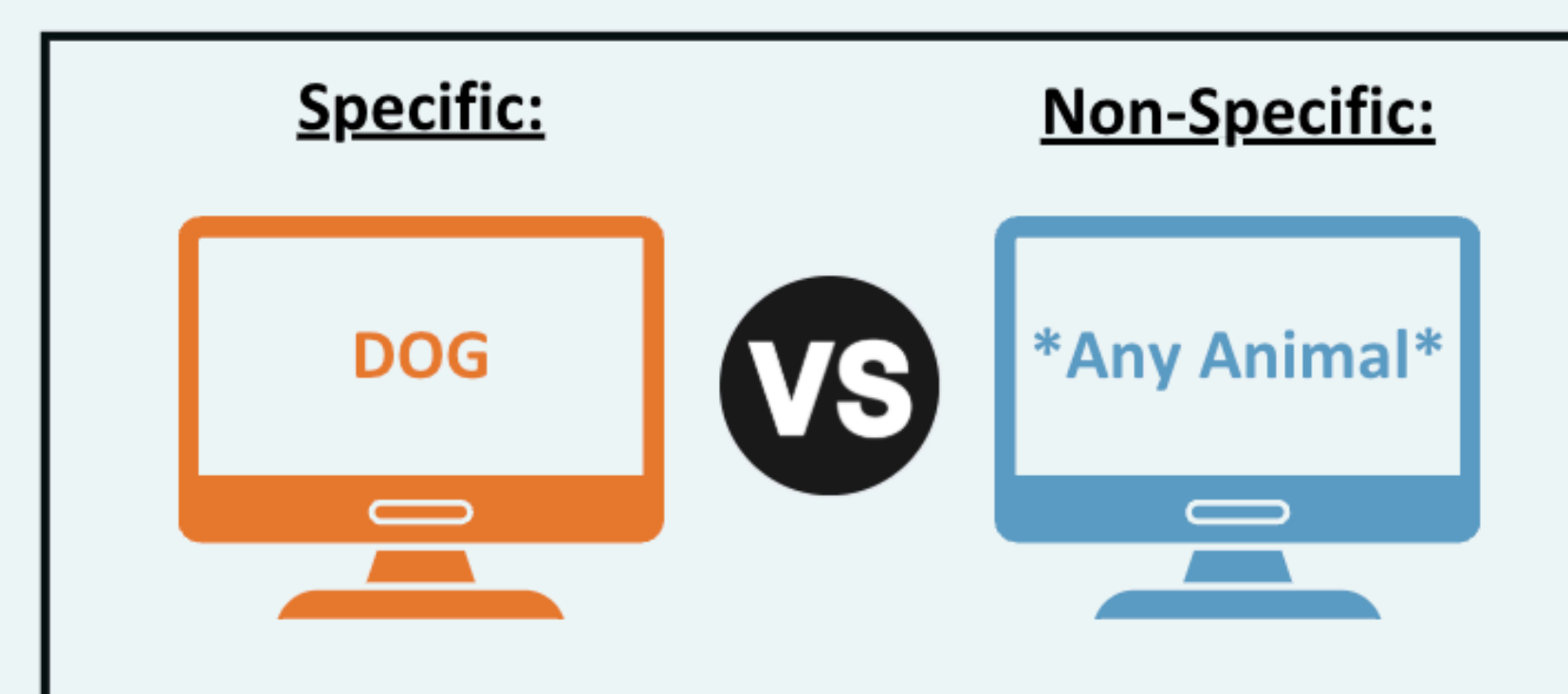
- **Prospective memory (PM)** is the ability to remember and execute future intentions
 - Critical role in daily activities such as medication adherence, managing appointments, and independent living.
- Impairments in PM are associated with **worse functional outcomes and lower quality of life**
- While PM deficits in epilepsy have been reported in behavioral studies, no study has examined their neural underpinnings using functional MRI (fMRI).
- This study will address this gap by investigating the neural mechanisms of PM in epilepsy, focusing on how different PM demands and reminder strategies influence performance.

Methods & Research Aims

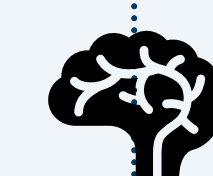


Compare neural mechanisms of specific and nonspecific PM in generalized epilepsy.

- Compare specific and nonspecific PM conditions in PWE and healthy controls
 - Specific PM tasks allow for more automatic retrieval
 - Nonspecific tasks require greater strategic monitoring and prefrontal engagement

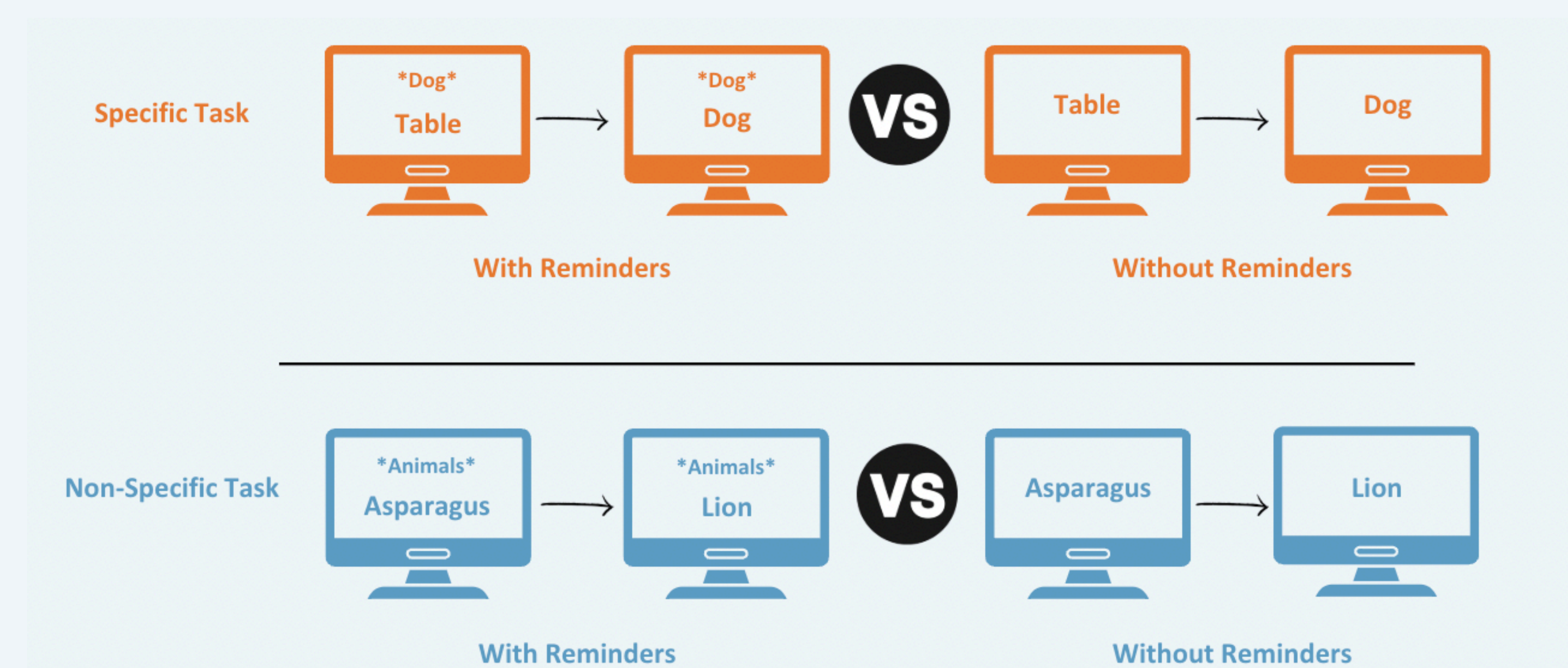


Hypothesis:
PWE will show greater deficits in nonspecific PM, with reduced activation in the prefrontal cortex and medial temporal lobe relative to controls.



Investigate the role of reminders on PM performance in generalized epilepsy.

- Given that external reminders can improve PM in healthy individuals, we will examine how reminders affect PM performance and brain activity in PWE
- Participants will complete a PM task with and without reminders, allowing us to assess compensatory neural mechanisms.



Hypothesis:
PWE will show a greater performance boost from reminders than controls, with reduced reliance on prefrontal monitoring processes when reminders are available.



Examine the role of reminders on PM performance in focal epilepsy.

- We will compare patients with temporal lobe epilepsy (TLE) and extratemporal epilepsy to determine how seizure focus affects PM and reminder benefits.



Temporal Epilepsy



Extratemporal Epilepsy

Hypothesis:
Individuals with TLE will exhibit greater PM impairments and a stronger reliance on reminders, with distinct neural activation patterns reflecting compensatory prefrontal engagement.

Methods: fMRI



T2-Weighted MRI Scan



Blood-oxygenation-level-dependent (BOLD) imaging



3-Tesla magnetic resonance imaging (MRI) machine located on UTA Campus in Clinical Imaging Research Center (CIRC)

Impact and Importance

- This study will be the first to use fMRI to examine PM in epilepsy
 - Providing critical insights into the neural mechanisms underlying PM deficits
- Findings will have important implications for cognitive rehabilitation, clinical interventions, and improving daily functioning for individuals with epilepsy.

References

Full reference list available upon request