



# PERFORMANCE ON THE ANTISACCADE TASK IN A PATIENT WITH A WORKING MEMORY DEFICIT

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## ABSTRACT

Recent work has emphasized the role of controlled attention in working memory capacity (Kane et al., 2001). Specifically, it has been argued that working memory and the ability to inhibit prepotent responses are closely related. Moreover, a deficient or overtaxed working memory system may increase the difficulty of resisting prepotent actions (Roberts et al., 1994). The antisaccade task measures the ability to inhibit such prepotent actions. Subjects are required to inhibit a reflexive response to a brief cue presented in the periphery of a display in order to discriminate a target stimulus presented on the opposite side of the display. We present data from a patient (ML) with very restricted memory span due to a deficit in retaining semantic information (Martin & Freedman, 2001). ML showed impaired performance on a number of tasks associated with executive function. Despite his limited memory span and impaired executive function, ML performed comparably to five healthy controls matched for age and education on two separate administrations of the antisaccade task. The dissociation of working memory and antisaccade performance in this patient suggests that limited working memory capacity does not necessarily result in an impaired ability to inhibit prepotent responses as measured by the antisaccade task.

## INTRODUCTION

• Antisaccade task is thought to measure inhibitory functions important in working memory -

**Roberts et al. (1994)-**

-working memory related to the ability to inhibit prepotent responses

-a deficient working memory system can increase the difficulty of resisting prepotent actions

-ability to to inhibit a prepotent response is dependent on working-memory processes

**Kane et al. (2001) -**

-propose that WM capacity reflects general capacity to maintain information in highly active state and suppress irrelevant stimuli via controlled attention

-individual differences in WM capacity are related to individual differences in performance on antisaccade tasks

**Mitchell et al. (2002)-**

-WM serves critical function in suppression of reflexive eye movements

-in order to inhibit response, must be able to maintain task instructions in memory, otherwise errors occur

**Present Study**

• Roberts et al. (1994) and Mitchell et al. (2002) employ dual-task methodology to demonstrate that taxing WM impairs performance on anti-saccade task

• How will patients with WM deficits perform on antisaccade task?

• **Objective of present study:** to assess patient with WM deficit on antisaccade task

## PATIENT ML

- 60 year-old male
- Education: two years of university course work
- CVA- 1990
- Lesion - frontal and parietal operculum
- **Language**
- good comprehension and single word processing
- production halting with reduced phrase length
- **Working Memory Deficit**
- semantic working memory deficit (Freedman and Martin, 2001)
- span - 3 items; category probe = 1.8 items

## STROOP & PI TASKS

### STROOP TASK

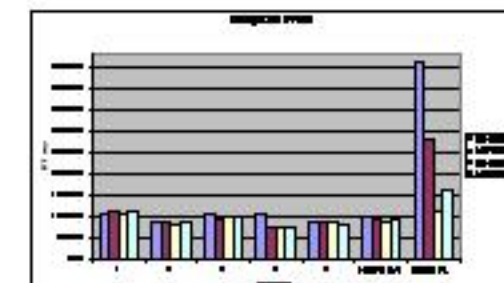
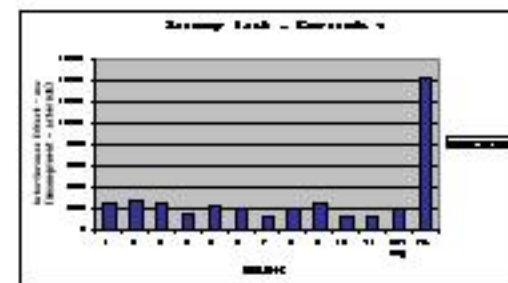
- Stroop commonly thought to require inhibition
- Stroop is sensitive to damage to frontal lobes
- ML demonstrates exaggerated interference effects for incongruent trials in Stroop Task (see figure below)

### LETTER PROBE RECOGNITION TASK

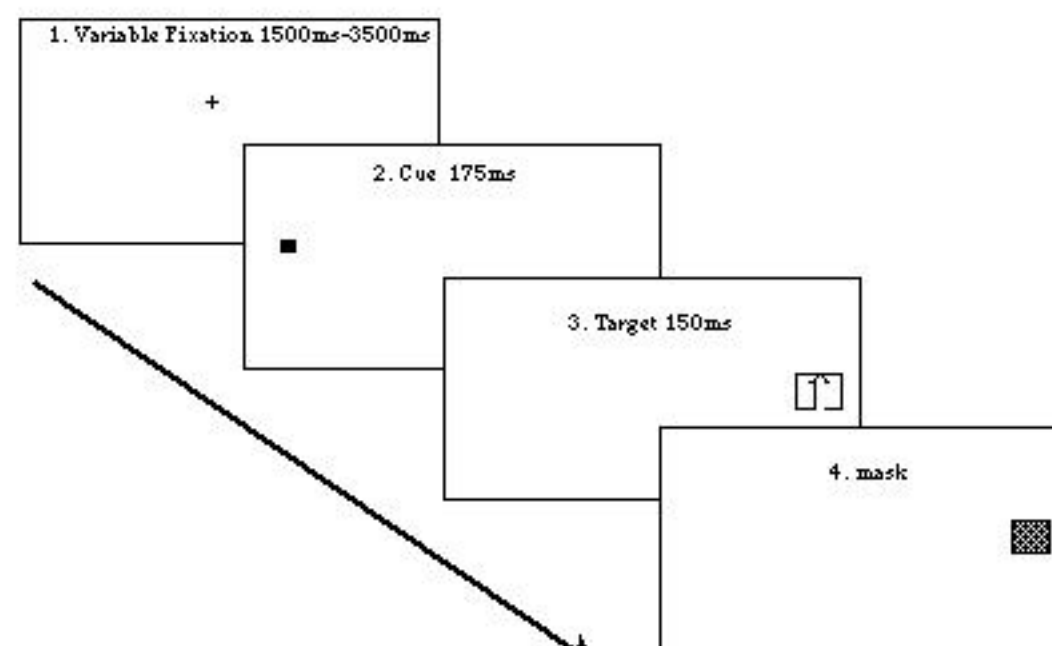
- ML demonstrates exaggerated effects for recent negatives in a modified letter probe recognition task manipulating recency of items (see figure below)

list	probe	response
X R T *	G ?	"NO"
K V L	T ?	"NO"

- task is commonly believed to require inhibition to overcome PI (Jonides et al., 1998)

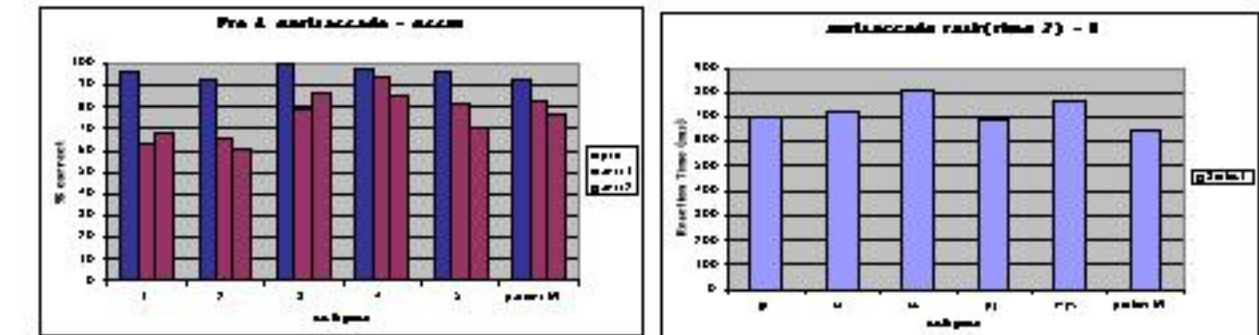


## ANTISACCADE TASK



- Ss' head placed 18" from monitor in chin rest

## RESULTS



- Patient ML, despite a severely restricted WM capacity and exaggerated effects on other tasks requiring inhibition (letter probe and Stroop task), demonstrates normal performance on the antisaccade task
- Patient ML's performance is within range of healthy, age- and education-matched controls in both accuracy and RT
- No impairment in inhibiting prepotent responses and reflexive saccades

## CONCLUSION

- Patient studies may be useful in elucidating the relationship among executive function, working memory and inhibitory mechanisms
- How to accommodate normal performance on antisaccade task in a patient with a dramatically impaired working memory capacity?
- Results imply dissociable types of inhibitory function - perhaps divided along verbal vs. visual-spatial domains

## REFERENCES

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