The Effect of Post Cueing Delay on Saccadic Latency in the Execution of Remembered Antisaccades

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Purpose

- Volitional saccades towards and in a direction opposite to a remembered target location have been quantified as a means of assessing **working memory** and **response inhibition**.[1,2,3]
- We seek to establish how saccadic eye movement latency for remembered antisaccades systematically changes **over a range of delays** after the target location has been cued and remembered.
- Our goal was to understand the **temporal constraints** of how working memory and response inhibition affect volitional eye movements.

Methods

- Eight subjects (mean age = 31yr ±16, six females) participated in the study.
- While fixating at a central white stimulus, a peripheral black square appeared for 100ms in the left or right visual field and then disappeared. An antisaccade (eye movement in opposite direction) was made to the remembered target location after a central visual cue appeared.
- The Gaze point (GP3) eye tracker, with a sampling rate of 150Hz and spatial resolution of 0.1°, recorded eye movements. Outcome measures were saccadic latency, number of disinhibitions and directional errors.
- Disinhibition (%) = $\frac{\text{number of eye movements during delay x 100}}{\text{total number of trials}}$
- Directional error (%) = $\frac{\text{number of eye movements after delay x 100}}{\text{total number of trials}}$

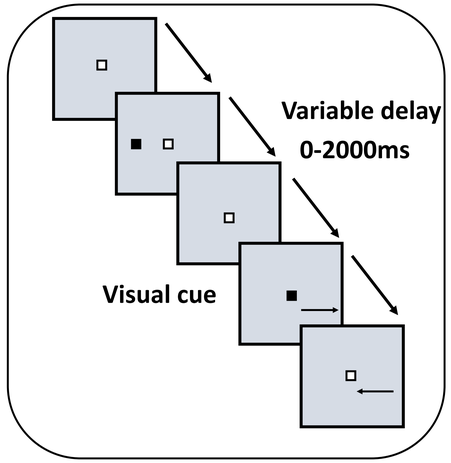

FIG 1. Schematic representation of the stimulus sequence used in the remembered antisaccade task. The arrow inside the box represents the correct eye movement.

Results

- Delay period significantly affected the latencies of remembered antisaccade ($F(5,30) = 6.3$, **$p = 0.0004$**).
- Mean saccadic latency was **longer for 0 delay** compared to **0.250, 0.500, 1 and 2s** (**Post-hoc, $p < 0.05$**) but not for 0.125sec.
- At short delays, particularly at **0** and **0.125s,** observers took more time to make a saccade in a direction opposite to the remembered location.
- Delay duration **did not** significantly **change** the disinhibition and directional error rates.

Results

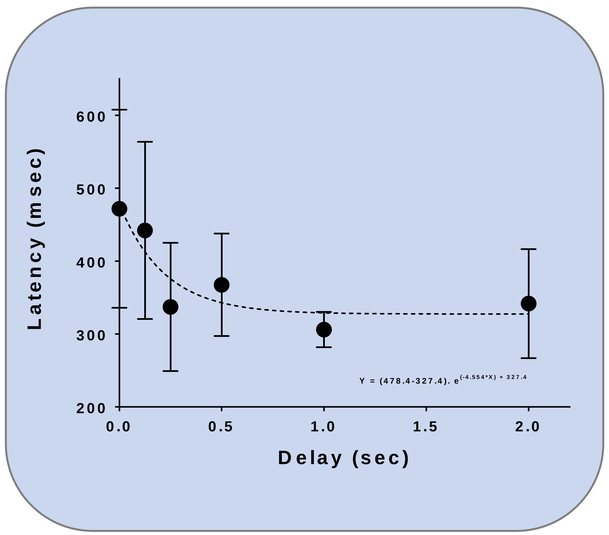

FIG 2. Mean latency for variable delay period. Error bars denote standard error. Dotted lines indicate the best fit exponential decay function.

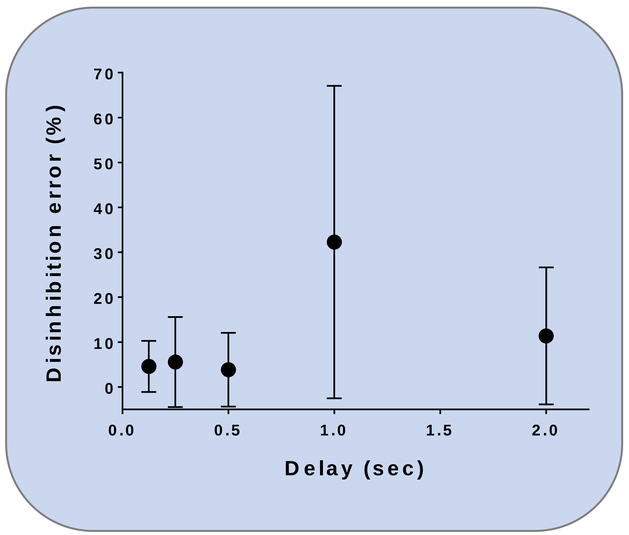

FIG 3. Mean disinhibition errors for variable delay period. Error bars denote standard error. No significant difference in errors rates were observed (ANOVA).

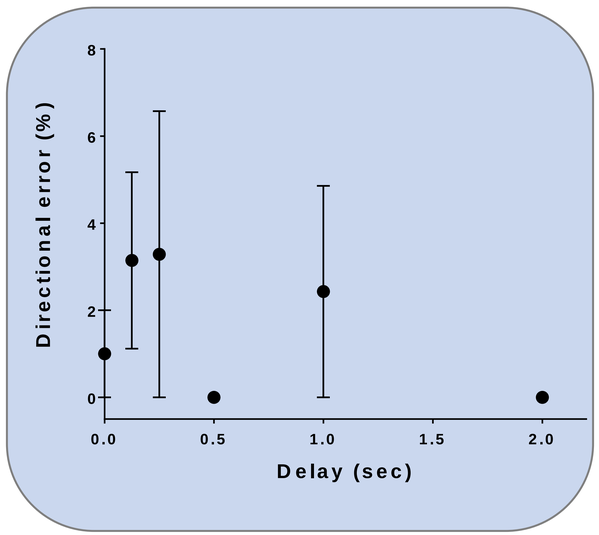

FIG 4. Mean directional errors for variable delay period. Error bars denote standard error. No significant difference in errors rates were observed (ANOVA).

Conclusions

- Remembered antisaccades with **shorter delays** showed **longer latencies.**
- Delay period **does not affect** the **disinhibition** and **directional errors** in normally sighted individuals.

References

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3. Amador, S. C., et al., Dissociating cognitive deficits involved in voluntary eye movement dysfunctions in Parkinson's disease patients. Neuropsychologia. 2002; 44(8):1475-1482.

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Disclosures: None