The Effect of Visual Delay Cue on Saccadic Response during an Antisaccade Task

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Purpose

- Reorienting **spatial attention** from one task to another requires disengaging and reengaging attention to the second task.[1,2]
- In this study, **antisaccades** was used to measure the ability to disengage **attention** and engage **response inhibition**. It does so because the observer must make a saccade in the **opposite direction** to the cued target location after its presentation.[1,2]
- Our aim was to investigate the ability to disengage attention in an antisaccade task by systematically varying the **delay duration** (i.e., time after the presentation of the test target).

Methods

- Eight subjects (mean age = 31yr ±16, six females) participated in the study.
- At each antisaccade trial, observers fixated a central target on a monitor placed at 70cm and made an antisaccade in response to a peripheral target in the left or right visual field only after the appearance of a central visual display cue.
- The Gaze point (GP3) eye tracker, with a sampling rate of 150Hz and spatial resolution of 0.1^{o}, recorded eye movements. Outcome measures were saccadic latency, number of disinhibitions and directional errors. The data were fitted with an exponential decay function.
- Disinhibition (%) = $\frac{\text{number of eye movements during delay x 100}}{\text{total number of trials}}$
- Directional errors (%) = $\frac{\text{number of eye movements after delay x 100}}{\text{total number of trials}}$

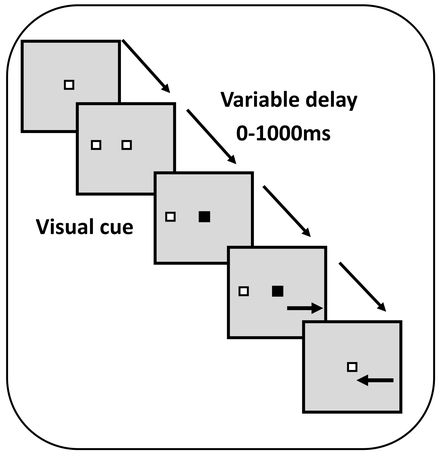

FIG 1. Schematic representation of the stimulus sequence used in the delayed antisaccade task. The arrow inside the box represents the correct eye movement.

Results

- Delay duration period significantly affected the antisaccade latencies [F(5,35)=10.59, **p = 0.002**].
- Mean saccadic latency was significantly **longer** for **0 delay** than for 0.0625, 0.500 and 1s delays (Post-hoc **p < 0.05**).
- **Disinhibition errors** significantly **increased** between delay duration of **0.0625s** and other longer delays (Fr=18.47, **p = 0.001**); particularly at **0.500s delay** (Post-hoc, **p = 0.011**).
- **Directional errors** significantly **decreased** with **increase** in **delay duration** (Fr=16.94, **p = 0.0046**).
- A longer delay duration helped to inhibit the reflexive saccades but not the incorrect saccadic response.

Results

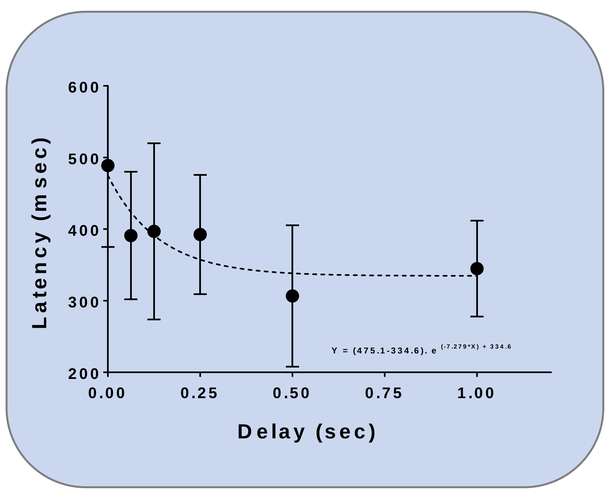

FIG 2. Mean latency for variable delay periods. Error bars denote standard error of mean.

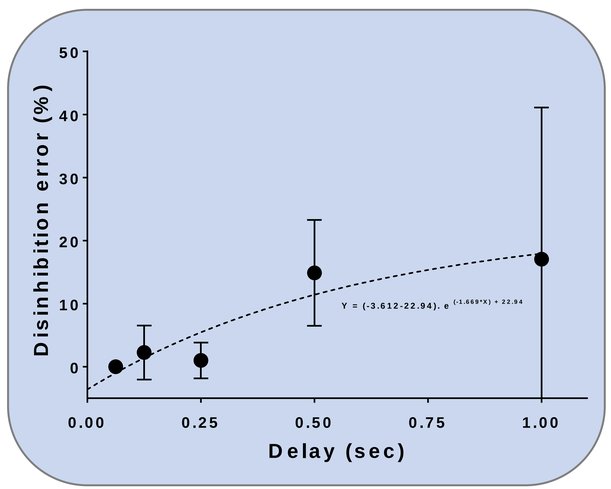

FIG 3. Mean disinhibition errors. Error bars denote standard error of mean.

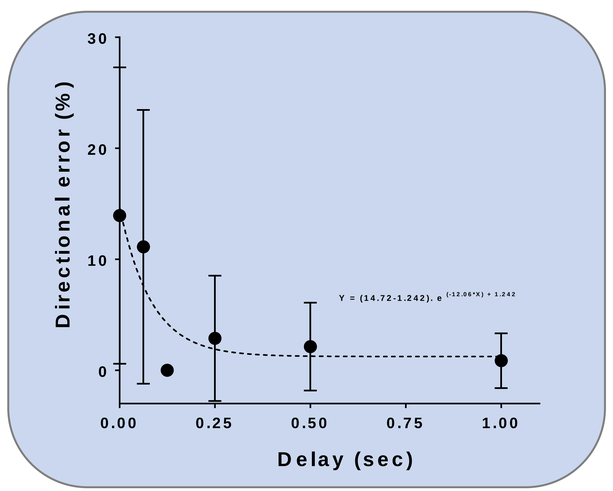

FIG 4. Mean directional errors. Error bars denote mean and standard error of mean.

Conclusions

- Antisaccades with shorter delay duration showed longer latencies in visually normal individuals.
- **Delay period** in the antisaccade task provides **time** to **disengage attention, plan** and **generate saccades** with **shorter latency**.

References

1. White JM et al., Saccades to Remembered target locations: an analysis of systemic and variable errors. Vis Res. 1994; 34(1):79-92.
2. 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