Examining reading deficits in the visual variant of Alzheimer's disease

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Objectives: Posterior Cortical Atrophy (PCA), widely regarded as the visual variant of Alzheimer's Disease (AD), involves a selective visual impairment while leaving language and memory functions relatively spared. The aim of this investigation is to identify patterns of reading deficits in individuals with PCA in order to better understand how such deficits relate to dysfunction in other parts of the visual system.
Methods: The participants recruited for this study were 20 individuals with PCA, 20 patients with typical AD and 20 age-matched controls. Single-word reading (N=196) tasks examined the effects of font, size, spacing, word length, case and letter confusability on accuracy and latency. Participants also completed letter processing tasks under conditions of visual crowding, temporal masking and contrast sensitivity.
Results: Preliminary results from 4 participants show a significant effect of font size on reading accuracy, with larger font words counterintuitively being read less accurately than smaller words (mean 22.9% vs 54.2%, $p<.05$). Word spacing also had a significant impact upon reading accuracy, with words with spaced letters being named correctly less often than unspaced words (mean 34.9% vs 59.9%, $p<.05$). Word length, case and letter confusability had no significant effect on reading performance.
Conclusions: Results confirm a common clinical complaint of finding large text harder to read than small print, and may reflect a progressive attentional restriction in the effective field of vision. We hope that further results will help clarify how other factors influence reading accuracy, which might inform the design of reading strategies and remedial techniques.

Automatic Guidance of Auditory Attention from Working Memory

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Objective: There are many researches demonstrate that working memory plays an important role in top-down attentional guidance. The present study sought to investigate whether the maintenance of a sound in working memory attracts our attention in auditory space? Additionally, are there cross-modal links between working memory and selection? Does the maintenance of an auditory stimulus attract attention to the equivalent visual stimulus and to semantically stimulus as well?
Methods**:** We tested performance in an auditory search task, in which we asked participants to memorize a sound (prime) and then we asked them to search for a target sound in a search field of different sounds to assess whether the stimulus in WM influenced search efficiency. Then, the influences of visual and semantic prime were tested on finding target in an auditory search field. In all three experiments, the bottom-up effect and automaticity were controlled separately.
Results: RTs were analysed for correct responses in the search-identification task and paired-sample t-test was used to compare mean of RTs in different conditions. In the analyses *p* values of main effects have been computed. Pairwise comparisons showed faster performance in the Valid trials than Invalid trials and Neutral trials.
Conclusion: The effects of the contents of WM on attention have been studied within auditorial modality. Additionally, cross-modal links between WM and selection has been studied. The results showed that the maintenance of an auditory stimulus attract attention to the equivalent visual and semantic stimulus.

Thalamic lesions impair memory guidance of visual selection

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Objective: Functional magnetic resonance imaging (fMRI) research suggests that guidance of attention from the contents of working memory (WM) engages a complex network including frontal areas in dorsolateral prefrontal cortex (DLPFC), superior frontal gyrus (SFG), middle temporal regions, thalamic nuclei and occipital visual cortex. However, evidence from fMRI is only correlational and therefore it is difficult to determine which of the identified brain regions are necessary and causally involved in WM guidance of attention. This issue was addressed in a lesion study with focal-lesion stroke patients.
Methods: A total of 67 patients were tested. Patients were required to perform a visual search task for a target object presented amongst distracters. In the valid condition the colour of the sought after target was pre-cued by a verbal cue presented prior to the search display. On neutral trials, the patients did not receive any cue prior to search. Voxel-based lesion-symptom mapping (VLSM) analyses were carried out to relate lesion anatomy to search behaviour.

Results: The VLSM analyses revealed that patients with thalamic lesions (N=4) showed no memory cueing effect of search despite having intact memory performance in a control memory task. In contrast, the control patients were able to use the memory cue to guide attention towards the target, as indexed by faster reaction times on valid relative to invalid trials.
Conclusion: The findings support the role of the thalamus in controlling visual attention, specifically in guiding attention based on relevant information held in memory.