Objectives

Search organization could be impaired following stroking. Currently, no standard test is available to assess disorganized search. Even though visual search is a key aspect during existing tasks, such as the cancellation task, it is not evaluated. In the current study we aimed to answer 1) what measure depicts search organization the best? And 2) which lesion locations result in disorganized search during cancellation tasks?

1. Measuring search organisation

Methods: 310 stroke patients and 37 healthy controls were given a computerized shape cancellation task. Measures that were computed:

- General search direction (Best r)
- Intersections with paths between previous cancelled targets
- Distance between consecutive cancelled targets
- Number of perseverations (revisits) of previously cancelled targets

Results: neglect and right brain damage are both related to disorganized search (Fig 1). The intersections rate (Fig 2) depicts search organisation the best.

2. Voxel-based lesion-symptom mapping

Methods: A computerized version of a shape cancellation task was administered in 78 stroke patients. We used the intersections rate as a measure of search organization. Voxel-based lesion-symptom mapping was applied (software: NPM. Settings: t-test; FDR q<0.01).

Results: The right lateral occipital cortex, superior parietal lobule, postcentral gyrus, superior temporal gyrus, middle temporal gyrus, supramarginal gyrus, inferior longitudinal fasciculus, first branch of the superior longitudinal fasciculus, and the inferior fronto-occipital fasciculus, were related to search organization (Fig 3).

Conclusions

Post-stroke disorganized visual search can already be measured during standard cancellation tasks by computing the intersections rate. Disorganized search is most strongly related to the right hemisphere, in particular the temporoparietal junction. These correlates overlap with regions that have previously been associated with conjunctive search and spatial working memory. Disorganized visual search might be caused by disturbed spatial processes, rather than executive function or planning, which is more related to frontal regions.

References: