Specificity of scan paths on the Span of Apprehension task in schizophrenia

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Introduction

The ability to process visual spatial stimuli, as measured by the Span of Apprehension task, has been proposed to be disturbed in schizophrenia patients. Deficits in iconic memory, dysfunction of cells in charge of information processing and a delay of search initiation have been put forward as possible explanations.
In several studies, specificity of task deficits could not be confirmed for schizophrenia patients. However, statistical power was low because of small sample sizes. In our current study, we compared a large sample of schizophrenia patients with patients suffering from a depressive disorder and healthy control subjects using a wide visual angle version of the Span of Apprehension task. An analysis of scan paths based upon target detection rates as a function of target location was conducted.

Methods

A sample of 47 schizophrenia (PANSS+:16.7, PANSS-:27.1, Age: 34.0 years) and 48 depressed patients fulfilling DSM IV- criteria and 46 healthy subjects participated in this study.

Paradigm

On the partial report version of the Span of Apprehension task, a letter matrix is presented for 83 ms and the subject has to detect one of the target letters (“T“ or “F“). Arrays of 3 and 12 letters were presented (cf. Asarnow et al., 1991).

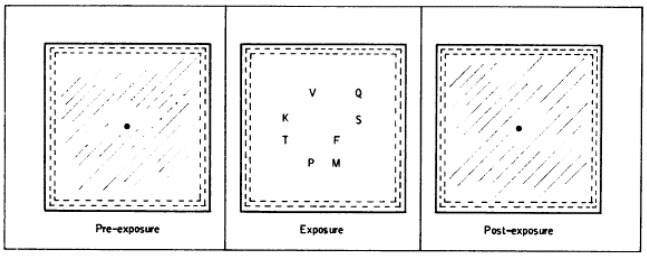
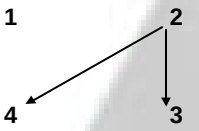


Figure 1: Original Span of Apprehension design (Estes & Taylor, 1964)

Results

No differential deficits could be found regarding total hit rates. Correlational analyses revealed only a relationship between age and performance on the 12- letter- condition in the whole sample. Scan path analyses, inferring scan moves in iconic memory from differences of detection accuracy between the quadrants, revealed that schizophrenia patients have no deficits on overall hit rates, but have a different pattern of scan paths (see figure 2).

Figure 2: Scan moves between the 4 quadrants …



… for schizophrenia patients on the 3-letter condition*

***For depressives and healthy controls no scan moves were observed in this condition**

On the 3-letter condition, schizophrenia patients executed a scan move (top-down), whereas depressives and controls did none. On the 12-letter condition, schizophrenia patients executed one scan move (top - down) as the control groups. Depressives and normal subjects displayed a very similar scan pattern.

Discussion

Our results are in line with recent studies that did not find differential deficits in schizophrenia patients regarding total hit rates on the Span of Apprehension. However, schizophrenia patients’ scan paths differ at least in part from that of normal subjects and affectively disturbed patients. Schizophrenia patients appear less efficient in the spatial read-out of letters. They have to conduct a scan move in a simple identification task which is resolved by depressed and normal subjects without a move. Our results contribute to a better understanding of visual spatial processing deficits in schizophrenia.

References
Asarnow, R.F., Granholm, E., Sherman, T. (1991) **Span of Apprehension in schizophrenia. In:Steinhauer, S.R., Gruzelier, J., Zubin, J. , editors, Neuropsychology, psychophysiology and information processing, Elsevier, Amsterdam**
Estes, W. D., Taylor, H. A. (1964) Detection method and probablistic models for assessing information processing from brief visual displays.Proc Natl Acad Sci USA 52:446-54

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