Introduction

N-back tasks are well established to measure working memory (WM) dysfunction in schizophrenia.

Two types of N-back task can be differentiated:

_CMT: Continuous matching tasks_
Subjects have to match the features of the present stimulus with those of the stimuli presented N-back.

_CDRT: Continuous delayed response tasks_
Subjects have to select the response depending on the information of the stimulus presented N-back.

First-episode, neuroleptically naive schizophrenic patients solve both types task relevant information depending on the type of N-back task?

Do healthy controls apply different encoding strategies of the tasks (CRT). In contrast, the impairments seen in CDRT are more pronounced but compared to healthy controls the deficits in CMT tasks can be attributed to a slowing of basal cognitive processes already involved in choice reaction tasks (CRT). This can be explained by the task solving behaviour of the healthy control subjects: They solve CDRT tasks in considerably less time and with higher accuracy than CMT tasks.

Method

Sample
32 healthy subjects (16 males, 16 females), 25.0 ± 3.4 years

Stimuli and Response
In each task 48 stimuli (50% squares, 50% triangles) were presented (duration 50ms).

Dependent variables
% Correct Responses
Reaction Time (RT, Stimulus-Onset to reaching the target array)

Tasks
SRT: Simple Reaction
SDT: Stimulus Discrimination
CRT: Choice Reaction
N-back-CDRT (N=1 + 2):
"React to triangles only"
"React to the stimulus N-back"
N-back CMT (N=1 + 2):
"React to all stimuli"
"React to the stimulus N-back" (100% vs. 50%)

Predictability of the correct response side
Prerequisite for the use of a motor encoding strategy is that a task allows the response selection to occur before the delay. A random arrangement of the target buttons was used to prevent that information in CDRT-tasks is hold online in a motor code.

Design and Statistics
2x5-ANOVA with 2 repeated measurement factors
"predictability of the correct response side" (100% vs. 50%)
"task" (SRT, SDT, CRT, 1-CDRT, 1-CMT)

Results

Accuracy decreased with 50% predictability in CRT and CDRT
but not in SRT, SDT and CMT

CDRT and CMT were solved with equal accuracy.

RT increased with 50% predictability in all tasks, but most pronounced in CDRT

CDRT and CMT were solved in a comparable time.

Discussion

Our data support the assumption that healthy subjects apply different encoding strategies depending on the type of N-back task:

_CMT_  sensory encoding strategy
_CDRT_ motor encoding strategy

When healthy subjects are forced to apply a sensory encoding strategy, the behaviour equals in CMT and CDRT, as it can be observed in schizophrenic patients.

The consideration of action related processes in WM might contribute to understanding the - sometimes diverging - results of WM studies in schizophrenia.

This might be important not only regarding behavioural data but also for the interpretation of hyp- and hyperactivation in prefrontal brain area.

Recent studies suggest that e.g. the activation of dorsolateral prefrontal structures is more pronounced when information is maintained in WM in a sensory code compared to the use of a motor representation (Curtis & D'Esposito, Neuroimage 2005).