



# Prospective remembering of Korsakoffs and alcoholics as a function of the prospective-memory and on-going tasks

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## Abstract

Prospective memory is assumed to rely more on the frontal lobes than retrospective memory. Since Korsakoff patients are known to suffer from a general cerebral atrophy and a frontal lobe atrophy in particular, they are expected to show considerably impaired prospective memory. In Experiment 1, the performance of Korsakoff patients on a semantic prospective-memory task (which was embedded in a perceptual on-going task) was particularly bad in Session 1; in Session 2, the Korsakoff patients improved substantially, to reach the performance level of nonamnestic alcoholics. In Experiment 2, prospective memory of the Korsakoff patients and nonamnestic alcoholics was better when the on-going task was more similar to the prospective-memory task; particularly striking was the much better prospective memory in the semantic prospective-memory task when the on-going task requires a semantic analysis than when the on-going task requires perceptual processing. The findings are in agreement with a task-appropriate processing explanation but also in partial agreement with the attention hypothesis of the instance theory of automaticity. Contrary to the frontal lobe hypothesis, prospective memory of the Korsakoff patients was surprisingly good in several aspects of the two experiments. © 2000 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

An easy way to describe prospective memory is to contrast it with the more familiar retrospective memory. Retrospective remembering stands for remembering information about activities that happened in the past. Prospective remembering, on the other hand, involves remembering activities to be performed in the future, as for example remembering to call a friend or to post a letter. Two forms of prospective memory have been distinguished [14,15]. Event-based prospective remembering stands for remembering to perform an action when some particular external event (called the target event) occurs; for example, asking a question

to a friend when you meet him or her. Time-based prospective remembering means to remember to perform an action at a certain point in time (called the target time); for example, calling a friend at noon today. Time-based prospective remembering is assumed to be more difficult because it requires more self-initiated retrieval processes than event-based prospective remembering [15].

The two forms of memory, prospective and retrospective memory, are not totally independent. A prospective-memory task typically also involves a retrospective component, namely the 'when' and 'what' of the task. For example, remembering to call a friend when you get home, requires also to 'when' to do this (when you get home) and 'what' to do then (to call). Many prospective-memory failures probably occur because of problems in remembering the retrospective component [14].

Research on the underlying brain structures suggests

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that prospective functioning relies more on the frontal lobes than retrospective memory [3,18,20,35]. The decision about what action needs to be performed, and the creation of the intent to carry out fall within the traditional domain of the executive function [5]. The frontal lobes are responsible for formulating plans, initiating actions, monitoring on-going behavior, and evaluating outcomes, and therefore probably also for prospective remembering [19]. When cognitive deficits appear in frontal lobe dementias, they typically involve disorders of planning and organization [38].

Korsakoff patients are known to have serious difficulties with retrospective memory. They suffer from severe anterograde and retrograde amnesia [6–8,24]. Far less is known about their prospective-memory functioning. While the precise anatomical localization of the Korsakoff syndrome remains a problem, it is assumed that there is damage in the medial thalamus, and possibly in the mammillary bodies of the hypothalamus as well as a generalized cerebral atrophy especially in the frontal lobe [21,23,36,37]. A prospective-memory task always implies retrospective- and prospective-memory components. The amnesic nature of the Korsakoff patients will greatly affect the retrospective component. Their frontal lobe atrophy will additionally influence the prospective component. They do show impairment in the planning of behavior and the formation of judgment [17,37]. Therefore, we predict that Korsakoff patients will show a considerably impaired prospective memory.

In a pilot study with Korsakoff patients [9], time- and event-based prospective memory was studied, using the identification of famous faces on slides as an on-going task. The pilot study was a failure as most Korsakoff patients refused to continue the task. It became clear that the tasks need to be easy in order to get the Korsakoff patients sufficiently involved. In the present study, the following changes were made. As a time-based prospective-memory task is assumed to be more demanding, only an event-based prospective-memory task was used. Identifying faces involves retrospective memory; therefore, another on-going task was selected. Since Korsakoff patients do not have problems with perceptual tasks [4], counting letters in a word seemed a better on-going task. As Coeckelbergh [9] observed a considerable improvement between a first and second session (with only a few minutes break in-between), we also used two sessions.

We also took into account the training some Korsakoff patients received to overcome their memory problems. In some psychiatric institutions, Korsakoff patients are given a so-called diary training. The purpose is to train Korsakoff patients in using a diary as a kind of memory reminder for the daily activities. The availability of the reminder was manipulated in order to see whether the reminder was indeed more

useful for trained than untrained Korsakoff patients, in carrying out the prospective-memory task. As a control nonamnesic group, chronic alcoholics were selected who resided in similar institutions as the Korsakoff patients and who showed no memory impairments on a standard memory test.

## 2. Experiment 1

### 2.1. Method

#### 2.1.1. Participants

Ten trained and 10 untrained Korsakoff patients, and 10 alcoholics participated in Experiment 1. All 10 (one female and nine male) trained Korsakoff patients were residents in a psychiatric institution. The average age of the group was 49.1 years (range 42–59 years). All patients showed severe anterograde and retrograde amnesia. On the Auditory–Verbal Learning Test, all scores were in the severe memory deficit range. For five of those patients we had scores on the Wechsler Adult Intelligence Scale, with an average VIQ of 84.8, an average PIQ of 89.8, and an average overall IQ of 88.2. For four other patients, the average Progressive Matrices IQ was 91. For one patient there was no IQ available.

The untrained Korsakoff group consisted of two female and eight male patients from two different psychiatric institutions. The average age of the group was 52.2 years (range 48–59 years). All patients also showed severe anterograde and retrograde amnesia. On the Auditory–Verbal Learning Test, the scores were all in the severe memory deficit range. For four patients we had an IQ approximation by the scores on the ‘Nederlandse Leeslijst voor Volwassenen’ [Dutch Reading List for Adults], with an average IQ of 98.75. For the remaining six patients, the average Wechsler Adult Intelligence Scale IQ was 86.1; there were no separate VIQ and PIQ scores available.

The 10 male chronic alcoholics were hospitalized in a detoxication ward of a similar psychiatric institution. The average age was 41.8 years (range 35–59 years). Among the alcoholics, there were no signs of any memory problems. All scores on the Auditory–Verbal Learning Test were situated in the no-memory deficit range. They were given no medication that could affect memory. The average IQ on the Progressive Matrices was 108.1.

All 30 participants had abstained from alcohol for at least one month.

#### 2.1.2. Design

Participants were tested twice individually. In Session 1, each participant was randomly assigned to one of the two conditions (reminder vs no reminder). In

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