



Memory and schizophrenia: differential link of processing speed and selective attention with two levels of encoding

Gildas Brébion*, Mark J. Smith, Jack M. Gorman, Dolores Malaspina, Zafar Sharif, Xavier Amador

Schizophrenia Research Unit, New York State Psychiatric Institute and Creedmoor Psychiatric Center, New York, NY, USA

Received 23 August 1999; received in revised form 28 November 1999; accepted 2 December 1999

Abstract

The purpose of this study was to investigate how underlying cognitive deficits such as a defect in processing speed or in selective attention contributed to different types of memory impairment observed in schizophrenia (superficial vs deep encoding). 49 schizophrenic patients and 40 normal controls were administered a verbal memory task. Superficial encoding was assessed by the ability to recall items in their serial order. Deep encoding was assessed by the ability to organise words into semantic categories. Two measures of processing speed (Digit Symbol Substitution Test and Stroop colour time) and one measure of selective attention (Stroop test) were used. Regression analyses were carried out. In the patient group, processing speed contributed to both superficial and deep encoding, and to a global verbal memory score. Selective attention only contributed to the superficial encoding processes. Thus, slowing of processing speed in schizophrenia seems to be more crucial for memory performance, since it affects memory in a pervasive way. © 2000 Elsevier Science Ltd. All rights reserved.

Keywords: Schizophrenia; Memory; Processing speed; Selective attention

1. Introduction

Understanding how dysfunctions of certain underlying processes in patients with schizophrenia are linked to their cognitive impairments may shed some light on the pathophysiology of this disease. One form of cognitive impairment that lends itself to this type of analysis is memory impairment, broadly investigated in this population (Aleman et al., 1999). In a previous paper from our group (Brébion et al., 1998), we attempted to find associations between certain underlying processes and memory impairment in a sample of patients with schizophrenia. Our results showed that long-term memory impairment was consistently linked

to slowing of processing speed. This parallels a similar relationship repeatedly found in the elderly (e.g. Bryan and Luszcz, 1996; Lindenberger et al., 1993; Nettelbeck and Rabbitt, 1992; Park et al., 1996), a population in which memory deficit and generalised slowing are commonly observed. Recently, other authors have demonstrated the role of slowing of processing speed on cognitive efficiency (Schatz, 1998) and memory (Salamé et al., 1998) in schizophrenic patients.

However, long-term memory is a complex function that can be broken down into different stages (e.g. encoding of the information, storage of the information over time, retrieval of stored information), with each stage potentially differentially affected by the illness. Therefore, perturbations in the various underlying processes may affect each stage differently. Furthermore, at the encoding stage, different levels can be distinguished, e.g. superficial vs deep encoding (Craik and Tulving, 1975). The distinction between these two levels of encoding has also been observed at the brain

* Corresponding author. Present address: Institute of Psychiatry, Department of Psychological Medicine, 103 Denmark Hill, London SE5 8AZ, UK. Tel.: +44-171-740-5087; fax: +44-171-740-5129.

E-mail address: g.brebion@iop.kcl.ac.uk (G. Brébion).

level, using recent brain imaging techniques (Demb et al., 1995; Martin, 1999). It parallels the distinction between effortful vs more automatic processes (Hasher and Zacks, 1979). In our previous study (Brébion et al., 1998), we found that processing speed was associated with the efficiency of *deep* encoding, although no explicit distinction among different levels of encoding was made. In the present study, we wished to test the hypothesis that an association between processing speed and memory measures relying on *superficial* encoding, such as serial learning of items, would be found as well. If such an association were observed, this would fit the model of working memory described by Baddeley (1986). According to this model, verbal information that is to be held in memory in a serial order is stored and rehearsed in an articulatory loop. The more often the items are rehearsed, the stronger the mnemonic trace (Burgess and Hitch, 1992). Therefore, a slowing of processing speed could be deleterious in that any information to be recalled would be rehearsed and refreshed less often in the articulatory loop. Such a relationship between processing speed and serial recall has been observed in normal populations (e.g. Cowan et al., 1992; Kail and Park, 1994).

However, perturbations in other underlying cognitive processes besides processing speed could also affect serial learning. One such possible underlying process is selective attention, which refers to the ability to inhibit non-relevant information. A deficit in selective attention can be indexed by increased distractibility. Indeed, several studies have shown that patients with schizophrenia, or people at risk for schizophrenia, were particularly impaired in a serial recall task, the digit span, when distractors were added to the task (Corrigan and Green, 1991; Harvey and Serper, 1990; Oltmanns and Neale, 1975; see Nuechterlein and Dawson, 1984, for a review). In addition, through analysis of recalled words according to their position in a word list, Oltmanns (1978) suggested that distractibility in schizophrenic patients interferes with the rehearsal processes of serial learning. Harvey et al. (1981) observed the same pattern of results in a population of children at risk for schizophrenia.

To test the hypothesis of an association between distractibility and serial learning, one could examine the relationship between an external measure of selective attention and serial recall of items, in either short-term or long-term memory. Such a relationship has never been investigated in a population of patients with schizophrenia, as far as we know. Finally, although the theoretical rationale is less compelling, distractibility may also interfere with deeper types of memory processing.

In our task, superficial encoding was assessed by two types of serial recall: in short-term memory, by the digit span, which consists in the learning of series

of digits by heart; in long-term memory, by serial recall of words in their order of presentation. Deep encoding was also assessed in long-term memory by the organisation of the recalled words according to semantic categories. Furthermore, we made a distinction between the encoding and storage phases in the long-term memory task.

We have already shown, in a sample of patients with schizophrenia, that these levels of encoding were differentially linked to clinical symptoms: the memory measures that relied on deep encoding were consistently affected by depression severity, whereas the memory measures that relied on superficial encoding were spared by depression (Brébion et al., 1997b). It thus seemed reasonable to assume that these two levels had different underlying mechanisms.

In the present study, our first purpose was to further investigate the relationship between processing speed and encoding. We hypothesised that our previous finding of an association between processing speed and deep encoding in long-term memory would extend to superficial encoding, in both short-term and long-term memory. More specifically, we expected in both schizophrenic patients and normal controls an association between processing speed and the number of items (words or digits) that could be recalled in sequence.

Our second purpose was to investigate the association between selective attention and the encoding and storage phases. On the basis of previous studies concerning distractibility and the digit span, we expected selective attention to be associated with serial recall, reflecting superficial encoding, in both short-term and long-term memory in the patient group. The same possible associations in the control group were investigated.

As regards possible associations between selective attention and organised recall, reflecting deep encoding, as well as association with the storage phase, we had no expectations about them and they were investigated in both groups in an exploratory way. An association between selective attention and measures of deep encoding would suggest that distractibility impeded the organisation of the information. An association with the storage phase would suggest that the mnemonic trace may be disrupted by the intrusion of irrelevant material during the delay period.

2. Method

2.1. Participants

Forty-nine in-patients meeting DSM-IV criteria for schizophrenia or schizo-affective disorders, screened to

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات