Psychiatry Research 169 (2009) 39–42

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Selective pair recognition memory impairment with no response bias in schizophrenia

David Luck, Alonso Montoya, Matthew Menear, Amélie M. Achim, Samarthji Lal, Martin Lepage *

Brain Imaging Group, Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Canada, 6875 Boul. LaSalle, Verdun, Québec, Canada H4H 1R3

ARTICLE INFO

Article history:
Received 28 February 2008
Received in revised form 2 June 2008
Accepted 13 June 2008

Keywords:
Pair recognition
Item recognition
Episodic memory
Response bias
Schizophrenia

ABSTRACT

Memory is one of the cognitive functions most affected in schizophrenia, but the severity of deficits varies from one task to another. In particular, greater impairments have been reported for pair recognition than item recognition. However, decision biases and how they could affect memory dysfunction in schizophrenia have received scant attention. In this study, 26 people with schizophrenia and 28 healthy controls were administrated an association item recognition task. During encoding, participants studied pairs of visual objects, and they had to memorise objects and their pairing. In a subsequent retrieval task, participants performed an item recognition test (old/new items) and a pair recognition test (intact/rearranged pairs). Results showed that both groups were better at recognizing items than pairs, with lower performance for pair recognition, but not for item recognition, in people with schizophrenia. Analyses of response biases revealed that patients had a conservative response bias for items but not for pairs. The study also provides evidence that associative impairment may not result from decisional bias but rather from impairments in mnesic processes.

1. Introduction

Schizophrenia is closely associated with episodic memory dysfunction (Saykin et al., 1991; Heinrichs and Zakzanis, 1998; Aleman et al., 1999; Pelletier et al., 2005; for review, see Danion et al., 2007). The magnitude and severity of the observed deficits seem to vary from one task to another (Pelletier et al., 2005), suggesting that particular memory processes may be selectively compromised in schizophrenia. For example, studies that contrasted memory for individual items and memory for associations, either between items or between an item and its context, consistently found greater impairments in people with schizophrenia on the latter (Rizzo et al., 1996; Danion et al., 1999; Waters et al., 2004; Lepage et al., 2006). These results may suggest that processes inherent to associative memory could be more affected than other memory processes. For instance, Danion et al. (1999) conducted an associative recognition test in which participants studied the pairing of common objects. Later, participants were presented with a typed list of object pairs, with half of these pairs in their initial combination (i.e. intact pairs) and the remaining half consisting of rearranged old objects that formed a new pairing. Participants were instructed to discriminate the intact pairs from the rearranged ones. These judgments proved to be much more difficult for the people with schizophrenia than for the healthy controls, suggesting that the ability to associate separate aspects of events into a cohesive, memorable and distinctive whole is impaired in schizophrenia. This finding is particularly interesting because the two groups did not significantly differ for item recognition; thus, it appeared that associative recognition was selectively impaired in the patients. However, subjects had to remember 10 items during the item memory test, while they had to remember 70 associations during the pairing test. As a result, this procedure may have underestimated the magnitude of the item memory deficit. On the other hand, Lepage et al. (2006) tested item processing (i.e. encoding and recognition) with half as many objects to remember relative to associative processing. Indeed, two different objects were presented for associative trials, whereas the same object was presented twice for items trials. A potential limitation was that participants had to memorise and evaluate more information in the associative recognition than was required for the item recognition. This last issue is very important and has to be taken into account in the assessment of relational processes in memory (Mitchell et al., 2000; Luck et al., 2008). As a result, these studies may have underestimated item recognition impairments relative to associative recognition impairments in people with schizophrenia (Pelletier et al., 2005). To address this issue, we used a task equating the memory load for both the pair and item recognition tests.

One aspect of memory dysfunction in schizophrenia that has received scant attention is the exploration of decision biases. In general, decision or response bias reflects the outcome of a decisionmaking process that occurs when an individual has to choose between several options. Decision bias is important because, whenever a judgment

* Corresponding author. Brain Imaging Group, Douglas Mental Health University Institute, 6875 Boul. LaSalle, Verdun, Québec, Canada H4H 1R3. Tel.: +1 514 761 6131x4393; fax: +1 514 888 4064.
E-mail address: martin.lepage@mcgill.ca (M. Lepage).

0165-1781/$ – see front matter © 2008 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.psychres.2008.06.037

cannot rely on perfect knowledge, it may be partially based on incorrect criteria. Previous studies have reported either a conservative response bias (Ragland et al., 2003; Brebion et al., 2005, 2007) or a liberal response bias (Brebion et al., 1999; Ishigaki and Tanno, 1999) in people with schizophrenia for single items, but little is yet known about the decision biases regarding associations. In an associative recognition task identical to that of Danion et al. (1999), in which distracting stimuli consisted of rearranged pairs of familiar items, it was hypothesized that patients would base their judgment on the familiarity of items when memory for associations failed. Under these circumstances, some patients would be more likely to respond "old". Thus, the deficit for associative recognition observed in schizophrenia might reflect a bias toward old responses attributable to the familiarity of items. In addition, recognition memory judgments might be influenced by the severity of clinical symptoms. For instance, some authors have reported that hallucinations are closely linked to response bias (Bentall and Slade, 1985; Rankin and O'Carroll, 1995; Ishigaki and Tanno, 1999; Brebion et al., 1999, 2000, 2005), whereas others have considered delusions and thought disorders to be better predictors of response bias (Ragland et al., 2003). The main objective of the present study was to investigate pair/item recognition using an advanced procedure from which straightforward conclusions could be drawn. A secondary objective was to examine whether a response bias would account for the low performance of people with schizophrenia during pair recognition. Finally, we explored the relation between response bias and several specific clinical symptoms considered to favour false recognition.

2. Methods

2.1. Subjects

Table 1 summarizes the demographic and clinical data. Thirty-three outpatients (19 male and 14 female) from Douglas Hospital participated in the study. All met DSM-IV criteria for schizophrenia (American Psychiatric Association, 1994). Symptom severity was determined using the Positive and Negative Syndrome Scale (PANSS). Individuals with schizophrenia had been clinically stable for at least 1 month at the time of testing. All but two patients were taking antipsychotic medication (eight were receiving typical antipsychotics, 16 were receiving atypical antipsychotics, and seven were receiving a combination of both). The mean dose of medication was equivalent to 406.88 mg/day of chlorpromazine (Woods, 2003). In addition, seven people with schizophrenia were receiving antidepressants (citalopram: $n=2$, mean dose = 25 mg; sertraline: $n=3$, mean dose = 116.67 mg; bupropion: $n=1$, dose = 150 mg; fluvoxamine: $n=1$, dose = 125 mg), and three patients were receiving anticholinergic medication (procyclidine: $n=1$, dose = 10 mg; benztropine: $n=2$, mean dose = 2. 5 mg). None of the outpatients were being treated with benzodiazepines.

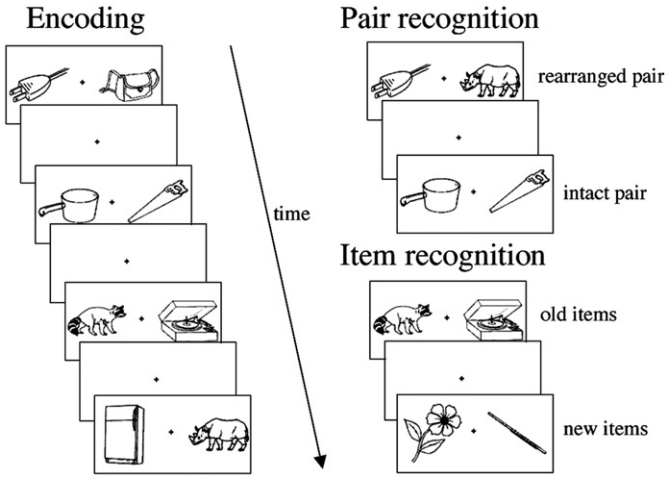

Fig. 1. Illustration of the behavioural task used in the present experiment. The left part represents a segment of the encoding task, with pairs consisting of two different objects. The right part represents a segment of recognition tasks. During the pair recognition, participants categorized each pair as either representing an intact (old) pair or a rearranged (new) pair. During the item recognition, participants categorized each pair as either representing old items (studied before) or new items (never seen before item).

Thirty-nine healthy subjects were recruited by means of advertisements placed in local newspapers and were examined with the Non-Patient Edition of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I/NP) to rule out current or past Axis I psychiatric disorder. The two groups were matched on age, educational level, gender and first language.

The institutional review board of the Douglas Institute approved the study. Each participant signed an informed consent form before the experiment and received financial compensation for participation.

2.2. Procedure

Fig. 1 presents a graphical illustration of the procedure. Stimuli consisted of arbitrary pairs of two different Snodgrass and Vanderwart

Table 1
Sociodemographic and clinical data in healthy controls and in patients with schizophrenia.

Characteristic	People with schizophrenia			Healthy controls			
Demographic characteristics	$n=26$			$n=28$			
	Mean	S.D.	Range	Mean	S.D.	Range	Analysis (P)
Age	34.29	9.93	20–50	35.38	9.04	20–50	0.64
Education	14.68	2.80	7–22	13.62	3.71	10–22	0.16
	N	%		*N*	%		
Sex							0.09
Male	18	69.23		12	42.86		
Female	8	30.77		16	57.14		
Language							0.87
English	7	26.92		8	28.57		
French	19	73.08		20	70.43		
Clinical characteristics	Mean	S.D.	Range	Mean	S.D.	Range	Analysis (P)
Duration of illness							
PANSS Positive Scale	13.81	5.03	8–29				
PANSS Negative Scale	12.08	6.31	7–28				
PANSS General Psychopathology	29.35	9.09	20–55				
Global Assessment of Functioning	61.08	12.00	30–80	82.18	9.85	60–95	<0.001

S.D.: standard deviations.