



Cognitive and clinical moderators of recognition memory in schizophrenia: a meta-analysis

Marc Pelletier, Amélie M. Achim, Alonso Montoya, Samarthji Lal, Martin Lepage*

*Brain Imaging Group, Douglas Hospital Research Centre, 6875 Boul. LaSalle, Verdun, Québec, Canada H4H 1R3
Department of Psychiatry, McGill University, Canada*

Received 5 May 2004; received in revised form 18 August 2004; accepted 25 August 2004

Abstract

Recognition memory performance in schizophrenia has been shown to vary greatly across studies. To identify the conditions under which recognition memory is significantly impaired, we used a meta-analytic strategy to quantify the moderating effects of several cognitive and clinical variables. Eighty-four studies (from 1965 to July 2003) provided recognition memory data for both a schizophrenia and control group. The overall group comparison for recognition memory yielded a significant mean weighted effect size of $d=0.76$. Material specificity was the most significant cognitive variable found, with patients exhibiting greater impairment for figural than verbal recognition. A yes–no recognition format and auditory encoding also led to significantly greater effect sizes for recognition memory relative to forced-choice recognition tests and visual encoding, respectively. Furthermore, the effect size for recognition memory as measured by false alarm was smaller than the effect size as measured by hit rate or by d -prime and its related measures. Among clinical variables that were associated with higher effect sizes, chronicity was the most significant, but different trends linking poor performance to negative symptoms and general symptomatology were also observed. Thus, a recognition memory deficit moderated by both cognitive and clinical variables is clearly present in schizophrenia.

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Keywords: Memory; Schizophrenia; Cognition; Familiarity; Cognitive neuroscience; Recognition

1. Introduction

One of the most robust findings of studies that have investigated cognitive functioning in schizophrenia is that episodic memory is significantly impaired (Aleman et al., 1999; Heinrichs and Zakzanis, 1998; Saykin et al., 1991). The magnitude of this impairment seems to depend, however, on the kind of memory test administered to the subjects. In a

* Corresponding author. Brain Imaging Group, Douglas Hospital Research Centre, 6875 Boul. LaSalle, Verdun, Québec, Canada H4H 1R3. Tel.: +1 514 761 6131x2393; fax: +1 514 888 4064.

E-mail address: martin.lepage@mcgill.ca (M. Lepage).

meta-analysis of 70 published studies reporting memory performance data in people with schizophrenia, Aleman et al. (1999) observed severe impairments on tests of delayed and immediate free recall (mean effect size (d) of 1.20 and 1.27 respectively), but only a moderate impairment of recognition memory relative to healthy comparison groups ($d=0.64$). In the context of a general cognitive deficit and with other cognitive domains such as executive functions yielding much greater impairments, this latter finding seems to be of limited theoretical and/or clinical interests. Why should one explore recognition memory? The answer resides in the high variability in recognition memory performance across the reported studies. Whereas some studies report no significant differences between a schizophrenia group and a control group (Bauman and Murray, 1968; Beatty et al., 1993; Goldberg et al., 1989; Koh, 1978; Nathaniel-James et al., 1996), other studies describe a recognition memory deficit so severe (Danion et al., 1999; Gold et al., 1992; Stirling et al., 1997) that some researchers have suggested that there exists an amnesic syndrome in schizophrenia (McKenna et al., 1990). The aim of the current meta-analysis was to uncover the cognitive and clinical moderator variables that account for this variability in recognition memory performance in schizophrenia.

One source of variability might result from the fact that recognition tests have been used to measure what could be different memory processes, including item memory, source memory and associative memory. In item recognition tests, subjects are required to discriminate between recently studied (old) and never presented before (new) items, whereas associative and source recognition tests require subjects to single out items based on their physical (e.g. size or color) or contextual features (e.g. place or time) at the time of encoding. Work in cognitive psychology suggests that item memory relies on two different decisional bases, one termed conscious recollection and the other familiarity detection, whereas associative recognition memory relies preferentially on conscious recollection (Yonelinas, 2002). Several studies (Danion et al., 1999; Huron et al., 1995; Keefe et al., 2002; Rizzo et al., 1996; Schwartz et al., 1991; Weiss et al., 2002) have reported that schizophrenia patients have sig-

nificantly impaired performance on tests of associative recognition relative to a control group. The group differences observed in these studies are particularly interesting because both groups performed well on an item recognition test. This intact item recognition performance points to a relative sparing of familiarity in these patients, whereas their poor performance on associative tasks suggests that their ability to consciously recollect information is significantly impaired. According to Danion et al. (1999), this dissociation between item and associative recognition hints at a specific impairment in the ability to “bind the separate components of events into a coherent, relational memory representation” (p. 643).

Another potential cognitive moderator is the material specificity (whether the item is a verbal or figural stimulus). Some studies of recognition memory have reported a preferential verbal memory deficit (Kareken et al., 1996; Keefe et al., 1999; Saykin et al., 1994), whereas others have reported a preferential figural (non-verbal) memory deficit (Aggleton and Shaw, 1996; Whittaker et al., 2001). The conflicting results are further complicated by several other reports that found no significant differences in cognitive performance for tasks using verbal and non-verbal stimuli, including two meta-analyses investigating recognition memory performance in schizophrenia (Aleman et al., 1999; Calev et al., 1987, 1991; Clare et al., 1993; Heinrichs and Zakzanis, 1998; Tracy et al., 2001).

The format in which item recognition memory is tested may also account for the high variability in recognition memory performance in schizophrenia. Thus, whether a yes–no (also known as old–new) or a forced-choice (FC) test is used might moderate patients’ performance differently than it does the performance of control subjects. In this regard, the yes–no test is believed to be more difficult than the forced-choice recognition test. This view is held in part because the yes–no test requires the subject to “develop and maintain an appropriate criterion for evaluating memory characteristics” (Nolde et al., 1998, p. 401). Another reason is that the yes–no test provides less information to the subject. This latter characteristic of the yes–no test makes it more difficult for the subject to rely on familiarity detection to discriminate old from new items, thus necessitating the retrieval and evaluation of additional episodic

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