



## Verbal memory in schizophrenia: sex differences over repeated assessments

Joanna M. Fiszdon\*, Steven M. Silverstein, Jennifer Buchwald, James W. Hull, Thomas E. Smith

*Department of Psychiatry, Weill Medical College of Cornell University and New York-Presbyterian Hospital, 21 Bloomingdale Road, White Plains, NY 10605, USA*

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### Abstract

There is conflicting evidence regarding the presence and direction of gender differences in verbal memory capacity in schizophrenia. We examined gender differences in verbal memory performance in schizophrenia and their interactions with repeated assessments and psychiatric symptoms. California Verbal Learning Test (CVLT) data were collected from 28 outpatients diagnosed with schizophrenia. The CVLT was administered on five occasions, 3 months apart. CVLT data were examined using repeated measures analyses, using maximum likelihood estimates, with Brief Psychiatric Rating Scale (BPRS) scores at assessments 1–5 as a time-varying covariate. There were significant main effects of time and gender, with scores improving over time, and women performing better than men. There was also a significant time by gender interaction. The BPRS covariate effect was not significant. Results are discussed in terms of implications for gender-informed approaches to rehabilitation treatments. © 2002 Elsevier Science B.V. All rights reserved.

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### 1. Introduction

Verbal memory and learning deficits have been well documented in schizophrenia (Aleman et al., 1999; Chan et al., 2000; Fossati et al., 1999; Nathaniel-James et al., 1996; Saykin et al., 1991). Whereas in nonpsychiatrically ill samples, women tend to perform better than men on measures of verbal mem-

ory (Bleecker et al., 1988; Kramer et al., 1988), this gender effect is not as pronounced in studies of individuals with schizophrenia. Some studies found no significant gender effects (Goldberg et al., 1995; Ragland et al., 1999), while some have suggested that women perform better than men (Albus et al., 1997; Goldstein et al., 1998). One study suggested better verbal memory function for men (Lewine et al., 1996). In trying to reconcile these results, Goldstein et al. (1998) suggested that the varied findings are due to sampling differences. Specifically, the majority of males with schizophrenia, as compared to females with schizophrenia, tend to have an earlier age of onset, poorer premorbid history, poorer course, poorer

\* Corresponding author. Psychology Service (116B), VA Connecticut Healthcare System, 950 Campbell Avenue, West Haven, CT 06516, USA. Tel.: +1-203-932-5711x2231; fax: +1-203-937-4883.

*E-mail address:* [rehab.javanet@rcn.com](mailto:rehab.javanet@rcn.com) (J.M. Fiszdon).

response to neuroleptics, longer hospital stays, and poorer outcomes (Angermeyer et al., 1990; Childers and Harding, 1990; Goldstein, 1988; Goldstein and Tsuang, 1990; McGlashan and Bardenstein, 1990; Seeman, 1986). Goldstein et al. (1998) suggested that these course factors are associated with poorer neuropsychological performance and early developmental deficits and not gender per se. In support of this idea, Goldstein et al. (1998) noted that studies which sample only the most chronic patients (and thereby include females who are more impaired than the modal female with schizophrenia) tend to be the ones that do not show a gender difference on neuropsychological measures.

The verbal memory data reported above come from single assessments with schizophrenic patients. While these data indicate single-trial performance deficits, they do not provide information about the variability or permanence of these deficits. Schizophrenia is a syndrome characterized by several phases (e.g., onset/relapse, stabilization, remission) and therefore by change over time. Changes over time in factors such as symptoms are typical, and can be considered critical indicators of clinical improvement or deterioration. A number of aspects of cognitive functioning is also known to change with clinical state in schizophrenia (Neuchterlein et al., 1992; Silverstein et al., 1996); however, verbal memory has not been extensively studied in this regard. This issue is important because studies have indicated that level of verbal memory impairment is one of the strongest predictors of rehabilitative treatment outcome and overall level of functioning (Green, 1996; Smith et al., 1999b).

Evidence indicates that practice effects exist for tests of memory. For example, Goldberg et al. (1989) reported a significant increase in Selective Reminding Test scores over immediate repeated trials in a sample of controls and patients with schizophrenia. Similarly, in a sample of HIV-positive and “at risk” volunteers, McCaffrey et al. (1995) reported a practice effect on an abbreviated neuropsychological battery (which included memory measures) at a 7–10-day retest interval. Hawkins and Wexler (1999) examined California Verbal Learning Test (CVLT) indices in a sample of 20 patients with schizophrenia, and also reported a significant practice effect. As part of a larger intervention study where patients practiced different cognitive and sensory-motor tasks, CVLT assessments

were examined at baseline, 10 weeks post-baseline, and 14 weeks post-baseline. Practice effect sizes ( $d$ ) across the three assessment times varied between 0.28 (change between second and third testing) and 0.81 (change between first and third testing), and there were significant differences between trials 1 and 5 total between the baseline and week 10, as well as week 10 and week 14 assessments.

The current investigation extends the Hawkins and Wexler (1999) study by increasing the number of repeated assessments and extending the length of follow-up. The purpose of the current investigation was to determine whether performance of patients with schizophrenia on a memory measure would improve over repeated assessments extended over a 1-year period. Study of the repeated administration effect in schizophrenia is quite important, as it provides information on patients' ability to benefit from information presented earlier, and as such, represents a type of learning. Although repeated administration effects are likely the most conservative indicators of the ability to learn, they nevertheless provide invaluable data about the potential remediation of cognitive deficits in schizophrenia. Within the context of recent data suggesting sex differences in neuropsychological performance, we also thought it would be informative to examine the effect of gender on repeated performance. Additionally, we wished to examine whether changes in performance were associated with particular learning strategies.

## 2. Method

Data presented here are part of a 2-year longitudinal study examining recovery processes in schizophrenia and schizoaffective disorder (Smith et al., 1999a). In the parent study, neurocognitive, insight, functioning, and symptom measures were administered to patients who had been discharged from an inpatient unit and subsequently enrolled in an outpatient clinic. Initial assessments were conducted within 30 days of discharge from the inpatient unit. Subsequently, assessments were repeated every 3 months, for a total 1-year period. Throughout the study period, no effort was made to control medications or type of outpatient treatment received. Of the 56 participants who gave consent and completed

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