

# The Premorbid Development of Reading in Schizophrenia

## Introduction

As previous research by the same author has suggested, patients with schizophrenia have impaired pragmatic comprehension in terms of metaphor and irony (Sutcliffe, 2004) and an enhanced facilitatory effect of semantic priming in lexical decision tasks (Sutcliffe, 2005). The experiments by other authors discussed in both of these previous reports relied primarily on experiments that involved reading. Leading on from these two pieces of research it was felt to be beneficial to investigate whether schizophrenic patients demonstrated differences in reading from normal controls in their development.

The experiments analysed in Sutcliffe 2004 and 2005 differ, as they involved controlled processing and automatic processing respectively. Accessing lexical entries in a lexical decision task (LDT), which were investigated in the 2005 paper, involves automatic processing and the research that was reviewed hypothesised that greater facilitation in semantic priming in schizophrenic patients was due to an increased and/or less inhibited semantic network (Manshreck et al, 1988 and Spitzer et al, 1993 in Sutcliffe 2005). In the 2004 paper it was found that metaphor and irony were often understood literally (and therefore incorrectly) by schizophrenic patients due to them not using contextual information which is a controlled process (Field 2003).<sup>1</sup>

Due to the findings of the previous research by this author (Sutcliffe 2004 and 2005) it was hypothesised that schizophrenic patients' reading abilities in their development would differ from those of controls. More specifically, in reading exercises where controlled processing was required schizophrenic patients would not perform as well as the controls and in exercises where automatic processing was required they would perform better than controls.

## Method

A literature review was conducted of research that had as part of its investigation an element of reading in schizophrenic patients. The research reviewed had cognitive ability as its primary focus, yet this was tested, in part at least, through the use of some kind of reading test. Wherever possible the type of processing that these experiments used has been identified here and so used to test the specific hypotheses of differences in automatic and controlled processes made above.

## Findings

In an investigation into early onset schizophrenia (EOS) Vourdas et al (2003) examined the premorbid dysfunction<sup>2</sup> of patients with EOS in comparison with healthy controls. The main tool for analysis was maternal interviews which focused on premorbid adjustment, including scholastic performance<sup>3</sup> and also on developmental difficulties, including those in reading. It was found that there was a significant difference in reading ability between the EOS participants and the controls with 15.0% of the EOS schizophrenic patients and 0.0% of the controls requiring professional help for reading difficulties. Overall developmentally, impairment in one or more areas noticeable enough to require professional help was found in 20% of patients, compared to 2.5% of controls, with reading difficulties highest at 20%, followed by speech at 12.5% (Vourdas et al, 2003). In premorbid adjustment in the transition from childhood to adolescence the most significant impairments were found in scholastic performance and social isolation (Vourdas et al, 2003).

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<sup>1</sup> In Field (2003) the use of contextual information is called '*higher level processing*'

<sup>2</sup> According to the American Academy of Child and Adolescent Psychology 'premorbid functioning' is defined as the 'highest functioning in the year prior to the onset of illness' and also 'the period of deteriorating function just prior to the onset of the disease (personal communication with E McNab 05.10.06). This has been taken at face value in this literature review; where 'premorbid development' is used this is replicating the research being reviewed and is taken to mean the development of the patient throughout their lifespan, prior to the diagnosis of schizophrenia.

<sup>3</sup> It is presumed here, but not stated by Vourdas et al (2003), that reading ability has a direct effect on scholastic performance.

Vourdas et al (2003) give no more information other than that 'reading difficulties' were assessed in the maternal interviews reported by the mother as either, having no problem, problems being present but no help sought or professional help sought for problems experienced. It has been presumed that Vourdas et al (2003) were therefore investigating reading in general, which would contain both automatic and controlled processing and it is dependent on whether reading is seen as a 'top-down' or 'bottom-up' which type of processing was more prevalent in general reading (Field, 2003). It can be said however, that skilled readers make more use of controlled processes such as using global meaning and use of context to enrich understanding.<sup>4</sup> What is clear from Vourdas et al's 2003 research is that in their early development schizophrenic patients demonstrate significantly more difficulties in reading compared to controls and it can be cautiously assumed that this could be related to deficiencies in controlled processing.

In a similar investigations Fuller et al (2002) retrospectively analysed 70 schizophrenic patients' scores on the Iowa Tests of Basic Skills (used from kindergarten to grade 8, age thirteen) and the Iowa Tests of Educational Development (used from grade 9 to 12)<sup>5</sup>. 'Reading comprehension' is assessed in both tests and within this levels of meaning are assessed; in the basic skills test, factual, inferential and evaluative and in the educational development test, factual, inferential, non-literal, generalising themes and ideas, and recognising literary techniques and tone (Fuller et al, 2002). From the levels of meaning assessed, and it must be noted without clarification, it has been assumed that these tests were mainly assessing the controlled processes of reading. Also, the assessment of 'sources of information' in the educational development tests involved primarily reading tasks (Fuller et al, 2002) and so the findings of that aspect are also included here.

Using a mean percentile rank, analysing data from grades 4, 8 and 11 (age sixteen), a descriptive analysis shows that before patients had developed schizophrenia they were performing below the state norms in all areas at all three ages (Fuller et al, 2002). However it is only in grade 11 that the scores of the schizophrenic patients were significantly below the median percentile rank for reading, language and sources of information, due to a significant drop in test scores between grades 8 and 11. This is the age-range 13-16 and could indicate that during puberty adolescents that later go on to develop schizophrenia show a marked decline in performance in cognitive functioning. (Fuller et al, 2002). What Fuller et al do not point out is that their reading scores are by far the lowest for all the areas at grades 4 and 8 (Figure 1:1186), showing that the schizophrenic patients were consistently poor readers. The findings from Fuller et al (2002) correlate with Vourdas et al (2003), that schizophrenic patients will have demonstrated problems with reading in their premorbid development, pointing towards a deficit in controlled processing even before the illness occurs. What weakens both Fuller et al's (2002) and Vourdas et al's (2003) reports is that while controlling for various factors, neither tests for dyslexia or other reading difficulties which could obviously have a major impact on reading performance.

The National Adult Reading Test (NART) is used to give an accurate measure of IQ by measuring the ability to read non-phonetic words

therefore using automatic processing as with the LDTs mentioned above. In an investigation into whether the NART) gave an accurate indication of premorbid ability in schizophrenic patients, O'Carroll et al (1992) concluded that the NART did indeed provide a reasonable estimate of premorbid ability. The investigation was undertaken as the NART had begun to be used to estimate premorbid ability in schizophrenic patients, without proof that performance on the test was unimpaired in schizophrenia. O'Carroll et al (1992) tested the hypothesis that NART performance might be impaired in schizophrenic patients by comparing NART estimated IQ with demographically predicted IQ in controls and schizophrenics and found no significant difference between groups. This can be taken to demonstrate that in reading, where automatic processing is involved, schizophrenic patients perform at the same level as controls. While schizophrenic patients did not demonstrate a better performance on the NART than controls, this does show a marked difference from Vourdas et al (2003) and Fuller et al (2002) where schizophrenic patients in their premorbid development showed inhibited controlled processing. However, this experiment gives no indication of how reading involving automatic processing is developed.

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<sup>4</sup> This was taken from lecture notes provided by G. Rundblad for the 8.11.05.

<sup>5</sup> These tests were developed more than 30 years ago and are standardised cognitive test batteries that were administered to all students resident in Iowa. The areas tested in both tests were *vocabulary, reading comprehension, language, mathematics, sources of information.*

In an analysis of cognitive impairment compared to predicted cognitive performance based on parental education and reading score, Keefe et al (2005) found that 98.1% of patients fell below expectations compared to 42% of controls. Reading performance was measured using the Wide Range Achievement Test, Reading Subtest which estimates premorbid intelligence using the recognition and pronunciation of printed words (Keefe et al, 2005), thus testing automatic processing. It was found that there was no significant difference between predictions of cognitive performance based on parental education or reading score (Keefe et al, 2005) and this demonstrates that schizophrenic patients have intact automatic processing abilities in reading, correlating with O'Carroll et al's (1992) findings. Once again, there is no evidence of how reading involving automatic processing is developed.

## Conclusions

It seems that the prediction that schizophrenic patients would develop their reading skills differently from normal controls was accurate, in as far as this limited literature review can ascertain. That they demonstrate inhibited reading skills in development when controlled processing is required seems to have been proved. Both Fuller et al (2002) and Vourdas et al (2003) demonstrate retrospectively that schizophrenic patients were underperforming in reading, long before their diagnosis.

The question of whether the development of reading that necessitates automatic processing develops differently remains unanswered; all that can be said is that this skill remains intact in patients with schizophrenia. O'Carroll et al (1992) and Keefe et al (2005) demonstrate that reading that requires automatic processing is unaffected in schizophrenia, unlike many other cognitive functions. Thus it can tentatively be assumed that reading involving automatic processing develops at least at the normal rate. No data was available, other than the previous research by Sutcliffe (2005), to demonstrate that schizophrenic patients performed better in reading tasks that involved automatic processing so this hypothesis remains untested as Sutcliffe's (2005) report focused on semantic priming and so is not only testing reading but semantic networks.

Overall then it can be concluded that a patient with schizophrenia, reading does develop slightly differently than that of a normal control. The limitations of this literature review must be stressed though, for more definitive conclusions to be made further research would be required. To fully test the general and specific hypotheses stated in the introduction a longitudinal survey would need to be carried out, specifically testing reading using automatic and controlled processing at different ages in a large enough population and then analysing these tests after a number of the group under investigation had developed schizophrenia. This is a highly impractical suggestion at this time, although more retrospective research could be carried out to determine definitively whether schizophrenic patients develop reading abilities to a lesser degree than normal controls.

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