

Asymmetry of Lateralised Hemispheric Functions in Schizophrenia Influence of Clinical and Epidemiological Characteristics on Quality Extinction Test Performance

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The Quality Extinction Test was used to detect lateralised abnormalities of hemispheric functions in schizophrenic patients. Course of illness significantly affected the distribution of tactile extinctions, chronic patients showing more left-side extinctions than sub-chronic ones. Age significantly affected the number of left extinctions, and sex the number of right extinctions. The importance of clinical and epidemiological characteristics of the patients in determining the quality and degree of hemispheric dysfunction in schizophrenia was confirmed.

In recent series of papers (Scarone *et al*, 1981, 1982, 1983) we reported the initial findings on various aspects of tactile 'losses' in schizophrenic patients. The Quality Extinction Test (QET) (Schwartz *et al*, 1979) provided the means for assessing their tactile sensitivity, by evaluating a blindfolded subject's verbal answers to simultaneous brushing of the palm of each hand with two different common materials. In general, compared with normal controls, schizophrenic patients have been found to have a significantly higher incidence of left extinguishing responses to the QET and a greater number of left and right extinctions; in the case of the latter, the left extinctions were significantly more frequent than the right ones (Scarone *et al*, 1981, 1982). Given the organisation of the neurofunctional pathways of tactile sensitivity (Critchley, 1953), these results suggest that both the parietal and anterior frontal regions of the brain might play a role in the pathophysiology of losses in tactile sensitivity.

A possible influence of the age of the schizophrenic patients on the proportion of left extinctions was also found, in contrast to the controls; there was no relationship between QET performances and the clinical paranoid/non-paranoid dichotomy (Scarone *et al*, 1983). Although the findings are not entirely consistent, recent reports lend support to the existence of a relationship between some of the clinical

and epidemiological characteristics of schizophrenia and hemispheric malfunctioning (Gruzelier, 1984; Andreasen *et al*, 1982; Luchins *et al*, 1981). Consequently, it seems reasonable to assume that characteristics of schizophrenia itself might have a determining role, relative to the nature and degree of hemispheric malfunctioning in this disorder. The objective of the present study was to further examine the QET performances of a sample of schizophrenic patients controlled for sex, age, diagnosis, and course of the disease.

Method

The subjects were 136 patients with a diagnosis of schizophrenia; Table I shows their epidemiological and clinical characteristics. The diagnosis of schizophrenia, subtype classification, and chronicity characteristics were independently determined by two senior psychiatrists using DSM-III criteria. All the patients were right-handed, as assessed by means of a standardised questionnaire (Raczkowski *et al*, 1974). Patients aged over 55 were excluded from the study, since both extended hospital stay and long-term treatment with psychotropic drugs have been reported to exercise a significant influence on hemispheric functioning (Luchins *et al*, 1981; Serafetinides, 1973). The majority (79) of the subjects were aged 18-35; the remaining 57 were aged 36-55. The 112 chronic patients tended to be older than the 24 sub-chronic patients, their mean ages being 35.8 years and 21.2 years respectively.

TABLE I
Clinical and epidemiological characteristics of schizophrenic patients, categorised according to diagnosis

Sex	Disorganised		Paranoid		Undifferentiated		Total	
	Number	Mean age	Number	Mean age	Number	Mean age	Number	Mean age
Males	36	27.8	19	42.7	19	32.3	74	32.7
Females	22	30.0	16	44.9	24	32.0	62	34.8

TABLE II
Distributions of tactile extinctions according to age, sex,
diagnosis, and chronicity

	Extinctions		
	Left	Right	None
Age			
Under 35	29	9	41
Over 35	29	5	23
Sex			
Male	34	9	31
Female	25	2	35
Diagnosis			
Disorganised			
Males	18	6	12
Females	9	1	12
Paranoid			
Males	5	1	13
Females	7	—	9
Undifferentiated			
Males	11	2	6
Females	9	1	14
Chronicity (total sample) ¹			
Sub-chronic	5	4	15
Chronic	56	7	49
Chronicity (age-matched) ²			
Sub-chronic	5	4	15
Chronic	15	2	7

1. $\chi^2 = 7.88$, d.f. = 2, $P < 0.025$

2. $\chi^2 = 8.58$, d.f. = 2, $P < 0.025$

None of the patients had a history of brain damage, and all had negative findings on physical and neurological examinations before administration of the QET. All subjects had been receiving medication (phenothiazines or butyrophenones) for at least six months before the study and up to the time of QET testing. The QET was administered in accordance with the standard procedures (Schwartz *et al*, 1977). The total QET score was derived by subtracting the number of negative responses relating to the more accurate hand from that relating to the other, and expressing this difference as a percentage. The absolute number of left and right extinctions was also computed.

The distribution of left and right extinctions was tested by 2×2 and 2×3 contingency tables. A linear stepwise multiple regression analysis was performed, with the number of left and right extinctions as the dependent variables and age, sex, diagnosis, and chronicity as the independent ones.

Results

Table II shows the distributions of tactile extinctions according to age, sex, diagnostic categories, and chronicity. Chi-squared tests showed no significant relationships to the first three of these. The course of schizophrenia, however, does affect the extinction distribution: chronic patients show significantly more left extinguishing characteristics ($P < 0.025$). To check for the possible influence of age on

this relationship, 24 chronic patients were age-matched with a sub-group of 24 sub-chronic patients. The results are also given in Table II; once again there is significant relationship between chronicity and tactile extinction type ($P < 0.025$).

When multiple regression analysis was performed, taking the number of left and right extinctions as dependent variables and age, sex diagnosis, and chronicity as independent variables, age was found to be the only independent variable affecting the number of left extinctions (R -square = 0.470, F -test = 6.651, $P < 0.025$). The insertion of the other variables into the regression equation did not significantly increase the proportion of variance accounted for. The multiple regression analysis relating to the number of right extinctions showed that sex was the only independent variable which increased the proportion of variance accounted for (R -square = 0.703, F -test = 10.209, $P < 0.001$).

Discussion

Degree of chronicity appears to be the clinical characteristic most markedly related to the distribution of tactile extinctions in the group studied, with the more chronic patients having far less left tactile sensitivity. Since the same differences appeared when age-matched subjects were compared, this finding seems to be unrelated to patients' age.

The relationship between chronicity and left tactile abnormal sensitivity might be interpreted in a variety of ways, but from the anatomico-functional viewpoint it would seem to reflect a specific impairment in hemispheric functioning — one inherent in the ongoing course of schizophrenia. Furthermore, this hypothesis is consistent with findings from other studies that have demonstrated a significant direct relationship between chronicity and degree of cerebral malfunctioning (Johnston *et al*, 1976; Gruzelier, 1984). Within this anatomico-functional context, there is also the possibility that other factors closely related to duration of illness, such as the length or number of admissions or exposure to pharmacological treatment, might affect tactile sensitivity. All these factors have been shown to have an influence on hemispheric functioning in schizophrenia (Luchins *et al*, 1981; Serafetinides, 1973).

The results reported here did not replicate a previous finding of a significant direct relationship between age and the incidence of left extinctions (Scarone *et al*, 1982). This might be explained, however by the fact that patients over 55 were not excluded from the previous study group; that group included a number aged over 60, all of whom had a marked tendency to be left extinguishers. The finding that there is no relationship between subtype of schizophrenia and the distribution of extinctions is

consistent with results from an earlier and smaller sample (Scarone *et al.*, 1983).

It is possible to conclude that QET responses in schizophrenia are independent of the clinical aspects of the illness and are related instead to some type of neurofunctional impairment in hemispheric functioning that is inherent in the disease itself. Since other neuropsychological and psychophysiological measures of lateralised malfunctioning show the same characteristics (Gur, 1978; Gruzelier & Hammond, 1980). It can be suggested that some hemispheric abnormalities reflect a certain degree of nuclear pathology in schizophrenic patients.

In schizophrenia, the quantitative aspects of tactile extinctions appear to be quite different from their qualitative ones; in fact, the present results show that patients' age significantly explains a part of the variance in the number of extinctions. Data from the neurological literature suggest that the left-sided pathways of tactile sensitivity are more vulnerable than the right-sided ones (Schwartz *et al.*, 1979). The possibility thus exists that some age-dependent neurofunctional modifications in hemispheric assessment play a critical role in determining such vulnerability.

The finding that patients' sex explains a part of the variance in the regression equation for the number of right extinctions does not lead to any simple

interpretation, and needs to be evaluated in the light of additional data. According to the neurofunctional interpretation of the tactile sensitivity pathways, however, a high rate of right-side extinctions almost exclusively reflects malfunctioning of the left hemisphere. A recent clinical study demonstrated that neurological lesions of the left hemisphere differentially affect males' and females' lateral functioning (Inglis *et al.*, 1982), thus suggesting that sex has a marked effect on hemispheric functional organisation. It is therefore possible that lateral functional disorders, as well as anatomical lesions, might be sex-dependent where such organisation is concerned.

The *R*-square values obtained explain a small part of the variance in both of the regression analyses undertaken. Other variables that were not introduced into the equation, such as duration and number of hospital admissions or duration of psychopharmacological treatment, might be important in determining QET responses in schizophrenia. Only continued study, however, will allow greater understanding of tactile sensitivity and its precise relationship to schizophrenia.

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