RIGHT HEMISPHERIC FUNCTION IN NORMALS, AFFECTIVE DISORDER AND SCHIZOPHRENIA

MILIND BORDE, AMAL ROY, ELIZABETH J.B.DAVIS, RACHEL DAVIS

ABSTRACT

The happy-sad chimeric faces test has been established as a useful test of right hemispheric function. It is known to elicit a left hemifacial bias (LHF bias) in right handed subjects. 41 normals and 19 manic, depressive and schizophrenic patients each were tested. All subjects were strictly right handed. Normals and depressives showed significant LHF bias. Manics and schizophrenics did not show significant LHF Bias. This suggests right hemispheric dysfunction in both mania and schizophrenia.

Key Words : hemispheric function, LHF bias, affective disorder, schizophrenia

INTRODUCTION

There has been a long standing debate on whether the major functional psychoses are independent entities or part of a continuum (Kendell, 1991). The continuum model of mental disorders holds that the differences found relate to differences in chronicity and severity while the categorical model holds that valid and useful lines of demarcation can be drawn between the psychoses. Many attempts have been made to demarcate valid differences between the functional psychoses on a large number of variables. These include symptoms and outcome (Kendell & Brockington 1980), genetic studies (Gershon et al, 1988) and neuropsychological tests (David & Cutting, 1990).

The contribution of lateralized hemispheric dysfunction to the major psychoses is currently the focus of interest. Earlier studies indicated marked differences in laterality between schizophrenia and affective disorder, but this has not been conclusively established. Most research points to a link between dysfunction of the right hemisphere, (RH) and affective disorder (Taylor & Abrams, 1987). Although most neuropsychological studies of schizophrenia have focussed on the left hemisphere, functional disturbances attributable to the RH have also been found in schizophrenia (Bellini et al, 1988).

Most studies have established the importance of the RH in the perception of faces. This includes both recognition of faces and perceiving facial expression (Strauss & Moscovitch, 1981). The happy-sad chimeric faces test (David, 1989) reliably elicits a RH advantage in right handed individuals. It does not require specialised testing equipment and can be easily administered to normal subjects as well as to psychiatric patients. This test requires the subject to examine half-happy and half-sad line drawings of faces (left half happy, right half sad or vice versa e.g. Figure 1) and to say whether the whole face looks happy or sad. Most normal right handed individuals have a strong left hemifacial bias (LHF Bias) on this test. They tend to rate the whole face as happy or sad depending on whether the half of the face which falls to their left is happy or sad respectively (i.e. the right side of the face in the line drawing).

David (1989) reported a significant and reliable LHF bias in right handed individuals and no bias in left handed individuals. There is evidence that this LHF bias is due to RH dominance in spatial organisation (Grega et al, 1988). Kolb et al, (1983) using a similar test found that the LHF bias is still present in patients, with left sided brain lesions regardless of site but is lost in those with right posterior lesions.

David & Cutting (1990) administered the happy-sad chimeric faces test to right handed normals

and to right handed manic, depressive and schizophrenic patients to assess RH function. They confirmed the presence of a strong LHF bias in normals. Manics showed increased LHF bias and depressives showed decreased LHF bias compared to normals. Schizophrenics showed no bias. These findings suggest that there are marked differences in RH function in mania, schizophrenia and depression supporting the validity of the categorical model of severe mental illness.

The present study tries to confirm the findings of David & Cutting (1990) and examines the use of the happy-sad chimeric faces test in an Indian setting. Replication of the findings across cultures would greatly support the hypothesis of marked differences in RH function in mania, schizophrenia and depression. The objectives of the study are to see whether,

1. Normal right handed Indian subjects show a significant LHF bias on the happy sad chimeric faces test.

2. Patients with schizophrenia, mania and depression differ from each other with respect to LHF bias on the test.

MATERIAL AND METHODS

Patients attending the psychiatric O.P.D. who met the following inclusion criteria were studied :-

1. D.S.M. - III - R criteria (American Psychiatric Association, 1987) for schizophrenia, mania or major depression.

2. Purely right handed on the Edinburgh inventory (Oldfield, 1971).

3. Cooperative and gave informed consent for testing.

Most patients were drug free at the time of testing. All patients were rated on the Brief Psychiatric Rating Scale - BPRS (Overall & Gorham, 1962). Manic patients were also assessed on the Young's Mania Rating Scale - YMRS (Young et al, 1978) and depressive patients were also assessed on the Hamilton Depression Rating Scale - HDRS (Hamilton, 1960). All these ratings were done by a single rater.

19 manic, depressive and schizophrenic patients each were tested. Patients were asked to rate their mood at the time of testing on a visual analogue scale (1 = saddest ever, 100 = happiest ever). The happy-sad chimeric faces test was then administered to all the patients, from a booklet (obtained from Dr. A.S.David). The test required subjects to rate 48 half happy, half sad chimeric faces as either happy or sad. These 48 faces consisted of 12 original faces and 12 mirror images, each face being presented twice. The initial part of the booklet consisted of 8 non chimeric 'fully happy' or 'fully sad' faces. All subjects had to demonstrate their understanding of the test by correctly classifying these non-chimeric faces before proceeding further. Each chimeric face was shown singly and the subject was asked to examine it for 10 seconds and say whether it appeared happy or sad. If he could not make up his mind he was asked to give a 'forced choice' by looking at the picture again and giving his first impression.

After testing of the patients, 41 normal controls were selected from the local population. Controls were matched for age distribution and male female ratio with the pooled patient sample. The controls were selected if :

1. They had no history of psychiatric illness.

2. They were completely right handed on the Edinburgh Inventory.

3. They were cooperative and consented for testing.

The controls marked their current mood on the visual analogue scale and completed the happy-sad chimeric faces test in the same manner as the patients.

Each response was classified as left sided if it corresponded to the viewers left visual field and right sided if it corresponded to the viewers right visual field (e.g. for the top left face in Figure 1, a response of 'Happy' will be considered as left sided and a response of 'Sad' will be considered as right sided). The total number of left sided responses minus the total number of right sided responses by each subject gave the left bias.

The left bias scores had a possible range from +48 to -48. A positive score would indicate left hemifacial bias, a score of zero would indicate no bias and a negative score would indicate right hemifacial bias. Subjects scores were also analysed for happy or sad bias. Happy bias was scored by the number of happy responses minus the number of sad responses for each subject. Happy bias scores also had a range from -48 to +48.

RESULTS

Table 1 compares normal controls and the three patient groups for age, sex distribution, mood (on the visual analogue scale), left bias and happy bias. The groups did not differ significantly from each other with respect to age. Sex distribution differed significantly between the groups on the chi square test ($X2 = 8.72$, $p = 0.03$). This difference was because there were no female patients in the manic group. If manic patients were excluded then no significant differences were seen between the other groups for sex distribution. The mood scores on the visual analogue scale differed significantly between the groups on the ANOVA test as expected ($F = 33.59$ d.f. $(3,94)$, $p < 0.0001$).

Each group was compared within itself for left bias against the null hypothesis of no bias (i.e. bias = 0), on the binomial test and the one sample 't' test. Normal controls showed significant left bias on both the tests. Depressives showed a weak left bias which was significant on the one sample 't' test. Manics and schizophrenics did not show significant left bias (Table 1).

All the groups showed a happy bias. This was statistically significant for the normal control group and the manic group on the one sample 't' test. To see if there was any relationship between the mood at the time of testing and the left bias, Pearson's correlation coefficients were calculated between the left bias scores and the visual analogue mood scores for each group. No significant correlations were found.

TABLE 1

COMPARISON OF PSYCHIATRIC PATIENTS WITH NORMAL CONTROLS

	Normals n = 41	Depressives n = 19	Manics n = 19	Schizophrenics n = 19
Mean Age (s.d) in years	28.68(7.17)	29.00(10.31)	30.79(9.90)	30.47(6.55)
Sex Male	33	12	19	16
Female	8	7	0	3
Mood Mean(s.d)	58.05(17.50)	17.11(15.44)	83.68(17.55)	48.94(32.21)
Left Bias Mean(s.d)	4.24(9.67)	4.53(7.97)	1.79(6.99)	1.26(6.97)
95%C.I.	1.19-7.29	0.69-8.36	-1.5-5.15	-2.09-4.62
No of subjects scoring >0	26	12	11	9
<0	9	5	6	10
=0	6	2	2	0
Binomial test	p = 0.006	p = 0.14	p = 0.33	-
One sample T test	p = 0.008	p = 0.024	p = 0.28	p = 0.44
Happy Bias Mean(s.d)	6.54(11.58)	5.26(11.09)	12.16(20.35)	2.95(22.47)
95%C.I.	2.88-10.19	-5.87-4.82	2.35-21.96	-7.88-13.78
One Sample T test	p = 0.0008	p = 0.84	p = 0.018	p = 0.57

C.I. = Confidence Interval. All p values are two tailed.

Table 2 shows the mean BPRS scores for each of the patient groups, the YMRS scores for the manic group and the HDRS scores for the depressive group. All the groups had marked psychopathology. BPRS scores were highest in the schizophrenic group, followed by depressives and then manics. Most of the patients were drug free at the time of testing. 1 schizophrenic patient, 7 depressive patients and none of the manic patients were on treatment when they were assessed.

TABLE 2
COMPARISON OF PATIENT GROUPS FOR
PSYCHOPATHOLOGY

	Depressives	Manics	Schizophrenics
BPRS Mean s.d)	46.26(9.90)	40.79(7.99)	50.95(8.47)
YMRS Mean (s.d)	-	32.05(8.30)	-
HDRS Mean (s.d)	30.21(8.39)	-	-

DISCUSSION

To the best of our knowledge, no previous study of RH function using the happy-sad chimeric faces test has been done on Indian subjects. However some related studies have been done. These include judgement of facial affect among depressives and schizophrenics (Mandal, 1986), decoding of facial emotions by schizophrenics and depressives (Mandal, 1987) and hemifacial display of emotion in normals (Mandal et al, 1992).

This study confirms the presence of a strong LHF bias on the happy-sad chimeric faces test for right handed Indian normal subjects. These findings are similar to those reported by David (1989) and David & Cutting (1990) on British subjects. This confirms the usefulness of this test as an easy to administer, culture free test of RH function.

Depressive patients also showed a significant LHF bias on the one sample 't' test. This study did not find significant LHF bias in manics and schizophrenics. These findings are independent of the severity of psychopathology as the mean BPRS scores were higher in the depressive group compared to the manic group. One possible explanation of these findings is that there is a continuum of RH dysfunction from depression to mania and schizophrenia. Crow (1991) has reviewed family and genetic studies and concluded that there is a continuum of psychotic illness from unipolar affective disorder, bipolar affective disorder, schizoaffective disorder to schizophrenia.

The results of this study differ from those reported by David & Cutting (1990). The main difference is that the manic patients in their study showed an increased LHF bias compared to the weak non significant LHF bias shown by the manic patients in our study. It is possible that these differences are due to the effects of drug treatment. In our study only 1 schizophrenic and 7 depressive patients were on treatment at the time of testing. No manic patients were on treatment in our study at the time of testing. In contrast, in David & Cutting's study only 2 schizophrenic patients, 3 manic patients and 4 depressives were not on treatment at the time of assessment. However Jaeger et al (1987) found that the administration of tricyclic antidepressants did not affect the bias in depressive patients.

Another interesting difference between these two studies relates to the presence of sad or happy bias. All the groups in our study displayed a happy bias (tendency to report more faces as happy than sad). This was significant for the manic group and the normal control group. On the other hand David & Cutting (1990) found that all the groups in their study displayed a sad bias. This may reflect a difference between Indian and British cultures. The mean mood on the visual analogue scale for the normals in our study (58.5 (17.50)) was not signicantly different from that of the normals in David & Cutting's study (53.1(14.7)). The persence of happy bias in the Indian normals and sad bias in the British normals was therefore independent of mood. A comparison with persons of Indian origin resident in the U.K. would be interesting. However it should be noted that Ekman & Oster (1979) have reviewed a large number of studies and concluded that emotions like happiness, sadness, fear and anger are universally recognized and observers label these the same way regardless of culture.

As the findings of this study differ in many ways from those of David & Cutting (1990), the results of our study should be considered as tentative. Replication by other centres in India to

confirm or refute our findings is necessary.

In conclusion, this study confirms the usefulness of the happy-sad chimeric faces test as a culture free test of RH function. Right handed Indian normals and depressives showed significant LHF bias. Both manics and schizophrenics did not show significant LHF bias, suggesting RH dysfunction in both mania and schizophrenia. This study did not find a difference in RH function between manics and schizophrenics and provides partial support to the continuum model of severe menal illness.
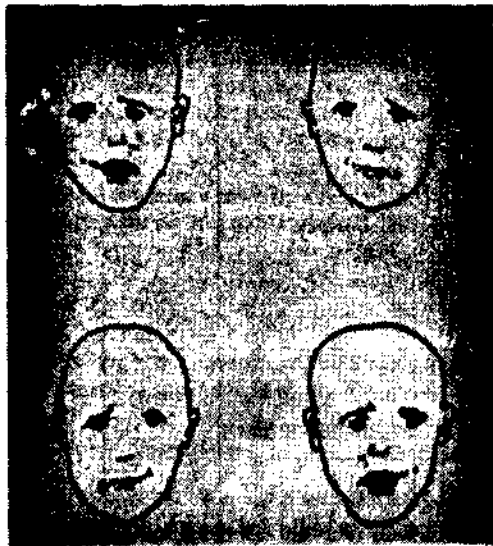

Figure 1. Happy-Sad chimeric faces : Original and mirror images. Examples with open and closed mouth expressions.
Source : David & Cutting (1990). British Journal of Psychiatry 156, 492. The Royal College of Psychiatrists, 1990. Reproduced with permission.

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Milin Borde MD, DPM,DNB* Consultant Psychiatrist, Amal Roy MSc, Mphil, Research Officer, Elizabeth J.B. Davis MD,DPM Consultant Psychiatrist, Rachel Davis, M.D, D.P.M, Consultant Psychiatrist, Davis Institute of Neuropsychiatry Kanke, Ranchi, 834006

* Correspondance