Abstract

Flat affect has long been recognized as a central manifestation of schizophrenia, and has more recently been appreciated as a stable and prognostically important attribute of this disorder. Yet, because it is thought to be difficult to evaluate, flat affect has been deemphasized in criterion-based diagnostic systems. Results of this study suggest that the clinical evaluation of flat affect may be contaminated by a number of behaviorally similar processes. The components we identified included right hemisphere dysfunction, retardation and extrapyramidal effects, as well as the sequelae of hospitalization. Thus, in the clinical evaluation of flat affect, a multivariate approach in which these different components are considered separately might improve the reliability of evaluation and make this important sign more useful.

In the severest cases emotional and affective expressions seem completely lacking. In milder cases we may note only the degree of intensity of the emotional reactions is not commensurate with the various events that caused those reactions. . . . [Bleuler 1950, pp. 9-10]

Recent investigations have supported the assertion that flat affect is a stable and prognostically important attribute in schizophrenia (Carpenter, Strauss, and Bartko 1974; Roff and Knight 1978), and suggest the importance of understanding its measurement and mechanisms. Clinically, an assessment of flat affect is based on decreases in such behaviors as facial expressiveness, expressive gestures, and vocal inflection (Andreasen 1979). The paucity of these behaviors contributes to the clinician’s impression that the patient possesses a lack of intensity or range of feelings.

In addition to schizophrenia, a paucity of expression of feelings also may be seen in Parkinson’s disease (Alpert and Rush 1983), and in patients with unilateral lesions of the right posterior hemisphere (Ross and Mesulam 1979; Ross 1981). Thus, both the basal ganglia and the right hemisphere may play an important role in the expression of affects.

Further, patients with both right hemisphere dysfunction and the neurological sign of left unilateral neglect were found to have difficulty in the production of affective intonation and the comprehension of affective speech (Heilman, Scholes, and Watson 1975; Tucker, Watson, and Heilman 1975), so that different brain sites may be involved in the
production and comprehension of affects (Ross 1981).

Although flat affect was known long before the advent of antipsychotic medication, the widespread use of neuroleptics may have made it more difficult to evaluate a patient's affects since they can produce extrapyramidal side effects, such as masklike faces or diminished movements, which could yield a flat appearance. Also, the use of these medications or some aspect of the course of schizophrenia may contribute to a high incidence of depression in association with schizophrenia (McGlashan and Carpenter 1976). The behavioral stigmata of flat affect and depression have been shown to overlap (Andreasen, Alpert, and Martz 1981). Thus, such symptoms as psychomotor retardation, slowed speech, and unresponsive demeanor, sometimes characteristic of the depressed patient, might also present an impression of flatness.

The present study focused on the relation between the clinical presentation of flat affect in chronic schizophrenia and a number of the factors mentioned above. Of special interest was the possibility of an association with defective right hemisphere functioning. Much theory concerned with the hemispheric asymmetry of cognitive function has implicated the left hemisphere in the pathophysiology of schizophrenia (e.g., Flor-Henry 1976; but see Alpert and Martz 1977), and evidence suggesting a role for the right hemisphere in this important schizophrenic sign would help to sharpen research in this area. It has been hypothesized that the clinical impression of flat affect in a group of chronic schizophrenic patients might be associated with deficit performance on neuropsychological measures that reflect right hemisphere functioning. In addition, independent measures of a number of clinical and pharmacological factors that could contribute to an impression of affective flattening were assessed and evaluated in a multiple regression model. This approach permits us to examine the interrelations among the predictors as well as their independent association with the rating of flat affect.

Methods

Subjects. The subjects were 48 chronic schizophrenic patients chosen from the wards of a State psychiatric hospital and from two of its outpatient clinics. The patient groups were drawn from pools of 100 each outpatients and inpatients, and the two groups were matched for sex, age, ethnicity, socioeconomic status, and length of illness. All patients met Research Diagnostic Criteria for chronic schizophrenia based on the Schedule for Affective Disorders and Schizophrenia (Endicott and Spitzer 1978), had a psychiatric history of at least 5 years' duration, had received at least 90 days of continuous antipsychotic medication up to the day of their evaluation, and had provided written consent to participate in the study after its purpose and procedures had been explained. The strategy of selecting patients from both wards and clinics was used to increase the range of outcomes in our study cohort.

Neuropsychological Measures. This study (Mayer 1983) was nested into a larger study in which patients were evaluated on a wide range of neuropsychological, neurological, psychiatric, and family variables. A comprehensive neuropsychological test battery was administered without knowledge of the patient's scores on the other measures described below. From this battery the following measures were selected as reflections of right hemisphere functioning (Lezak 1976; Heilman and Valenstein 1979): (1) the Test of Facial Recognition (Benton, Hamsher, and Levin 1978); (2) the Benton Test of Visual Retention (Benton 1974); (3) the Wechsler Adult Intelligence Scale-Revised (WAIS-R) Block Design subtest (Wechsler 1981); (4) left-sided (contralateral) performance on a somatosensory receptor process battery, modified from the Halstead-Reitan battery (Reitan and Davison 1974); and (5) left-handed (contralateral) Purdue Pegboard performance (Tiffin 1968).

To serve as a control for level of overall deficit (or overall ability) independent of right hemisphere dysfunction, a composite left hemisphere measure (Cohen and Cohen 1975) was derived by finding the average standardized scores of the tasks in the battery thought to be reflective of left hemisphere functioning. Included were the following: WAIS-R Vocabulary and Similarities subtests (Wechsler 1981); the Reading Test from the Wide Range Achievement Test (Jastak and Jastak 1965); the Wechsler Memory Scale (Wechsler 1945); subtests of the Multilingual Examination of Aphasia (Benton and Hamsher 1978); the Wepman (1958, 1973) Tests of Auditory Discrimination, Color Naming, Body Naming, and Sound Blending; right-sided (contralateral) performance on the Purdue Pegboard (Tiffin 1968); and the Somatosensory Receptor Process Battery (Reitan and Davison 1974). A reliability analysis of the left hemisphere measures yielded a Cronbach's alpha of .802, an adequate level for developing a composite measure.

Clinical Ratings of Flat Affect.

Following a 30-minute interview, a psychiatrist without knowledge of the
patient's neuropsychological scores completed the Affective Flattening Scale from the Scale for Assessment of Negative Symptoms (Andreasen 1981). The global rating of flat affect from this measure was used in the computations reported below. In previous research, this item demonstrated acceptable reliability with a Kappa value of .63. In a reliability check, we found that independent but simultaneous global ratings of flat affect done by two psychiatrists on a sample of 10 patients yielded an acceptable product-moment correlation of .86.

Extrapyramidal Effects. Extrapyramidal side effects were assessed by a psychiatrist using an adapted version of the Rating Scale for Extrapyramidal Effects (Simpson-and Angus 1970). An overall measure was derived by summing the scale's 12 items. In a reliability check, two psychiatrists rating 10 patients obtained an acceptable product-moment correlation of .84.

Acoustical Analysis. The speech of depressed patients is characterized by increases in pause durations (Greden et al. 1981; Alpert 1982) rather than by the constricted dynamic range of voice level and pitch (Alpert and Andersen 1977) found in the speech of schizophrenic patients with flat affect. Acoustical analysis of taped monologues, as previously described (Andreasen, Alpert, and Martz 1981), was used to derive pause duration scores. Although patients with primary depression were excluded by our inclusion requirements, schizophrenic patients included in the sample suffered varying degrees of more minor depressive symptomatology. It was anticipated that acoustical analysis, which could provide a quantitative measure of depressed mood (pause time) that was independent of the clinical rating of affective flattening, would facilitate the differentiation between disturbances of mood and affect.

Table 1. Optimal model for predicting flat affect

<table>
<thead>
<tr>
<th>Variable</th>
<th>R²</th>
<th>F</th>
<th>Probability of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial Recognition Test scores</td>
<td>.38</td>
<td>6.50</td>
<td>.0003</td>
</tr>
<tr>
<td>Pause duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandoz scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient-outpatient status</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results

An Optimal Model for Predicting Flat Affect. Table 1 presents the results of a forward stepwise regression analysis used to choose those variables potentially contributing most to a model predicting flat affect. On the basis of a significance criterion of .05, four variables were included. In order of selection they were: the Facial Recognition Test (low scores were flatter), pause duration scores (longer pauses were flatter), Simpson-Angus scores (more extrapyramidal symptoms were flatter), and inpatient-outpatient status (inpatients were flatter). The model generated in this manner was significant at the .0003 confidence level, and the set of variables together accounted for 38 percent of the variance in flat affect ratings. Thus, it appears that the clinical impression of flat affect may be conceptualized as a multidimensional construct, various aspects of which are related to right hemisphere dysfunction, psychomotor slowing, extrapyramidal effects of pharmacological treatment, and inpatient status.

It is interesting that although the first entered measure was a measure of right hemisphere dysfunction, the second was our "pause time" speech measure since speech is usually attributed to the left hemisphere. We discuss this further below. The contribution of pseudo-parkinsonism to the regression is clinically noteworthy since anticholinergic medication was permitted. Either the medication was not completely effective or the medicating psychiatrist did not detect or elect to treat the extrapyramidal signs. The strength of the simple dichotomous measure of inpatient or outpatient status as a predictor of flat affect is impressive and probably reflects the impact on the patient's morale of long periods in the hospital (Wing 1962).

Right Hemisphere Functioning And Flat Affect. To clarify the contribution of the presumed right hemisphere deficit to our results, a series of hierarchical multiple regression analyses for sets, according to the procedures described by Cohen and Cohen (1975, pp. 136-138) were done, and the results are presented in table 2. To test whether flat affect would be associated with the set of right hemisphere measures beyond effects due to overall dysfunction, the left hemisphere composite score was first
Table 2. Hierarchical regression analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>$R^2$</th>
<th>$F$</th>
<th>Probability of $F$</th>
<th>Significance of Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Flat affect L composite</td>
<td>.04</td>
<td>2.11</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>Flat affect L composite Set of right hemispheric measures</td>
<td>.30</td>
<td>2.47</td>
<td>.03</td>
<td>$F = 2.46$ $p &lt; .05$</td>
</tr>
<tr>
<td>B. Flat affect L composite Demographics</td>
<td>.25</td>
<td>2.25</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>Flat affect L composite Demographics Set of right hemispheric measures</td>
<td>.38</td>
<td>1.80</td>
<td>.09</td>
<td>$F = 1.27$ $p = NS$</td>
</tr>
<tr>
<td>C. Flat affect L composite Pause duration</td>
<td>.14</td>
<td>3.76</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Flat affect L composite Pause duration Set of right hemispheric measures</td>
<td>.45</td>
<td>3.98</td>
<td>.002</td>
<td>$F = 3.62$ $p &lt; .01$</td>
</tr>
<tr>
<td>D. Flat affect L composite Pause duration Demographics (3 Items)</td>
<td>.31</td>
<td>3.84</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td>Flat affect L composite Pause duration Demographics (3 Items) Set of right hemispheric measures</td>
<td>.51</td>
<td>3.44</td>
<td>.002</td>
<td>$F = 2.45$ $p &lt; .05$</td>
</tr>
</tbody>
</table>

forced. This variable alone proved insignificant in predicting flat affect ($R^2 = .04$, $p = .15$). Next, the measures selected as indicative of right hemisphere functioning were permitted to enter the equation. This analysis allowed us to determine the increment to the proportion of variance in flat affect accounted for by the group of right hemisphere variables beyond what had been accounted for by effects due to overall dysfunction. A significant proportion of variance was accounted for by the model ($R^2 = .30$, $p = .03$) with a significant increment due to the set of measures. Thus, it appears that chronic schizophrenic patients with flatter affect may be characterized by greater right hemisphere deficit over and above any generalized or left hemisphere deficit they may suffer.

Possible Confounds. Table 2B shows the combined impact of a number of potential confounds on the above-described model. Variables considered were: sex, age, handedness, inpatient or outpatient status, and extrapyramidal side effects. These variables were selected because of their potential complex intercorrelations with the dependent measure, with the lateralized predictors, and with each other. The regression on the flat affect score of the set of four variables, together with the left composite score, approached significance in predicting flat affect (table 2B). Moreover, inclusion of this set of variables in the hierarchical regression analysis attenuated the relationship between the right hemisphere variables and flat affect, reducing $R^2$ to .38 and $p$ to .09. Likewise, the increment of variance accounted for by adding the set of right hemisphere variables to the model was also insignificant. Of the potential confounds considered, sex, inpatient-outpatient status, and extrapyramidal side effects are those variables that most overlap with right hemisphere measures in predicting flat affect.

These results raise questions about the nature of the relationship between flat affect and the indices of right hemisphere functioning. Inpatient or outpatient status and extrapyramidal side effects were shown, in the stepwise analysis in table 1, to be independently related to flat affect ratings. Of the set of right hemisphere measures, only face recognition entered the multiple regression. Sex has complex relations with lateralization of cognition (Heilman and Valenstein 1979) that may somehow interact with our right
hemisphere measures. Pause duration had an important role in the stepwise analysis, and we pursued this in additional hierarchical analysis.

**Pause Duration Scores.** Given the multidimensional nature of flat affect described above, it was questioned whether some of the other factors contributing to a flat impression might have obscured the relationship between flat affect and right hemisphere dysfunction. Indeed, this proved to be the case. Table 2C presents results which suggest that the acoustical variable, pause duration, acts as a suppressor. When pause duration was added to the model regressing level of left hemisphere function and the set of six right hemisphere variables on the global rating of flat affect, the proportion of variance accounted for by the model rose from \( R^2 = .30 \) (when pause duration was taken into account, right hemisphere variables significantly predict flat affect over and above variables previously indicated to be potential confounds (sex, inpatient-outpatient status, and the left composite control measure). These results are presented in Table 2D.

The above results suggest that the right cerebral hemisphere may play an important role in mediating the sign of flat affect in chronic schizophrenic patients. Patients with flatter affect performed more poorly on tasks usually associated with right hemisphere functioning. The strength of this relationship was attenuated when demographic variables were considered but reemerged when the suppressor variable, pause time, was entered into the regression. One scenario for such a suppressor action would be for pause time to correlate positively with both global rating of flat affect and ability on right hemisphere tasks. We have discussed why the former might be true, but it is not clear why the latter relation would pertain.

We should bear in mind that the average level of performance on the cognitive tasks was poor (Mayer 1983). Increased pause time need be associated only with less of a disadvantage, not an absolute advantage on right hemisphere tasks. The observed relationship might also be seen as consistent with the hypothesis of a right hemisphere hyperfunction in depression (Flor-Henry 1976; Tucker et al. 1981). However, such an explanation would require that flat affect produce a right hemisphere hypofunction simultaneously with the depressive hyperfunction, a complex mechanism that seems beyond the explanatory power of our data.

**Comment**

The present work, implicating right hemisphere dysfunction in a schizophrenic sample, may seem at variance with a good deal of the theory on schizophrenia and laterality, which has usually assigned a greater role to the left hemisphere in this disorder. We have focused on flat affect within schizophrenia, and have not examined either a schizophrenic population without flat affect or a nonschizophrenic population with flat affect. Thus, our results do not address the degree of lateralized dysfunction in schizophrenia, but rather whether there is a hemispheric performance differential associated with the symptom of flat affect. In fact, chronic schizophrenic patients in this sample performed in a manner suggestive of bilateral dysfunction, but it was the level of their right hemisphere impairment that was specifically related to the clinical impression of affective blunting.

Flat affect is plausibly conceptualized as a multidimensional construct, various aspects of which relate to different underlying processes. There appear to be components of right hemisphere dysfunction, retardation, and extrapyramidal side effects, as well as the sequelae of hospitalization. In our cohort of chronic schizophrenic patients, there do not seem to be subgroups of types of patients with flat affect; the various components appear admixed across the patient spectrum.

Thus, flat affect in chronic schizophrenia may best be understood as the final common pathway for the behavioral expression of multiple independent underlying processes. We have identified four components, and there may well be more. We suspect that the evidence of a right hemisphere dysfunction may be the component that provides flat affect with its efficiency as a predictor of a morbid course, although the lack of affect might itself produce a cycle of isolation and decline. In the clinical evaluation of flat affect, a multivariate approach, in which the different components we have discussed are evaluated separately, might improve the reliability of evaluation and make this important sign more useful.

**References**


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**Expressed Emotion in Families**

Expressed Emotion in Families: Its Significance for Mental Illness, authored by Julian Leff and Christine Vaughn, has been recently published by The Guilford Press (200 Park Avenue South, New York, NY 10003). The discovery that discharged schizophrenic patients who returned home to parents or spouses often fared worse than those living alone led researchers to look for conditions within the family that might influence the schizophrenic patient’s condition. At the vanguard of this endeavor was George Brown, whose recognition of the debilitating effect of high levels of expressed emotion—such as hostility, criticism, and overinvolvement—has stimulated important insights as well as considerable controversy. In this volume, Leff and Vaughn, together with two other prominent investigators, address some of the confusions and misconceptions that have arisen regarding the measures of expressed emotion and the techniques for obtaining data, and present important new findings which significantly expand Brown’s original insights. The book will be of great interest to psychiatric researchers as well as to all mental health professionals who work with schizophrenic patients and their families.