Cue Availability and Affect Perception in Schizophrenia

by Alan S. Bellack, Jack J. Blanchard, and Kim T. Mueser

Abstract

This study examined affect perception in schizophrenia. Subjects were 35 patients with schizophrenia or schizoaffective disorder, 11 with bipolar disorder, and 19 matched nonpatient controls. All patients were in the latter stages of an acute hospitalization. Measures included a videotaped test of affect perception administered with and without sound, two tests of facial affect perception based on photographs, and two measures of nonaffect perception. The patient groups did not differ from one another on any of the affect perception measures, and few differences occurred between schizophrenia patients and nonpatient controls. Affect perception in schizophrenia patients was not correlated with symptomatology or history of illness, and there were no gender differences. Deficits reported in prior studies may reflect limitations in the assessment methodology commonly employed.


Schizophrenia patients have been reported to have marked deficits in the ability to decode affect cues (Walker et al. 1984; Morrison et al. 1988b; Heimberg et al. 1992). These findings have important implications for hypotheses about the neurobiology of the disorder, as well as for the development of rehabilitation strategies to improve social functioning. However, it is not clear if the deficits are specific to the recognition of emotions, if they reflect some broader deficit in perception of facial characteristics in general, or if the results simply reflect the generalized deficit so often observed in schizophrenia patients (Chapman and Chapman 1973). One recent study (Heimberg et al. 1992) found that schizophrenia patients were differentially impaired in affect recognition compared to an age-discrimination task. In contrast, a number of other recent studies found persons with schizophrenia to be no more impaired on measures of affect recognition than on a number of carefully matched control tasks (Feinberg et al. 1986; Gessler et al. 1989; Archer and Hay 1992; Kerr and Neale 1993; Mueser et al., in press), suggesting a generalized rather than an emotion-specific deficit. Unfortunately, interpretation of this literature is complicated by marked variations in methodology across studies, including affect stimuli used, exposure time of slides, rating task for the subject, and chronicity of subject samples (Morrison et al. 1988b; Archer and Hay 1992; Heimberg et al. 1992).

Most studies have assessed affect perception by having subjects judge the affect expressed in photographs of faces. However, affect in ordinary social encounters is interpreted on the basis of a variety of cues in addition to facial expression, including environmental context, flow of the interaction, paralinguistic features, and speech content (Scherer 1986). Facial expressions in real-life interactions change from moment to moment, sometimes in concordance with verbal and paralinguistic cues and sometimes inconsistently. Moreover, the critical problem in many social encounters is determining the intensity of affect, rather than its fundamental type. The ability to appraise and integrate these diverse, dynamic cues cannot be tested by still photographs. Videotaped dis-

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plays provide an alternative assessment modality that may better approximate natural interactions.

The ability of schizophrenia patients to make accurate social judgments based on videotaped portrayals has been investigated in a number of studies. Cramer et al. (1989, 1992) and Joseph et al. (1992) showed different samples of patients five videotapes, each 2 to 3 minutes long, of dyadic interactions initially developed to train raters to code expressed emotion (EE). Patients in both Cramer et al. studies were less accurate in judging the affective state of an actor portraying a parent, but Joseph et al. found no difference between patients and controls. These studies are difficult to compare because they used different rating procedures, and because subjects in the Joseph et al. study were all remitted outpatients, while samples in the Cramer et al. studies included chronic inpatients. Two prior studies in our laboratory compared schizophrenia patients, matched groups of patients with major affective disorder, and nonpatient controls (Morison et al. 1988b; Bellack et al. 1992). Stimuli in the former study were brief videotaped vignettes (mean = 7 seconds) derived from television shows, while the latter study employed interactions representing high and low EE. The schizophrenia patients in both studies differed from both the affective disorder and nonpatient groups in judgment of the intensity of negative affect (i.e., they rated scenes as less negative) but not in other measures of affect recognition.

The literature suggests that at least some schizophrenia patients do have a deficit in the ability to judge affect. However, variability in assessment procedures, sample differences, and the failure to use nonemotion perceptive control tasks cloud the interpretability of the literature. The purpose of the present study is to clarify several unresolved issues:

1. Do schizophrenia patients have a focal impairment in the ability to discriminate affect states and determine the intensity of affect displayed by others, or are their performance deficits limited to specific assessment strategies?

2. Do deficits in measures of affect perception reflect specific impairments in the ability to perceive and decode affective expressions, or are they secondary to deficits in information processing speed and capacity or the generalized deficit characteristic of the illness (Blanchard and Neale 1994)?

3. Do schizophrenia patients have more difficulty in affect perception than patients with other severe and persistent mental illnesses?

To answer these questions, we assessed affect perception using both still photographs of facial affect and videotaped dyadic interactions. The videotape measure was administered twice, once with and once without the soundtrack, to examine ability to decode affective information with limited cues (video version only), and when more extensive information was available (video plus audio version). We also assessed nonemotion perceptual ability to determine if affect perception deficits were specific to emotion or reflected a generalized impairment. We hypothesized that schizophrenia patients would exhibit a specific, differential deficit on affect perception tasks that presented limited information (i.e., slides of faces and video-only version of the videotape), but that their difficulty would be ameliorated when they were given more time and information to make their judgments (i.e., audio plus video version of the videotape).

**Method**

**Subjects.** Subjects were 25 patients meeting DSM-III-R (American Psychiatric Association 1987) criteria for schizophrenia, 10 patients meeting criteria for schizoaffective disorder, 11 patients meeting criteria for bipolar disorder, and 19 nonpatient controls. Patients were all in the latter stages of an acute hospitalization. Exclusion criteria for patients included mental retardation, substance dependence, and organic brain syndrome. Controls were recruited from among nonprofessional hospital staff and the surrounding community. They were demographically matched to the patient cohort and were excluded if they had a current Axis I disorder as determined in a structured interview or if they reported ever receiving treatment for psychiatric problems in the past.

Diagnoses were determined on the basis of the Structured Clinical Interview for DSM-III-R (SCID-P; Spitzer et al. 1990). Interviews were conducted by two master’s-level interviewers who had achieved levels of agreement (Kappa) above 0.90 in several previous studies. Symptomatology was assessed with an anchored version of the Brief Psychiatric Rating Scale (BPRS-A; Woerner et al. 1986) and the Scale for the Assessment of Negative Symptoms (SANS; Andreasen 1984). As previously reported (Blanchard et al., in press), adequate reliability was achieved for the summary scores on both the BPRS-A and the SANS. All subjects provided informed consent and were paid $45 each as an incentive for their participation.

Demographic characteristics of the sample and treatment history and
symptomatology ratings for patients are presented in Table 1. A series of analyses of variance (ANOVAs) indicated that the four groups were equivalent in age and education. Differences in gender and race, examined with chi-square tests, were similarly nonsignificant. The three patient groups were also equivalent in chronicity (age at first hospitalization and number of prior hospitalizations). Handedness was assessed with a self-report questionnaire developed and standardized by Chapman and Chapman (1987). A chi-square analysis indicated that the groups did not differ in hand preference (schizophrenia patients 71% right-handed; schizoaffective disorder, 70% right-handed; bipolars, 80% right-handed; controls, 84% right-handed). Separate ANOVAs were conducted comparing the three patient groups on the total scores for the BPRS-A and the SANS. ANOVA for the BPRS-A was significant ($F = 5.39, df = 2, 45, p < 0.01$). Post hoc (Tukey) comparisons indicated that both schizophrenia and schizoaffective patients had higher BPRS-A scores than did bipolars (all $p < 0.05$).

All schizophrenia and schizoaffective patients were receiving neuroleptics. Average daily dosages calculated in chlorpromazine unit equivalents (Davis et al. 1983) were 676.1 mg for schizophrenia patients and 447.5 mg for schizoaffective patients. Thirty-three percent of schizophrenia patients and 40 percent of schizoaffective patients were on adjunctive antiparkinson medications, and 12 percent of the schizophrenia patients and 40 percent of the schizoaffective patients were on lithium (mean = 1,200 mg). Sixty-three percent of the bipolar group were receiving neuroleptics (mean = 634.5 mg), 27 percent were taking antiparkinson medications, and 82 percent were on lithium (mean = 1,133.3 mg). At the time of assessment, schizophrenia patients had been in the hospital a mean of 32.8 days (range = 13–64), schizoaffective patients for a mean of 24 days (range = 14–33), and bipolar patients for a mean of 32.4 days (range = 18–75).

Measures. Subjects were assessed with a large battery of instruments, including measures of symptomatology, affect recognition and social perception, and cognitive-perceptual functioning. The battery was administered to patients in 2- to 3-hour blocks on 2 or 3 successive days. Nonpatients generally completed the battery in 1 full day.

Affect perception. A variety of different videotaped measures of affect perception have been used in previous studies, but all have potential limitations, including stimuli that are too brief to display a variety of cues, restricted content, or lack of standardization. Consequently, a new instrument was developed for this study: the Videotape Affect Perception Test (VAPT). Research staff screened a large sample of movies and television shows and extracted over 100 brief scenes displaying a dyadic interchange based on the following criteria: (1) a single character predominated; (2) the dominant character's face was clearly visible during most of the scene; (3) there were no extraneous cues to provide an external indication of the affect displayed (e.g., a gun, music implying tension).

Table 1. Demographic characteristics of subjects

<table>
<thead>
<tr>
<th></th>
<th>Schizophrenia (n = 25)</th>
<th>Schizoaffective disorder (n = 10)</th>
<th>Bipolar disorder (n = 11)</th>
<th>Controls (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Age, years</td>
<td>37.76 (9.50)</td>
<td>42.50 (8.89)</td>
<td>39.27 (6.75)</td>
<td>34.68 (9.73)</td>
</tr>
<tr>
<td>Education, years</td>
<td>12.08 (1.29)</td>
<td>12.50 (3.24)</td>
<td>13.09 (1.70)</td>
<td>13.22 (1.59)</td>
</tr>
<tr>
<td>Male, %</td>
<td>44</td>
<td>70</td>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td>Black, %</td>
<td>28</td>
<td>20</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Age at first hospitalization</td>
<td>22.72 (5.24)</td>
<td>26.80 (6.07)</td>
<td>23.36 (7.72)</td>
<td>—</td>
</tr>
<tr>
<td>Number of prior hospitalizations</td>
<td>10.08 (6.93)</td>
<td>12.70 (6.78)</td>
<td>6.27 (4.78)</td>
<td>—</td>
</tr>
<tr>
<td>BPRS-A total</td>
<td>42.84 (5.33)</td>
<td>43.90 (10.67)</td>
<td>35.09 (7.01)</td>
<td>—</td>
</tr>
<tr>
<td>SANS total</td>
<td>41.68 (9.76)</td>
<td>41.80 (4.61)</td>
<td>34.64 (6.50)</td>
<td>—</td>
</tr>
</tbody>
</table>

Note.—BPRS-A = Brief Psychiatric Rating Scale–Anchored version (Woerner et al. 1986); SANS = Scale for the Assessment of Negative Symptoms (Andreasen 1984); SD = standard deviation.
or to detract from the dominant actor (e.g., an exotic dancer in the background); and (4) the scene lasted long enough to portray a distinct affective tone, but not so long that multiple affective states were expressed.

The first two authors then reviewed the collected scenes and abstracted 61 that best met all the criteria and in which the sound and picture were of good quality (e.g., no extreme accents, adequate lighting). These 61 scenes were shown to nine clerical and support staff members, who independently rated the affect displayed by the dominant actor on dimensions of pleasantness and arousal. Thirty items received homogeneous affect ratings and were retained for the VAPT: 8 in which the actor’s affect was uniformly rated as very pleasant, 14 in which the affect was rated as mildly unpleasant or somewhat neutral, and 8 that were rated highly unpleasant. The mean scene duration was 15.16 seconds (range = 10–24 seconds). Three affectively neutral practice scenes were spliced onto a master tape, followed by the 30 test items in random order.

After viewing each scene, participants in this study rated the affect displayed by the primary character on dimensions of pleasantness–unpleasantness and arousal–sleepiness: two orthogonal dimensions thought to underlie judgments of affect, including the ratings of facial displays of emotion (Russell 1989; Russell et al. 1989). Each rating was made on a 9-point scale from 1 (very unpleasant or very unaroused) to 9 (very pleasant or very aroused). Subjects were given brief definitions of pleasantness and arousal (from Russell 1989; Russell et al. 1989) and were given practice on the rating scales with hypothetical examples to ensure they understood the dimensions to be rated. After rating each scene on pleasantness and arousal, subjects selected one emotion from a list of six that best characterized the scene (happiness, sadness, anger, surprise, fear, and shame).

The VAPT was first administered without audio to minimize the contribution of verbal cues of emotion and to parallel the visual demands of the two tasks using photographs of facial affect (described below). Subjects then completed other tasks unrelated to perception of emotion (e.g., cognitive-perceptual assessment), which lasted approximately 30 to 60 minutes. Subsequently, the VAPT was administered a second time with both visual and auditory cues. The same ratings of pleasantness and arousal were made for both the visual-only and the visual-plus-audio conditions of the VAPT. The interventions between the two administrations of the VAPT were intended to reduce recall of ratings from the first administration.

Two measures developed and standardized by Kerr and Neale (1993) were employed to assess the ability to perceive affect from still photographs of faces. Each of these tasks uses photographs of facial emotion developed by Izard (1971) and Ekman (1976). The Face Emotion Identification task contains 19 black-and-white photographs of faces expressing the six basic emotions. The items are presented on a videotape with an exposure duration of 15 seconds per item and 10 seconds of blank screen between items. After viewing each item, the subject identifies which of the six emotions best represents the affect expressed by the face. The Face Emotion Discrimination test requires the subject to determine whether two faces presented side by side are expressing the same or different emotions. The test consists of 30 photographs of same-sex pairs. Each pair is presented on a videotape with an exposure duration of 15 seconds. Scores for each of these tasks are the number of correct items.

Nonaffect perception. To examine the extent to which any deficits on the three affect perception measures were due to a specific impairment in affect perception (rather than a more generalized perceptual dysfunction), two standard nonaffect-related neuropsychological tests were administered. The 54-item Test of Facial Recognition (Benton et al. 1983) assesses the ability to identify and discriminate photographs of unfamiliar faces. The patient is required to match photos for which hair, eye color, clothing, and hair style are invariant. The Speech Sounds Perception Test (Halstead 1947) is a test of auditory discrimination requiring the patient to attend to tape-recorded nonsense syllables and indicate, on a multiple-choice form, which syllable they hear. The first 30 items were used because this shortened version has been shown to be more efficient and diagnostically effective than the full 60-item test (Golden and Anderson 1977). The shortened versions of the Test of Facial Recognition and the Speech Sounds Perception Test have both been shown to discriminate undMedicated schizophrenia patients from controls and to be related to affect perception in schizophrenia patients (Kerr and Neale 1993; Blanchard and Neale 1994).

Results

The schizophrenia and schizoaffective groups were compared on all measures with a series of t tests. There were no significant differences on any demographic, symptom, or performance measure; consequently, these two groups were combined for
all subsequent analyses. The sample sizes reported below vary somewhat across analyses (primarily for those involving the nonaffect perception tasks) because some subjects were unable to complete all of the measures due to the length of the battery.

As an initial step in examining performance on the VAPT, a series of Cronbach alphas were calculated for ratings of pleasantness and arousal on the three different sets of scenes (pleasant affect, mildly negative affect, and highly negative affect). Coefficient alphas across both video and audio-plus video versions of the VAPT indicated adequate reliability for ratings of pleasantness (median $\alpha = 0.70$) and arousal (median $\alpha = 0.79$). Consequently, composite scores (means) were created for each subject for each scene type on each version of the test. The results are summarized in table 2. Pleasantness ratings and arousal ratings were each examined with a four-way, repeated measures ANOVA: viewing condition (video vs. audio plus video) $\times$ gender $\times$ scene type $\times$ group. The analysis on pleasantness yielded a significant effect for scene type ($F = 671.36$, $df = 2,100$, $p < 0.001$), which served as validation for the manipulation: post hoc tests indicated that, in each viewing condition, highly negative scenes were rated as less pleasant than mildly negative scenes, which were rated as less pleasant than pleasant scenes (all $p < 0.005$). There were no significant main effects for group ($F = 2.37$, $df = 2.50$, NS), gender ($F = 0.11$, $df = 1.50$, NS), or viewing condition ($F = 2.89$, $df = 1.50$, NS). The only significant interaction was between viewing condition and scene type ($F = 7.96$, $df = 2.100$, $p < 0.001$). Post hoc tests indicated that subjects gave more ex-

Table 2. Performance on affect perception tasks in schizophrenia-schizoaffective disorder (n = 32), bipolar disorder (n = 11), and controls (n = 19)

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Schizophrenia or schizoaffective disorder Mean (SD)</th>
<th>Bipolar disorder Mean (SD)</th>
<th>Controls Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Videotape Affect Perception Test: Pleasantness ratings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasant scenes$^1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>6.57 (0.93)</td>
<td>7.36 (0.50)</td>
<td>6.81 (0.45)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>6.96 (0.71)</td>
<td>7.48 (0.77)</td>
<td>6.89 (0.39)</td>
</tr>
<tr>
<td>Mildly negative scenes$^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>4.16 (0.99)</td>
<td>4.49 (0.74)</td>
<td>3.86 (0.60)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>3.99 (0.86)</td>
<td>4.12 (0.98)</td>
<td>3.75 (0.75)</td>
</tr>
<tr>
<td>Highly negative scenes$^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>2.82 (0.95)</td>
<td>3.32 (0.98)</td>
<td>2.54 (0.62)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>2.70 (0.95)</td>
<td>2.65 (0.99)</td>
<td>2.43 (0.78)</td>
</tr>
<tr>
<td>Videotape Affect Perception Test: Arousal ratings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasant scenes$^3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>6.76 (0.68)</td>
<td>7.18 (0.48)</td>
<td>6.45 (0.74)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>6.85 (0.80)</td>
<td>7.34 (0.60)</td>
<td>6.47 (0.80)</td>
</tr>
<tr>
<td>Mildly negative scenes$^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>6.13 (0.81)</td>
<td>6.15 (0.48)</td>
<td>5.73 (0.76)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>6.01 (1.06)</td>
<td>6.33 (0.79)</td>
<td>5.81 (0.73)</td>
</tr>
<tr>
<td>Highly negative scenes$^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video only</td>
<td>7.04 (0.91)</td>
<td>7.18 (0.82)</td>
<td>7.22 (0.69)</td>
</tr>
<tr>
<td>Audio and video</td>
<td>7.04 (1.10)</td>
<td>7.01 (1.06)</td>
<td>7.25 (0.57)</td>
</tr>
</tbody>
</table>

Note.—All ratings made on a 1–9 (very unpleasant/unaroused) to 9 (very pleasant/aroused) scale. SD = standard deviation.

$^1p > 0.01$;

$^2p > 0.005$;

$^3p > 0.001$.  

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treme ratings on all three scene types when they heard the audio portion of the tapes. When subjects heard the audio track, they perceived negative scenes as more unpleasant and the pleasant scenes as more pleasant than when they were limited to just video information.

The results for the analysis of arousal ratings were very similar to those for pleasantness. There was a significant main effect for scene type ($F = 58.83, df = 2,100, p < 0.001$), but the effects for group ($F = 1.37, df = 2,50, NS$), gender ($F = 0.03, df = 1,50, NS$), and viewing condition ($F = 0.34, df = 1,50, NS$) failed to reach significance. The only interaction that was significant was group $\times$ scene type ($F = 3.71, df = 4,100, p < 0.01$). Post hoc tests indicated that all three groups rated the highly negative and pleasant scenes as more aroused than the mildly negative scenes (all $p < 0.005$). However, the nonpatient controls also rated the highly negative scenes as more aroused than the pleasant scenes ($p < 0.005$), while the two patient groups did not perceive a difference in arousal between these two scene types (all $p > 0.05$).

The first two authors independently categorized each VAPT scene on the six affect labels employed by subjects. Nine scenes were jointly categorized by the authors as displaying sad affect, nine were categorized as angry, and eight involved happy affect. The remaining four scenes contained mixed affect states and were not categorized reliably; thus, these scenes were not included in the following analyses. The authors’ ratings were used as criteria to determine subjects’ accuracy in nominating an affect for each scene. An accuracy score was generated for each subject for each affect (sad, angry, and happy) by calculating the proportion of correct nominations for each of the three types of scenes.

We examined these accuracy scores in a $3 (\text{group}) \times 3 (\text{affect}) \times 2 (\text{viewing condition}) \times 2 (\text{gender})$ repeated measures multiple analysis of variance (MANOVA). There were significant main effects for group ($F = 4.05, df = 2,59, p < 0.023$), viewing condition ($F = 6.95, df = 1,59, p < 0.011$), and affect ($F = 78.78, df = 2,58, p < 0.0001$). Also important were significant two-way interactions between group and viewing condition ($F = 3.29, df = 1,59, p < 0.044$) and affect and viewing condition ($F = 12.84, df = 2,58, p < 0.0001$), and a significant three-way interaction between group, viewing condition, and affect ($F = 2.72, df = 4,118, p < 0.032$). No other main effects or interactions were significant. These results indicate that there were significant diagnostic group differences in the accuracy of affect nominations and that these group differences were a function of both the affect of the scenes and whether or not the scenes were viewed with audio.

To examine the interactions obtained in the MANOVA, separate $3 (\text{group}) \times 2 (\text{viewing condition})$ repeated measures ANOVAs were conducted on the accuracy scores of the angry, sad, and happy scenes. For the angry scenes, there were no significant main effects or interactions (all $p > 0.05$), indicating that schizophrenia patients, bipolar patients, and nonpsychiatric controls were equivalently accurate in identifying angry scenes and that accuracy was not affected by viewing condition.

For sad scenes, there was a significant main effect for viewing condition ($F = 25.13, df = 1,62, p < 0.001$), and the group $\times$ viewing condition interaction was significant ($F = 5.34, df = 2,62, p < 0.008$). One-way ANOVAs indicated no significant group differences in the video-only condition; however, in the audio-plus-video condition the ANOVA was significant ($F = 6.06, df = 2,64, p < 0.005$). Post hoc analyses indicated that nonpsychiatric control subjects were significantly more accurate in the audio-plus-video condition than either schizophrenia or bipolar patients (all $p < 0.05$). Thus, in the labeling of sad scenes, the groups were comparable in their accuracy in the video-only condition; however, controls performed more accurately than both patient groups with the addition of audio cues.

The repeated measures ANOVA for the happy scenes yielded significant main effects for group ($F = 4.17, df = 1,62, p < 0.02$) and viewing condition ($F = 4.96, df = 1,62, p < 0.03$). Although the group $\times$ viewing condition interaction did not reach significance ($F = 2.10, df = 2,62, NS$), subsequent one-way ANOVAs indicated a significant group difference ($F = 5.81, df = 2,64, p < 0.005$) for the video-only scenes but not for the audio-plus-video scenes ($p > 0.05$). Post hoc tests indicated that nonpsychiatric controls were significantly more accurate than schizophrenia patients in labeling happy scenes in the video-only condition ($p < 0.05$).

Descriptive statistics for Face Emotion Identification, Face Emotion Discrimination, Test of Facial Recognition, and Speech Sounds Perception Test are presented in table 3. Reliability was adequate for Face Emotion Identification ($\alpha = 0.73$) although reliability for the Face Emotion Discrimination task was somewhat lower ($\alpha = 0.64$). Performance on the Face Emotion Identification and Face Emotion Discrimination tests were evaluated with group $\times$ gender ANOVAs. For Face Emotion Identification, the main effects of group and gender were not significant ($F = 0.71$ and $1.31, df = 2,59$, respectively); nor was the group
× gender interaction significant, \((F = 1.23, df = 2.59)\). Similarly, for Face Emotion Discrimination, there were no significant main effects for group or gender \((F = 1.11 \text{ and } 0.21, df = 2.59)\); nor was the group \(\times\) gender interaction significant \((F = 0.31, df = 2.59)\).

Group differences on the nonaffect perception tasks were examined with group \(\times\) gender ANOVAs. There was a significant main effect for group on the Test of Facial Recognition \((F = 4.10, df = 2.56, p < 0.05)\). Post hoc paired comparisons indicated that nonpatients performed significantly better than both schizophrenia patients \((t = -2.54, df = 49, p < 0.05)\) and the bipolar groups \((t = -2.21, df = 27, p < 0.05)\). None of the other group differences were significant, and neither the gender effect \((F = 0.24, df = 1.55)\) nor the group \(\times\) gender interaction \((F = 0.33, df = 2.55)\) were significant. Thus, both patient groups performed more poorly than controls on each of the nonaffect perception measures, but they did not differ on the Kerr and Neale (1993) tasks of emotion perception.

To explore the effects of symptomatology on emotion perception in schizophrenia, ratings on the VAPT and scores from the Face Emotion Identification and Face Emotion Discrimination tests were correlated with total scores from the BPRS-A and the SANS. Performance on the emotion perception measures was not significantly correlated with either measure of symptomatology (all \(p > 0.05)\).

### Discussion

The results did not support the hypothesis that schizophrenia patients have diminished ability to interpret affect cues and evaluate other peoples’ affective state. There were no significant differences between the schizophrenia and bipolar groups on the VAPT or either of the tests that employed facial photographs. There were several significant differences between the nonpatient controls and the two patient groups: for example, the controls appeared to be able to draw finer distinctions in level of arousal and in displays of sadness. There was also one significant difference between the schizophrenia group and the nonpatient controls (identification of happy affect on the video-only version of the VAPT). Interestingly, schizophrenia patients did display impaired performance compared to controls on the nonemotion perceptual tasks (i.e., the Test of Facial Recognition and the Speech Sounds Perception Test).

We expected the addition of linguistic cues on the audio-plus-video version of the VAPT to have a beneficial effect for schizophrenia patients by providing them with additional, redundant cues on which to make their judgments. Schizophrenia patients did have increased difficulty identifying happy affect without the soundtrack. Otherwise, they were no more impeded by the silent videotape than subjects in the other groups. Conversely, with the exception of sad scenes, their ratings changed in the same magnitude and direction as subjects in the other groups when the soundtrack was added.

The videotape test in this study was different from the tests used in our two earlier studies (Morrison et al. 1988a; Bellack et al. 1992), both of which found schizophrenia patients to underestimate the intensity or

### Table 3. Performance on emotion and nonemotion perception tasks in schizophrenia-schizoaffective disorder, bipolar disorder, and controls

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Schizophrenia or schizoaffective disorder Mean (SD)</th>
<th>Bipolar disorder Mean (SD)</th>
<th>Controls Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face Emotion Identification</td>
<td>11.69 (3.98)</td>
<td>11.27 (3.44)</td>
<td>12.68 (2.40)</td>
</tr>
<tr>
<td>Face Emotion Discrimination</td>
<td>23.46 (3.35)</td>
<td>23.36 (3.01)</td>
<td>24.79 (3.12)</td>
</tr>
<tr>
<td>Test of Facial Recognition(^1)</td>
<td>43.62 (5.18)</td>
<td>44.10 (4.07)</td>
<td>47.44 (2.96)</td>
</tr>
<tr>
<td>Speech Sounds Perception Test(^1)</td>
<td>24.44 (3.65)</td>
<td>24.20 (3.82)</td>
<td>26.89 (2.71)</td>
</tr>
</tbody>
</table>

Note —For these tasks r’s were 32–35 for the schizophrenia-schizoaffective group, 10–11 for bipolars, and 18–19 for controls (r’s varied due to missing data). SD = standard deviation.

\(^1p < 0.05\).
unpleasantness of negative affect. In addition to differences in specific content, the stimuli in this study were longer and contained more facial and linguistic cues about the actors' affective state. If the deficits found in those earlier studies resulted from faulty perceptual scanning or slowed processing—rather than a fundamental inability to translate the sensory input—the additional, redundant information may have been compensatory. If this conclusion is valid and a few more seconds of information or a few more cues are sufficient to normalize judgments, any deficit in the perceptual process must be circumscribed and limited to situations with few cues or with subtle or inconsistent cues. Of course, even a mild perceptual dysfunction could be exacerbated and lead to a functional disability if processing capacity were reduced by autonomic arousal or acute psychotic disorganization. This possibility should be explored in future studies.

Research on social perception conducted with nonpsychiatric populations has emphasized that, when appraising others, individuals can be either passive perceivers or active perceivers (Gilbert et al. 1988; Gilbert and Osborne 1989; Gilbert and Hixon 1991). The main distinction between these two types of perception is that active perceivers are also allocating cognitive resources to other processes (e.g., anticipating their own behavioral response). Gilbert proposes that, as cognitive demands increase (what he refers to as cognitive busyness), active perceivers may fail to use certain forms of available information in perceiving others because they do not have the capacity to do so. This model suggests that passive viewing paradigms, as used in the present study, may fail to reflect the cognitive demands faced in actual social interaction and thus fail to identify true social perceptual impairment. In addition to examining subject characteristics, future studies should consider the development of paradigms that allow for the evaluation of active emotion perception in schizophrenia, which should achieve greater ecological validity than studies conducted to date. Further research is also needed to determine the functional significance of any impairments in affect perception. Schizophrenia patients have been shown to have significant deficits in social skill, social problem solving, and the ability to fulfill social roles. Rehabilitation programs for these problems have placed increasing emphasis on remediation of purported deficits in social perception (Bellack 1992). It is necessary to determine if, and under what circumstances, deficits in social perception contribute to social failure and if social perception must be targeted in treatment.

An alternative explanation for our failure to find group differences is that the VAPT was not valid. However, the test was subjected to a careful, empirical development process, and the results provide validation for the instrument. The three scene types were perceived differently and elicited different ratings under the different viewing conditions. In addition, pleasantness ratings for the negative scenes on the VAPT and identification of angry affect were both highly correlated with accuracy on the Facial Identification task, which primarily includes faces expressing negative affect states.

Several other studies have also failed to find robust differences between schizophrenia patients and other patient groups or nonpatient controls. Gessler et al. (1989) found that only one of three cohorts of schizophrenia patients was impaired relative to controls, and Zuroff and Colussy (1986) reported that hospitalized schizophrenia patients did not differ from an affective disorder group and differed from controls only on judgments of some affect states. Joseph et al. (1992) failed to find a difference between a cohort of remitted patients and nonpatient controls on a videotaped test that had yielded significant differences between chronic patients and controls in two other studies (Cramer et al. 1989, 1992). Finally, although Walker et al. (1984) reported differences between hospitalized schizophrenia patients and both nonpatient and affective disorder controls, the group differences were significant only at an alpha level of \( p < 0.10 \).

As previously discussed, there are marked differences in subject populations studied in investigations of emotion perception in schizophrenia. Two of the most well-controlled studies (Heimberg et al. 1992; Kerr and Neale 1993), each of which reported affect perception differences between schizophrenia patients and controls, tested unmedicated patients. Heimberg et al., whose subjects were young, acute, unmedicated patients, found differential deficits in affect recognition. In contrast, Kerr and Neale tested very impaired, chronic, unmedicated patients and found the generalized deficits common to research on schizophrenia, with little evidence for specific impairments in affect perception ability. We have also found evidence for a generalized deficit in a recent study of medicated patients in a State psychiatric hospital (Mueser et al. 1996). Thus, affect perception deficits may be specific to highly symptomatic or chronically impaired patients.

The mixed results associated with sampling differences underscore the
methodological problems inherent in studying a heterogeneous disorder like schizophrenia (Tsuang et al. 1990; Carpenter et al. 1993). For example, Carpenter et al. have suggested that schizophrenia may be a single disease entity with diverse manifestations, multiple disease entities with a common manifestation, or a series of independent pathophysiological processes that combine in different ways to produce clinical heterogeneity. These different possibilities would require very different research designs to identify meaningful group differences. The nomothetic approach employed in most studies (including ours) assumes that clinical heterogeneity is secondary to etiological homogeneity (i.e., schizophrenia patients as a group will differ from controls due to a common neurocognitive deficit in affect recognition). The data may be better explained by a heterogeneity model, in which only a subgroup of patients is assumed to have the neurocognitive lesion that leads to affect perception deficits. That hypothesis would require either a very large sample in which subgroup differences might be evident or a predefined cohort that might be hypothesized to have affect perception deficits due to some independently identified neurocognitive impairment or status on some other marker (e.g., social skills deficits, reports from significant others, or family linkage characteristics). The data from the current project suggest that schizophrenia as a generic clinical entity is not characterized by gross deficits in affect perception. Conversely, our sample was too small to examine subgroup differences, so we cannot rule out the possibility that some narrowly defined cohorts do have such deficits. Future studies should consider employing an ideographic approach and pre-defining relevant subgroups, as suggested by Carpenter et al. (1993).

References


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**Acknowledgments**

This research was supported in part by USPHS grants MH-38636, MH-39998, and MH-41577 from the National Institute of Mental Health, and the Ireland Award from the National Allience for Research on Schizophrenia and Depression, all to the first author. Portions of this article were presented at the International Congress on Schizophrenia Research, Colorado Springs, CO, April 17–21, 1993, and at the Annual Meeting of the Association for Advancement of Behavioral Therapy, Boston, MA, November 21–23, 1992. The authors thank Sandra Kerr for making her facial emotion perception measures available to us and Paul Ekman and Carroll Izard who kindly provided permission to use their photographs of facial affect in these measures.

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