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Social perception in schizophrenia: the role of context

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Abstract

The purpose of this study was to examine social context processing in persons with schizophrenia. A secondary goal was to examine the ecological validity of these measures (i.e. how they relate to social behavior in the treatment setting). The performance of 35 persons with DSM-IV diagnosed schizophrenia and/or schizoaffective disorder was compared to a non-clinical control sample of 46 individuals on a battery of social perceptual tasks that require social context processing. In addition, the relationship between social context processing and ward behavior (as measured with the Nurse's Observation Scale for Inpatient Evaluation) was examined for the clinical sample only. The results showed that the group with schizophrenia/schizoaffective disorder was impaired on all tasks relative to the control group and showed little evidence of utilizing available contextual information. Task performance for the group with schizophrenia/schizoaffective disorder was relatively independent of symptoms, but was related to social functioning in the treatment setting. Implications for future research are discussed.

Keywords: Social cognition; Social behavior; Symptoms

1. Introduction

Individuals with schizophrenia demonstrate impairments in the ability to utilize contextual information during information processing (e.g. Silverstein et al., 2000; Stratta et al., 1999, 2000). Context refers to information that is considered and 'held in mind' (Stratta et al. 1999, p. 46) prior to enacting various behavioral responses. Therefore, deficits in context processing may reflect problems in internally representing stimulus information, rendering it difficult for such information to be used for either inhibiting or modifying subsequent responses (Cohen and Servan-Schreiber, 1992; Stratta et al., 2000). As noted by Stratta et al. (2000), context influences 'on-line' processing, in much the same way that priming effects occur; the individual uses context to interpret, judge, and respond to presented stimulus information. Therefore, context processing is thought to represent an important factor underlying

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the cognitive and functional impairments of schizophrenia (Cohen and Servan-Schreiber, 1992).

Most of the extant work on context impairments in schizophrenia has focused on perception of non-social stimuli, in particular, those sensitive to prefrontal cortex processing (e.g. Continuous Performance Test; Braver et al., 1999; Stratta et al., 2000). Scant attention has been given, however, to the role of context in social perception. In particular, individuals with schizophrenia, relative to non-clinical and clinical control participants, have impairments in their social perception skills (reviewed in Leonhard and Corrigan, 2001). These performance deficits are typically assessed with tests of facial affect recognition and contrived interpersonal scenes. However, a potential limitation of these tasks is they often omit contextual information, which could affect the percept itself. For example, tears streaming down someone's face may be perceived as sadness if the person is saying goodbye to a loved one, or happiness if it occurs when the loved one returns. Thus, social perception involves both identification of behavior (i.e. someone is crying), followed by inferences about what caused the behavior (i.e. the person is crying because her/his son is leaving for college) (Trope, 1986). This suggests that social perception is influenced not only by the apprehension of the stimulus itself, but also by the context in which it occurs.

This study represents an initial investigation into whether persons with schizophrenia utilize contextual information when perceiving social stimuli. A secondary goal was to examine the external validity of the social context measures used in this study by assessing their relationship with both symptoms and behavior in the treatment setting. Given the relationship between non-social context processing deficits and symptoms (thought disorder: Kuperberg et al., 1997; Passerieux et al., 1997; Stratta et al., 2000; disorganization syndrome: Cohen et al., 1999; Silverstein et al., 1998, 2000), we would expect a similar relationship to emerge for social context processing performance. For social behavior, the relationship between context processing and actual social functioning has hitherto not been assessed. This may be an important omission, as context processing, particularly for social information, has been hypothesized to be an important component of social competence (Stratta et al., 2000). Specifically, Stratta et al. have suggested 'Impairment in social functioning is a fundamental diagnostic criterion for schizophrenia and is likely to be related to inappropriate processing of social contexts and internal representation of the real world in general' (p. 66). This study will allow for an initial test of this hypothesis.

2. Methods

2.1. Participants

Eighty-one individuals participated in the study.[1] Thirty-five of the individuals were residents of the acute-care unit at Charity Hospital in New Orleans, LA (USA) and were in the latter stages of an acute exacerbation of their illness. These individuals were tested within 2 weeks of admission. All of these individuals met criteria for either schizophrenia or schizoaffective disorder based on the Structured Clinical Interview for DSM-IV, Patient version (SCID-P, Spitzer et al., 1995), chart review, and discussion with the primary psychiatrist. The SCID-P was administered by clinical psychology doctoral students trained to 100% agreement on primary diagnosis with a previously trained interviewer. For ease of communication, this group will be called the 'schizophrenia/schizoaffective group'.

Forty-six non-clinical control participants were recruited from the community and university campus (i.e. the 'control group'). Participants were excluded from the study if they had a history of neurological injury and were under 18 or above 60 years of age.

The clinical participants were administered the expanded version of the Brief Psychiatric Rating Scale (BPRS; Ventura et al., 1993) by clinical psychology doctoral graduate students trained to a minimum intraclass correlation coefficient (ICC) of 0.80 with previously trained raters. Four symptom clusters were computed: Affect, Anergia,

[1] Not all participants completed all of the study measures. The total sample of 81 represents the number of participants enrolled in the study.

Table 1
Clinical and demographic characteristics of the two groups

	Schizophrenia/ schizoaffective disorder	Non-clinical control subjects
Age (Mean) (S.D.)	35.03 (9.01)	32.74 (11.03)
Education (years) (Mean) (S.D.)	11.36 (1.78)	13.15 (0.87)*
Gender (*n*)		
Males	29	23*
Females	6	23
Ethnicity (*n*)		
Caucasian	6	19*
African–American	29	27
Diagnosis (*n*)		
Schizophrenia	29	
Schizoaffective disorder	6	
CPZ [a] (mg) (Mean) (S.D.)	738.63 (450.39)	
% on anticholinergics	60.6%	
BPRS subscales (Mean) (S.D.)		
Anergia	7.71 (2.91)	
Thought disorder	14.11 (4.48)	
Disorganization	5.74 (1.68)	
Affect	9.74 (3.22)	

* $P<0.05$.
[a] Chlorpromazine equivalent.

Thought Disorder, and Disorganization (Mueser et al., 1997).

Demographic data for the two groups are summarized in Table 1. One-way analyses of variance (ANOVAs) and chi-square tests revealed that the two groups significantly differed from one another in years of education, $F_{1,77}=34.9$, $P<0.05$, proportion of African–Americans, $\chi^2=5.43$, $P<0.05$, and female participants, $\chi^2=9.33$, $P<0.05$.

2.2. Measures

2.2.1. Social perception context measures

The Schema Comprehension Sequencing Test-Revised (SCST-R; Corrigan and Addis, 1995) comprises 12 sets of index cards. Each set of cards describes a particular social situation (e.g. going shopping; going to the movies; going grocery shopping). Half of the card sets contain five index cards, with each index card describing a specific behavioral action (e.g. for the set entitled 'going shopping', behavioral actions include 'driving to the store' and 'going to the checkout line'). The other half of the card sets each contain eight behavioral actions. For any given set, the cards were presented in a standardized mixed-up order to the participant and she/he was instructed to put them in the correct order as fast as possible. To assess the role of context, the participant was given the title of the social situation prior to organizing the cards for half the situations. The title was omitted for the other half of the situations. Therefore, two within-subject variables were manipulated on this task: Sequence length (i.e. short vs. long) and context (i.e. title vs. no title). Performance was indexed as the average time to complete the task (seconds) and the average number of correct adjoining behavioral actions (e.g. the first two cards placed in the correct order would be given a score of '1') across the 12 sets of cards. A context effect would be manifest by shorter times to complete the SCST-R, and a greater number of correct adjoining parts, in the 'title' relative to 'no title' conditions. Psychometric properties of the SCST-R (i.e. mean difficulty

levels, reliability and validity) are summarized in Corrigan and Addis (1995).

The Gilbert–Pelham Task (GPT; Gilbert et al., 1988) is composed of three silent videotaped clips of a target woman discussing various topics. In all clips, the woman appears extremely anxious. For one half of the participants, the clips are accompanied by subtitles that reflect the discussion of 'anxious' topics (i.e. public humiliation; hidden secrets; sexual fantasies). For the other half of the participants, the subtitles reflect non-anxious topics (e.g. fashion trends; world travel; favorite books). Previous research has shown that participants who receive the anxious topics rate the target person's dispositional anxiety as *lower* than participants who received the non-anxious topics (Gilbert et al., 1988). This reflects the presence of the discounting and augmenting principles, respectively; participants who received the anxious topics discounted the observed behavioral anxiety as being due to the topic content, while those who received the non-anxious topics tended to augment their ratings as the target appeared anxious despite the discussion of pleasant topics.

Following the three clips, participants were asked to rate the target person's *dispositional* anxiety on three 13-point bipolar scales anchored by: (1) is a calm (nervous) sort of person; (2) is probably comfortable (uncomfortable) in social situations; and (3) is generally relaxed (anxious) with people. Participants were then asked to *predict* the target person's anxiety in seven social situations (e.g. giving a spontaneous speech in class; meeting someone for the first time; going on a job interview) on 13-point Likert scales anchored by 'not at all anxious' and 'extremely anxious'. Both the three-item dispositional scale and the seven-item anxiety prediction scale had good reliability in the present study (i.e. Cronbach's alpha = (.70, .85)). Greater dispositional and predicted anxiety ratings in the 'non-anxiety' topics relative to the 'anxiety' topics' condition would reflect utilization of social contextual information.

After the anxiety ratings, a surprise recall and recognition task was administered to participants as a manipulation check. These memory tasks allowed for an indirect evaluation of whether participants had paid attention to the subtitles during the task. Participants were first asked to recall the three subtitles that had been shown and then, if all three subtitles were not recalled, to identify the three subtitles from a larger list of titles.

The Situation Matching Task (SMT; Ferman, 1993) comprises 14 target cartoons. Each cartoon depicts a protagonist experiencing a particular emotion (e.g. fear). The participant's task is to match the affective state of the protagonist in the target cartoon with the emotion displayed by the same character, but in different contexts. In the correct cartoon choice, the protagonist displays the same emotion but in a different context. In the distractor cartoon, the protagonist displays the same physical mannerisms as in the original cartoon, but exhibits a different emotion. For example, a target cartoon may show a figure struggling to keep his head above water (suggesting fear). The choices presented are either a figure surfing in an ocean (a distractor choice that shares similar physical properties with the target cartoon) and the correct choice, which depicts a figure being chased by someone (again depicting fear). For the present study, the SMT had adequate reliability (Cronbach's alpha = 0.62). Performance was indexed as the total number correct. Higher scores reflect greater use of social context.

2.2.2. Ward behavior

The clinical participants' behavior in the treatment setting was measured with the Nurse's Observation Scale for Inpatient Evaluation (NOSIE-30; Honigfeld et al., 1996). The NOSIE-30 was selected because of its previously demonstrated association with both neurocognitive (Spaulding et al., in press) and social-cognitive functioning (Penn et al., 1996) among persons with schizophrenia. The NOSIE-30 includes 30 behavioral items, which were rated by psychiatric technicians blind to the purpose and hypotheses of the study. Each item was rated on a five-point scale anchored by 'never' and 'always' based on observation of the participant's behavior over the previous 72 h. From these 30 items, six subscales were formed: Social Competence, Social Interest, Neatness, Irritability, Psychomotor Retardation, and Psychoticism.

Table 2
Group means on the Schema Comprehension Sequencing Task (SCST) as a function of context (title vs. no title) and stimulus length

Group							
Schizophrenia/schizoaffective				Non-clinical control subjects			
No title		Title		No title		Title	
Short	Long	Short	Long	Short	Long	Short	Long
Time to complete the task							
38.8	85.5	34.6	80.5	16.4	35.4	16.1	33.6
Number of correct adjoining parts							
2.4	3.5	2.2	3.3	3.0	6.1	3.1	6.0

Inter-rater reliability (i.e. intra-class correlations) was based on the ratings of three technicians for a subset of six participants. The ICC values for each scale were as follows: Social Competence (0.86); Social Interest (0.71); Neatness (0.87); Irritability (0.94); Psychomotor Retardation (0.42); and Psychoticism (0.80).

3. Results

3.1. Analyses of group differences on the social perception context tasks

A 2(Group: schizophrenia/schizoaffective vs. control subjects) ×2(Context: no title vs. title) ×2(Length: short vs. long) mixed model analysis of variance (ANOVA), with repeated measures on the Title and Length variables, was conducted on the time to complete the Schema Comprehension Sequencing Task-Revised (SCST-R) (in seconds) (Table 2). This analysis resulted in significant effects for Context, $F_{1,70}=8.84$, $P<0.01$, Group, $F_{1,70}=78.89$, $P<0.00$, and Length, $F_{1,70}=317.3$, $P<0.01$; faster time to complete the sequencing tasks occurred in the presence of the title, for the shorter length stimuli, and for non-clinical control subjects relative to those with schizophrenia/schizoaffective disorder. However, these main effects were qualified by a significant Length×Group interaction, $F_{1,70}=60.81$, $P<0.01$ (Fig. 1). Probing of the interaction revealed that increasing the length of the sequencing task had a stronger effect on the participants with schizophrenia/schizoaffective disorder relative to the non-clinical control subjects. The group with schizophrenia/schizoaffective disorder showed a greater slowing to complete the sequencing task than the non-clinical control subjects as stimulus length increased from five to eight cards. No other interactions were significant. Because the two groups differed on a few demographic variables, the analyses were repeated, first including participant Gender as an additional independent variable, and then including Years of Education as a covariate.[2] Gender did not exert any main or interactive effects on time to complete the sequencing task. Including Education in the analyses did not alter the significant main effect for Group or the Group×Length interaction, but did result in the main effects for both Context and Length no longer being statistically significant.

A 2(Group: schizophrenia/schizoaffective disorder vs. control subjects)×2(Context: no title vs.

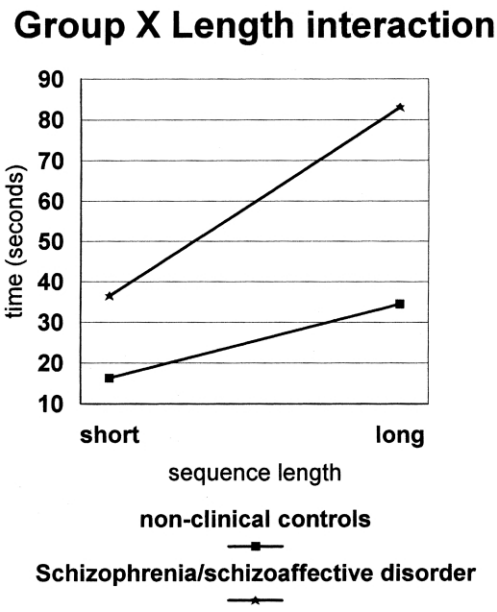

Fig. 1. Time to complete the SCST as a function of Group and Stimulus Length.

[2] Participant ethnicity was not included in the analyses because not all participants completed the SCST (schizophrenia/schizoaffective group=27; non-clinical control group=45). Based on those who completed the SCST, the two groups only differed in years of education and participant gender.

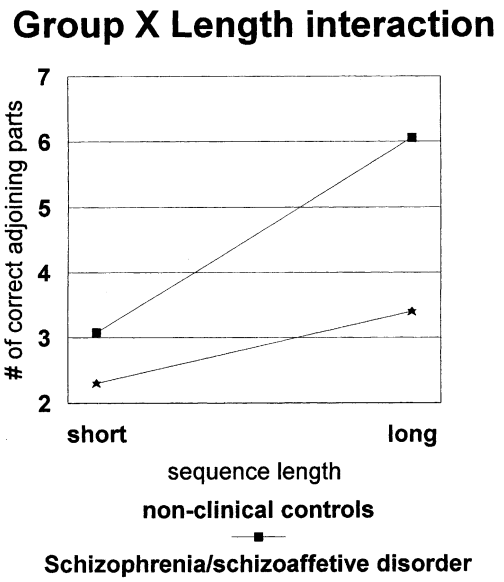

Fig. 2. Number of correct adjoining parts on the SCST as a function of Group and Stimulus Length.

title)×2(Length: short vs. long) mixed model ANOVA, with repeated measures on the Title and Length variables, was conducted on the number of correct adjoining parts on the SCST-R (Table 2). This analysis resulted in significant main effects for Length, $F_{1,70}=294.00$, $P<0.01$, and Group, $F_{1,70}=86.09$, $P<0.01$; more correct adjoining parts were formed for the long vs. the short sequences, and for the control subjects relative to the group with schizophrenia/schizoaffective disorder. These main effects were qualified, however, by a significant Group×Length interaction, $F_{1,70}=67.23$, $P<0.01$ (Fig. 2); the group with schizophrenia/schizoaffective disorder benefited less (i.e. in terms of number correct) than the non-clinical control subjects from the increase in sequence length from five to eight cards. No other main effects or interactions were significant. These results were unchanged after including Participant Gender and Education in the analyses, with the exception of the main effect of Stimulus Length no longer being significant after including Education as a covariate in the analyses.

On the Gilbert–Pelham Task (GPT), participants' ratings of the target person's *dispositional* anxiety level were entered into a 2(Group: control group vs. group with schizophrenia/schizoaffective disorder)×2 (Task Condition: anxious vs. non-anxious topics) between-subjects ANOVA (Table 3).[3] This analysis resulted in a main effect for Group, $F_{1,73}=4.95$, $P<0.05$; the control subjects rated the target person as more anxious than did the group with schizophrenia/schizoaffective disorder. The main effect of Task Condition and the Group×Task Condition interaction were not significant. These results were unchanged after including Educational Level as a covariate, and Participant Gender and Ethnicity did not exert any main or interactive effects on the dispositional anxiety ratings. However, the main effect for Group was attenuated ($P=0.165$) after including participant Ethnicity in the analyses. Although the means for the two groups were virtually identical across both sets of analyses, the inclusion of participant Ethnicity resulted in a loss of 4 d.f. and, therefore, less statistical power.

Participants' ratings of the target person's *predicted* anxiety level were entered into a 2(Group: control group vs. group with schizophrenia/schizoaffective disorder) ×2 (Task Condition: anxiety vs. non-anxious topics) between-subjects ANOVA (Table 3). As with the previous analysis, the only significant effect to emerge was for Group, $F_{1,73}=20.26$, $P<0.05$; the control subjects predicted that the target person would be more anxious in the future than did the group with schizophrenia/schizoaffective disorder. These results were unchanged after including education, target gender and ethnicity in the analyses.

The above analyses were repeated with only those participants who recalled or recognized at least two subtitles during the surprise memory task. This was done so as to ensure that the above findings were not an artifact of participants either not seeing or paying attention to the subtitles in the clips. The results were unchanged for participants' predicted anxiety ratings; only a main effect for Group was observed. For participants' ratings of the target's dispositional anxiety level, a Group main effect again emerged. However, both the

[3] Based on sample sizes of 45 (non-clinical control subjects) and 32 (group with schizophrenia/schizoaffective disorder).

Task Condition main effect, $F_{1,53}=3.21$, $P=0.079$) and the Group×Task Condition effects approached statistical significance, $F_{1,53}=3.10$, $P=0.084$. Inspection of the means from the interaction revealed that task condition had little effect on the control participant ratings (non-anxious topics=9.80; anxious topics=9.82). However, participants with schizophrenia/schizoaffective disorder rated the target's dispositional anxiety level as lower in the non-anxious topic condition (mean=7.13) than in the anxious topic condition (mean=9.43), *the opposite pattern* predicted from utilizing contextual information. Probing of the interaction revealed that the two groups differed in their dispositional anxiety ratings only for the non-anxious topics condition, $F_{1,30}=7.3$, $P<0.05$.

Performance on the Situation Matching Task (SMT) was evaluated in a one-way ANOVA, with Group as the between-subjects variable. The results of this analysis were significant, $F_{1,62}=30.93$, $P<0.01$ (Table 3); the group with schizophrenia/schizoaffective disorder performed significantly worse on this task relative to control subjects. These results were unchanged after including education as a covariate in the analyses.[4]

Table 3
Group means and standard deviations on the Gilbert–Pelham Task (GPT) and the Situation Matching Task (SMT)

Task	Group			
	Schizophrenia/schizoaffective		Non-clinical control subjects	
	Mean	S.D.	Mean	S.D.
GPT—Dispositional Anxiety Ratings				
Non-anxious topics	7.96	2.92	9.86	2.11
Anxious topics	8.97	2.50	9.46	1.76
GPT—Predicted Anxiety Ratings				
Non-anxious topics	7.92	2.09	10.39	2.72
Anxious topics	7.89	2.26	10.39	2.21
SMT	10.76	2.22	13.17	0.87*

* $P<0.05$.

3.2. Correlational analyses

To assess the relationship between social context processing and symptomatology, Pearson correlations were computed between performance on the SCST-R (i.e. time to complete the task and number of correct adjoining parts for short and long sequences, with and without the title) and SMT (i.e. number correct) with the four BPRS factors (i.e. Anergia, Thought Disorder, Disorganization, and Affect) ($N=28$). One-tailed tests were used because we expected that better performance on the social context tasks (i.e. faster time and more correct adjoining parts on the SCST; more correct on the SMT) would be associated with fewer symptoms. Performance on the Gilbert–Pelham Task was not included in the analyses, as higher or lower ratings of the target's anxiety level may not reflect better or more accurate task performance. In general, the results revealed little relationship between performance on the social context tasks and symptomatology. The only significant correlations in the hypothesized direction were greater Anergia being associated with the following indices on the SCST: Fewer correct adjoining parts on the SCST, with title, short stimulus sequence ($r=-0.33$, $P<0.05$), and fewer correct adjoining parts, with title, long stimulus sequence ($r=-0.43$, $P<0.05$). No other significant correlations were found in the hypothesized direction.

To assess the relationship between social context processing and ward behavior, Pearson correlations were computed between performance on the SCST and SMT with the six NOSIE scales (i.e. Social Competence, Social Interest, Neatness, Irritability, Psychomotor Retardation, and Psychoticism) ($N=24$) (one-tailed tests). The results revealed that greater Social Comptence was associated with the following indices on the SCST-R: More correct adjoining parts, short stimulus sequence, with title ($r=0.42$, $P<0.05$); more correct adjoining parts, long stimulus sequence, without title ($r=0.34$, $P<0.05$); and faster time to complete task (in seconds), long stimulus sequence, without title ($r=-0.35$, $P<0.05$). Greater Social Interest was associated with faster time to complete the SCST task (in seconds) for the following task conditions:

[4] Participant ethnicity and gender was not included in the analyses because not all participants completed the SMT (schizophrenia/schizoaffective disorder group=34; non-clinical control group=30). Based on those who completed the SMT, the two groups only differed in years of education.

Short sequence, with and without title ($r=-0.38$, $P<0.05$ and $r=-0.47$, $P<0.01$), and long sequence, with and without title ($r=-0.43$, $P<0.05$ and $r=-0.50$, $P<0.01$). More Neatness was associated with better performance on the SMT ($r=0.37$, $P<0.05$) and more correct adjoining parts, for the short sequence, with title, on the SCST ($r=0.47$, $P<0.05$). Finally, greater Psychomotor Retardation was associated with fewer adjoining parts on the SCST, for the short sequence with title ($r=-0.39$, $P<0.05$), and a longer time to complete the SCST for the following task conditions: Short sequence, with title ($r=0.43$, $P<0.05$), and long sequence, with and without title ($r=0.37$, $P<0.05$ and $r=0.40$, $P<0.05$).

4. Discussion

The purpose of this study was to examine social context processing in persons with schizophrenia/schizoaffective disorder. A secondary goal was to examine the ecological validity of these measures. The results showed that relative to a non-clinical control group, persons in the latter stages of an acute episode of schizophrenia/schizoaffective disorder showed deficits in various aspects of social cognition, with some evidence of impairments in the ability to utilize social contextual information. These impairments remained after controlling for initial group demographic differences. Although social context processing was relatively independent of symptoms, it showed a significant association with behavior in the treatment setting. These findings are discussed below.

Consistent with work on context processing for non-social stimuli (Silverstein et al., 2000; Stratta et al., 1999, 2000), participants with schizophrenia/schizoaffective disorder manifest impaired social context processing across multiple tasks. In particular, persons with schizophrenia/schizoaffective disorder had difficulty matching the emotional state of a cartoon character in one context with the character's emotional state in a different context. They also did not benefit from adding contextual information to a social sequencing task, as providing them with the title of the social situation did not significantly improve their time to complete the task or increase the number of behavioral actions placed in the correct order. However, the non-clinical control subjects also did not utilize contextual information (discussed below), although perhaps for different reasons. Therefore, the inability of the participants with schizophrenia/schizoaffective disorder to utilize contextual information represents an absolute impairment (i.e. within the group itself) and not a relative impairment (i.e. relative to the control group). Consistent with previous work in the area, persons with schizophrenia/schizoaffective disorder showed greater impairment on this sequencing task for long vs. short stimuli, suggesting that social-cognitive deficits become more pronounced as task difficulty increases (Corrigan and Addis, 1995). Finally, on a social perception task presented on videotape, they did not incorporate the content of the conversation topics into their impression of the target's dispositional and predicted anxiety level. Rather, a post hoc analysis suggested that the participants' with schizophrenia/schizoaffective disorder may have been distracted by the topics themselves, resulting in ratings that were based on topic content and not on the integration of that information with the observed behavior of the target person.

It is unclear whether these context-processing deficits are specific to social stimuli or reflect generalized poor performance (Chapman and Chapman, 1978). To address this issue, it would be necessary to include a battery of non-social context processing tasks, psychometrically and conceptually matched to the social context tasks used in this study.[5] Although the findings were generally unchanged after considering group differences in educational level, it is still possible that the group with schizophrenia's impairment in social context processing group could have been due to general context processing difficulties. Indirect evidence, however, for the possible independence between context processing for non-social and social stimuli is gleaned from the symptom correlational analyses. Specifically, while context processing for non-social stimuli has shown rela-

[5] A non-social context task was originally included in the design of this study (i.e. a perceptual configuration task; Silverstein et al., 1996). However, incomplete data and software problems precluded using those data in this study.

tionships with disorganization (Cohen et al., 1999; Silverstein et al., 2000) and positive symptoms (Kuperberg et al., 1997; Stratta et al., 2000), little relationship with symptoms was observed in this study, other than isolated associations with Anergia. Of course, the different pattern of findings across studies could be due to differences in samples, symptom assessment tools, etc. Alternatively, it could reflect the general independence found between positive symptoms and measures of social functioning (reviewed in Glynn, 1998). Therefore, performance on the social context tasks may reflect the processes that are used during actual social situations, which thus make them likely to conform to the type of correlational patterns shown with social competence measures.

Along these lines, we found fairly consistent relationships between performance on the social sequencing task and behavior in the treatment setting. We have previously reported on a similar pattern of findings regarding a different social sequencing task and social behavior among long-term inpatients with schizophrenia (Penn et al., 1996). This suggests that the ability to organize social situations into their component parts may have important implications for actual social behavior. Thus, these findings add to the growing body of literature regarding the ecological validity of social cognition in schizophrenia (Penn et al., 2001).

An unexpected finding was that the non-clinical control participants did not utilize the contextual information on the Schema Comprehension Sequencing Task-R (SCST-R) and the Gilbert–Pelham tasks (i.e. the subtitles).[6] Inspection of the means for the SCST (Table 2) suggests that the lack of a context effect might have been due to performance ceiling effects in the 'no title' (i.e. no context) condition. This would have left little room for improvement after adding contextual information. It is possible that the non-clinical control participants applied their own 'context' to the stimuli in the form of their knowledge regarding social situations or schemata. If this is true, then different mechanisms may underlie the lack of social context effects observed for the group with schizophrenia and non-clinical control subjects.

The lack of social context effects for the non-clinical control subjects on the Gilbert–Pelham Task is in contrast to the findings reported in the original Gilbert et al. (1988) study, in which participants showed the hypothesized augmenting and discounting effects in response to the subtitle topics. This lack of context effect occurred despite following the original Gilbert et al. instructions verbatim and consulting with both Gilbert and Pelham on task administration. Unlike the participants in Gilbert et al., the majority of non-clinical control subjects in this study were persons living in the community, not university students. Therefore, subtle differences in cognitive processes, familiarity with experimental research, and conformity to task demands between university students and persons in the general population may have accounted for the observed results (Sears, 1986). It is also possible that the participants in our study chose *not* to use the contextual information in their target ratings. On the surprise memory task, the non-clinical participants recalled an average of 2.21 subtitles (S.D. = 0.87), indicating that the contextual information was available to them, just not utilized. Therefore, for the non-clinical control subjects in this study, the Gilbert–Pelham Task was performed more as a straightforward social perception task. Interestingly, for those participants with schizophrenia/schizoaffective disorder who recalled or recognized at least two subtitles, their target ratings did not incorporate the subtitle content, but appeared to be distracted by them. Thus, participants receiving the non-anxious topics tended to rate the target person as less anxious than those who received the anxious topics. Their perception, then, appeared to be driven more by the subtitle content than the target person's behavior, a pattern consistent with the tendency of persons with schizophrenia to spend more time than necessary looking at non-essential features of social stimuli (e.g. Phillips and David, 1998).

[6] These unexpected findings do not appear to be the result of non-normality of the study subjects' performance on the various tasks. A deviation from normality was observed for only the control sample on the Gilbert–Pelham Task; scores were negatively skewed. However, a square root transformation with reflection did not change the observed results.

This study has a number of limitations that should be considered. First, the findings concerning social context processing (and their behavioral correlates) among acutely ill persons with schizophrenia/schizoaffective disorder may not be generalizable to persons whose symptoms have remitted. Second, the two groups in this study may have differed in a number of unmeasured variables, such as socioeconomic status and executive processing skills, which may have influenced the findings. Third, although group differences in demographics did not affect the observed results, it should be noted that dividing modest sample sizes into smaller subgroups reduced power significantly. Therefore, the effects of gender and ethnicity on social context processing should be examined with larger sample sizes. Finally, two of the social context measures, the GPT and the EMT, have a limited history of utilization in clinical research. Although data were presented supporting their reliability, they should still be considered relatively novel measures and exploratory in use.

In closing, the present study showed that persons with schizophrenia/schizoaffective disorder do not use context when processing social stimuli. Future work should examine performance on these tasks relative to matched non-social context tasks. It is unclear whether these impairments are stable or reflect state/clinical characteristics. Therefore, a longitudinal design or one that compares individuals during different phases of the illness is advised. Finally, the measures of social context processing showed an association with behavior in the treatment setting, suggesting that the constructs underlying these processes may be worthy targets of psychosocial interventions.

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