Abstract

The purpose of the study was to identify subjective experiences that are characteristic of schizophrenia. A questionnaire for self-assessment of disturbances in several cognitive-perceptual areas (the Eppendorf Schizophrenia Inventory) was constructed and administered to first episode schizophrenia patients (SCH; n = 45), negative-syndrome schizophrenia patients (SCH; n = 45), remitted schizophrenia subjects (SCH; n = 24), depressive patients (DEP; n = 43), alcoholic patients (ALC; n = 48), obsessive-compulsive patients (OCD; n = 46), and healthy controls (CON; n = 57). Comparisons between the SCH, SCH, DEP, ALC, and OCD groups and a subsequent factor analysis revealed four schizophrenia-specific dimensions: Attention and Speech Impairment (AS), Ideas of Reference (IR), Auditory Uncertainty (AU), and Deviant Perception (DP). Further analyses suggested that the AS syndrome represents a mediating vulnerability factor, while IR, AU, and DP probably are reversible episode indicators. The results may contribute to the refinement of the measurement of specific prepsychotic signs, thus facilitating the development of early intervention approaches.

Keywords: Schizophrenia, subjective experience, diagnostic specificity, self-assessment, early signs and symptoms, Eppendorf Schizophrenia Inventory.


The investigation of prepsychotic subjective signs and symptoms of schizophrenia has a long history in psychological and psychiatric research. Many studies have dealt with the diagnostic specificity of these phenomena and their validity as precursors of psychotic decompensation. The following is a short review of the research on this topic.

Cameron (1938) investigated symptoms of early schizophrenia in a sample of 100 inpatients who had been admitted for the first time. He distinguished nonspecific from specific symptoms. The nonspecific symptoms (e.g., nervousness, sleeplessness, lack of concentration, depression) were considered diagnostically ambiguous since they can be found preceding disorders other than schizophrenia. The specific symptoms (e.g., ideas of being observed and talked about, hallucinations, odd somatic experiences) appear especially in clinically manifest schizophrenia. As Cameron pointed out, these symptoms can persist for varying periods (days to years) before hospitalization is considered necessary.

In 1961, McGhie and J. Chapman interviewed schizophrenia patients (n = 26) in early stages of their psychotic illness to investigate subjective experiences of cognitive dysfunction of schizophrenia. The authors concluded that schizophrenia is primarily marked by a disturbance in the selective-inhibitory mechanism of attention. J. Chapman (1966) interviewed 40 schizophrenia inpatients with a maximum duration of illness of 3 years to examine changes in subjective experience in early stages of the disease. He found different facets of perceptual and cognitive dysfunction (disturbed visual perception, blocking phenomena, and disturbances in speech production, gesture language, and motor functions). Chapman (1966) interpreted these cognitive-perceptual phenomena as primary, while affective symptoms (anxiety, depression), social withdrawal, and certain odd behaviors were considered secondary reactions.

In order to achieve a quantification of subjective experiences, Tucker et al. (1969) constructed a questionnaire mainly based upon the patient’s verbatim statements presented in the clinical reports of Chapman (1966) and McGhie and Chapman (1961). However, Tucker et al. (1969) found that schizophrenia patients merely exceed other patient groups in admitting to this questionnaire. This lack of diagnostic specificity has been explained with the narrow and idiosyncratic formulations of the items
(Freedman and Chapman 1973). Another explanation is that the reports, which were the starting point for the Tucker et al. (1969) scale, included clinical interviews exclusively with schizophrenia patients and, therefore, it remained unknown to what extent the described phenomena also occur in non-schizophrenia samples.

Freedman and Chapman (1973) interviewed 20 schizophrenia and 20 non-schizophrenia inpatients; preliminary analyses yielded ratings for 46 specific subjective experiences of cognitive and perceptual changes. Schizophrenia patients exceeded nonschizophrenia subjects significantly in eight symptoms: thought blocking that disrupts speech, mental fatigue, inability to focus attention, concentration impairments attributed to preoccupation, visual illusions, more acute auditory perception, misidentification of people, and language not understood.

On the basis of a literature review, Docherty et al. (1978) extracted five stages of onset of a schizophrenia psychosis. The first two of these are nonpsychotic: (1) overextension (characterized by, e.g., overstimulation, irritability, distractibility); (2) restricted consciousness (e.g., limited range of thought, apathy, social withdrawal); (3) disinhibition (e.g., hypomanic behavior, dissociative phenomena, ideas of reference); (4) psychotic disorganization (e.g., speech of others seems incomprehensible, loss of self-identity, hallucinations, catatonia); and (5) psychotic resolution (e.g., delusional systems, paranoid or hebephrenic organization). In a retrospective study on schizophrenia patients and family informants, Herz and Melville (1980) confirmed this model by describing a nonpsychotic, prodromal period usually preceding schizophrenia relapses. However, patients did not report two distinct prepsychotic stages.

Birchwood et al. (1989) interviewed family members of 42 schizophrenia patients to elicit changes in the patient’s behavior prior to the recent hospitalization. They discerned four groups of symptoms: anxiety/agitation, depression/withdrawal, disinhibition, and incipient psychotic symptoms. Based on these relative observations, a 34-item questionnaire was formed (Early Signs Scale, ESS). During a prospective pilot study, the ESS was completed fortnightly by 19 schizophrenia outpatients and observer informants (e.g., relatives). Post hoc analyses showed that increased ESS scores predicted relapse and no relapse accurately in 79 percent of cases. In spite of these promising results, it can be argued that the symptoms measured by the ESS are limited to changes in behavior. However, subjective experiences without observable effects may have additional predictive power; furthermore, they may occur first, thus offering possibilities for earlier interventions. Nothing can be said about the diagnostic specificity of the ESS since no comparison with other clinical groups has been made.

Cutting and Dunne (1989) described the development of a structured interview for the assessment of subjective experience of schizophrenia and depression. In the final stage of the study, 20 remitted schizophrenia subjects (mean period of remission: 19 months) were compared with 20 remitted depressive patients (mean period of remission: 5 months). When asked for their experiences when they first became ill, the depressives remembered more often an increased noise sensitivity, and the schizophrenia subjects remembered more visual-perceptual changes and a special quality of thinking. No differences for attention, language, and auditory perception were reported. Although these results were reliable in terms of interrater and intertemporal stability, the validity of the retrospective accounts seems questionable, in particular because both groups differed considerably regarding the remission period.

Altogether, in spite of the long tradition of research on the manner in which schizophrenia subjects perceive themselves and their environments, less is known of the extent to which the described phenomena are specific signs or precursors of schizophrenia. The availability of valid diagnostic methods is crucial for the efficacy of recent approaches of early detection and treatment of schizophrenia (Carpenter and Heinrichs 1983; Falloon 1992; Birchwood and Macmillan 1993; Falloon et al. 1996; Yung et al. 1996). Therefore, a study was designed to systematically and quantitatively investigate those facets of subjective experiences that discriminate schizophrenia patients from other clinical groups. A new questionnaire for quantitative measurement of these signs and symptoms will be developed. To evaluate the nature of these experiences, they will be compared with psychopathological, neuropsychological, and other data.

Methods

Subjects. A total of 308 subjects were included in this study: 227 psychiatric inpatients who were recruited from the University Hospital, Hamburg-Eppendorf, and from the Northern Clinic, Hamburg-Ochsenzoll (table 1), 24 outpatients, and 57 healthy persons. These subjects were attached to seven diagnostic groups: three schizophrenia groups, three clinical comparison groups, and a control group.

Forty-five patients had an International Classification of Diseases (ICD-10, World Health Organization 1992) diagnosis of paranoid schizophrenia (code F20.0) and currently were passing through their first psychotic episode (group SCH1); the subsequent course confirmed the original diagnosis (otherwise the patient was excluded from the study). Twenty-eight members of the SCH1 group agreed to participate in a 1-year followup investigation. The second group (SCH2) was composed of 45 schizophrenia patients with a predominant negative psy-
Subjective Experiences of Schizophrenia

Table 1. Characteristics of the comparison groups

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Age in years, mean (SD)</th>
<th>Male gender, n (%)</th>
<th>Duration of illness in years, mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCH₁</td>
<td>45</td>
<td>30.0 (9.7)</td>
<td>28 (62.2)</td>
<td>0.8 (1.4)</td>
</tr>
<tr>
<td>SCH₂</td>
<td>45</td>
<td>37.8 (9.7)</td>
<td>35 (77.8)</td>
<td>9.3 (7.9)</td>
</tr>
<tr>
<td>SCH₃</td>
<td>24</td>
<td>37.7 (11.6)</td>
<td>14 (58.3)</td>
<td>8.5 (9.5)</td>
</tr>
<tr>
<td>DEP</td>
<td>43</td>
<td>48.2 (11.6)</td>
<td>17 (39.5)</td>
<td>9.9 (10.6)</td>
</tr>
<tr>
<td>ALC</td>
<td>48</td>
<td>38.4 (7.3)</td>
<td>30 (62.5)</td>
<td>5.0 (5.8)</td>
</tr>
<tr>
<td>OCD</td>
<td>46</td>
<td>33.8 (9.9)</td>
<td>19 (41.3)</td>
<td>6.2 (6.9)</td>
</tr>
<tr>
<td>CON</td>
<td>57</td>
<td>33.8 (10.7)</td>
<td>29 (50.9)</td>
<td>—</td>
</tr>
</tbody>
</table>

Note.—ALC = alcoholism; CON = control; DEP = depression; OCD = obsessive-compulsive disorder; SCH₁ = first episode schizophrenia; SCH₂ = negative-syndrome schizophrenia; SCH₃ = remitted schizophrenia; SD = standard deviation.

¹ Actual age minus age at first contact with a mental health care professional.

Of the schizophrenia inpatients (SCH₁ and SCH₃, n = 90), 39 were on typical neuroleptic (NL) treatment (median of daily dosage in equivalence to chlorpromazine: 171 mg); 37 patients took atypical NL (equivalence median: 257 mg). Nine patients received both typical and atypical NL (equivalence median: 244 mg), and five patients received no NL at all. Additionally, 31 patients received benzodiazepines (median of dosage in equivalence to lorazepam: 2.5 mg), and 29 patients received other medication (e.g., biperiden, antidepresants, antiepileptic drugs). Calculation of NL and benzodiazepine equivalents was based upon the algorithms of Jahn and Mussgay (1989) and Poser and Poser (1986).

Questionnaire. The main research instrument of the study was the Eppendorf Schizophrenia Inventory (ESI). Initially, the ESI was an item pool of 138 statements aimed at subjective experiences of schizophrenia with a special focus on cognitive phenomena. In order to obtain a preliminary survey of the range of possible subjective phenomena, symptom descriptions from several procedures that measure abnormal psychic experiences were inspected: Frankfurt Complaint Questionnaire (Süßwolfd 1986), Bonn Scale for the Assessment of Basic Symptoms (Gross et al. 1987), Schizotypal Personality Questionnaire (Raine 1991), Perceptual Aberration Scale (Chapman et al. 1978), Abnormal Psychic States (Dittrich 1975), and Scales for Rating Psychotic and Psychotic-like Experiences (Chapman and Chapman 1980). Additionally, reports with citations of verbatim statements of early schizophrenia signs and symptoms were reviewed (e.g., Conrad 1958; McGhie and Chapman 1961; Chapman 1966; Freedman and Chapman 1973). Irrespective of their different theoretical backgrounds, these procedures and reports show considerable overlap concerning the target phenomena. Suitable symptom descriptions were selected; however, in most cases the formulations had to be changed and simplified (e.g., to avoid connected state-
ments or double negations). A preliminary subdivision of the 138 symptomatic items yielded the following scopes considered by the ESI: disturbed thinking (29 items), disturbed speech (13 items), impaired memory (7 items), loss of automated behavior patterns (6 items), aberrations of visual or auditory perception (34 items), abnormal body perception (20 items), disturbed motor control (12 items), and psychotic-like experiences (17 items). Additionally, 16 control items (mainly to control for tendencies to answer in a socially desired manner) were included.

A short instructional text asked subjects to take the current state (i.e., the last 4 weeks) as a basis for the self-assessment; it was especially noted that the statements are not aimed at effects of medication, alcohol, or drugs. All ESI items had to be answered on a four-step scale (ranging from 3, “absolutely true,” to 0, “not true at all”).

Psychopathological Assessment. Psychopathological symptoms of all subjects were documented with the Positive and Negative Syndrome Scale (PANSS; Kay et al. 1987). PANSS ratings were completed by clinically trained investigators based on semistructured interviews lasting about 30–60 min. According to former factor analyses (Mass et al. 2000), psychopathology was described with positive, negative, cognitive, excitement, and depression PANSS syndromes.

Neuropsychological Testing. Since disorders of attention are an important aspect of the subjective experience of schizophrenia (e.g., McGhie and Chapman 1961), the relationship of those experiences with objective measures of attentional dysfunction is of interest. Therefore, the Continuous Performance Test (CPT), the Span of Apprehension Task (SAT), and the test of Reaction Time (RT) were used. The CPT is a measure of sustained attention, while the SAT refers to the number of stimuli that can be attended to, apprehended, and reported (Braff 1987). The simple RT test was used to distinguish between specific information-processing dysfunctions, as measured by CPT and SAT, and a possible generalized deficit. In the following paragraphs, only a short description of the CPT, SAT, and RT procedures is given; see Mass et al. (2000) for more detailed information.

Continuous performance. During the computerized CPT version (Kathmann et al. 1996) used in this study, 480 blurred digits were presented successively on a monitor; each stimulus was presented for 42 ms with an interstimulus interval of 1 s. The task was to detect the digit “0” (25% of all stimuli, randomly distributed) and to respond to it by pressing the space bar of the keyboard. As performance measures, the indexes $d'$ and $\log (B)$ (sensitivity and response bias; Green and Swets 1966) were calculated. The test duration was 8 min.

Span of apprehension. In this computerized SAT, either three (16 stimuli) or eight (80 stimuli) consonants falling in a $4 \times 4$ matrix were displayed (presentation time: 100 ms) in a randomized order. Every display contained either the letter “F” or the letter “T,” but never both. The subjects were instructed to press the left cursor key when detecting “F,” to press the right cursor key when detecting “T,” and to guess (right or left cursor key) when in doubt. The visual angle of the displays was relatively wide (about $15° \times 15°$). The performance measures are the numbers of correct reactions during the three- or eight-letter condition, respectively. The test duration was also about 8 min.

Reaction time. To obtain RT parameters, 128 visual (red light) or auditory (signal tone) stimuli were presented in a randomized order (presentation time: 1 s; interstimulus interval: 2.5 s) using a Vienna Reaction Device. Subjects had to press a button as fast as possible when a stimulus occurred. The performance measure is the median (ms) of all 128 single reaction times. The test duration was 5 min.

Statistical Analyses. All analyses were conducted with the Statistical Package for the Social Sciences, Release 6.0.1 for the Macintosh. Because of skew distribution and statistical outliers of the questionnaire data, nonparametric procedures were preferred. Statistical testing always was two-tailed.

Results

Identification of Characteristic Items and Formation of Subscales. Each ESI item was compared between the five inpatient groups (SCHg, SCHh, DEP, ALC, and OCD). An ESI item was considered characteristic for schizophrenia if a Kruskal-Wallis $H$-Test was marginally significant ($p < 0.1$) and both schizophrenia groups occupied the first two mean rank places. The requirement that a symptom has to be predominant in the first episode group (SCHg) as well as in the chronic group (SCHh) prevents the selection of symptoms that are just secondary reactions occurring in the later stages of the illness (e.g., experiences produced by prolonged hospitalization or tardive dyskinesia). This criterion was met by 34 of the 138 items included ($\approx 25\%$). The dimensional structure of these selected items was evaluated using an exploratory principal components analysis with orthogonal varimax rotation and application of the eigenvalue criterion, carried out with the combined data of the groups SCHg and SCHh ($n = 90$). Four factors were extracted, explaining 48.2 percent of the total variance. Based on these factors, four subscales were derived by simply summing up the items with the highest loading on the respective factor.
The first factor (explaining 27.3% of the variance) was AS. It mainly describes impairments of the adequate reception and interpretation of environmental stimuli, above all affecting speech. The subscale consists of 10 items and has an internal consistency of 0.87 (Cronbach’s $\alpha$). Typical statements of this subscale are “If someone speaks to me, I often have trouble grasping the meaning of the words correctly” (loading: 0.76) and “When I watch television, it is difficult for me to follow the pictures and words and to catch the story simultaneously” (0.71).

The second factor (8.6%) was IR. It represents a tendency to interpret trivial events in an excessively meaningful way and a delusional mood. Typical statements of the subscale (7 items, $\alpha = 0.77$) are “Now and then, events, broadcasts, etc., seem to be related to me although it is actually impossible” (0.66) and “Sometimes I think that certain signs are given personally to me that no one else can recognize” (0.64).

The third factor (6.8%) was AU. It describes an insecurity in discriminating between thoughts and words that actually have been heard. Furthermore, a vague impression of being influenced is part of this factor. The subscale consists of eight items ($\alpha = 0.78$); typical statements include “Even if I hear something very clear, sometimes I am not sure whether I just imagined it” (0.73) and “Sometimes I hear my ’inner voice’ as distinctly as if someone actually is talking to me” (0.72).

The fourth factor (5.4%) was DP. It refers to aberrations of perceptual processes, especially involving disturbances of body image. The subscale includes nine items ($\alpha = 0.83$); typical statements are “Sometimes a part of my body seems to be smaller than it really is” (0.69) and “Now and then, I don’t feel my limbs properly when I move” (0.64).

One-way analyses of variance (ANOVAs) with post hoc Duncan comparisons showed that, in all four ESI subscales, the groups SCHf and SCHn showed significantly higher scores than each of the remaining five groups (SCH,, DEP, ALC, OCD, and CON). The AS score of the SCHn group was higher than that of the SCHf group, while both groups did not differ significantly in the other subscales (figure 1).1

**Psychopathology.** The mean PANSS syndrome scores of the three schizophrenia groups at the time of assessment are shown in figure 2.

The relationship between characteristic subjective experiences of schizophrenia (ESI subscales) and psychopathologic symptoms (PANSS syndromes) were investigated for the combined group of schizophrenia inpatients (SCHf and SCHn; table 2).

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1A copy of the final version of the ESI (English or German) is available by request from the author.

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**Figure 1. Mean ESI subscale scores for all groups**

**Figure 2. Mean PANSS syndrome scores of the schizophrenia samples**
Neuropsychology. The relationship between ESI subscales and neuropsychological data will be presented for the SCHr group only (table 3); within the SCHf group, none of the considered neuropsychological variables showed significant correlations with the ESI subscales.

The first episode schizophrenia group showed several slight but significant correlations between the CPT indexes and the ESI subscales. SAT performance (eight-letter condition, left visual field) correlated with all subscales. SAT three-letter condition, SAT eight-letter condition (right visual field), and simple reaction time were not related to subjective experiences.

Followup. As mentioned above, 28 of the 45 first episode schizophrenia patients took part in a 1-year retest. Thirteen patients refused further participation, one patient was not within reach, and three patients in the meantime had committed suicide. The dropout subjects did not differ from the participating subjects in age or school education; however, the portion of males was higher in the dropout group ($\chi^2 = 4.71$, $df = 1$, $p < 0.05$). Furthermore, the dropout patients had more negative ($t = 2.08$, $df = 43$, $p < 0.05$) and cognitive symptoms ($t = 2.60$, $df = 43$, $p < 0.05$).

Table 2. Relationship (Spearman's Rho) between ESI subscales and PANSS syndromes (combined group SCHr, n = 90)

<table>
<thead>
<tr>
<th>ESI-AS</th>
<th>ESI-IR</th>
<th>ESI-AU</th>
<th>ESI-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PANSS-POS</td>
<td>0.34**</td>
<td>0.47***</td>
<td>0.53***</td>
</tr>
<tr>
<td>PANSS-NEG</td>
<td>0.21*</td>
<td>-0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>PANSS-COG</td>
<td>0.22*</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>PANSS-EXC</td>
<td>0.12</td>
<td>0.28**</td>
<td>0.20(*)</td>
</tr>
<tr>
<td>PANSS-DEP</td>
<td>0.08</td>
<td>0.13</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

Note.—ESI = Eppendorf Schizophrenia Inventory (AS = Attention and Speech Impairment; AU = Auditory Uncertainty; DP = Deviant Perception; IR = Ideas of Reference); PANSS = Positive and Negative Syndrome Scale (COG = cognitive; DEP = depression; EXC = excitement; NEG = negative; POS = positive); SCHr = first episode schizophrenia; SCHf = negative-syndrome schizophrenia.

(*) $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; two-tailed

Table 3. Relationship (Spearman's Rho) between ESI subscales and neuropsychological results (group SCHf, n = 45)

<table>
<thead>
<tr>
<th>ESI-AS</th>
<th>ESI-IR</th>
<th>ESI-AU</th>
<th>ESI-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT-$d'$</td>
<td>-0.19</td>
<td>-0.33*</td>
<td>-0.29(*)</td>
</tr>
<tr>
<td>CPT-log (B)</td>
<td>-0.28(*)</td>
<td>-0.43**</td>
<td>-0.43**</td>
</tr>
<tr>
<td>SAT-3</td>
<td>-0.02</td>
<td>-0.09</td>
<td>-0.28</td>
</tr>
<tr>
<td>SAT-8 left</td>
<td>-0.28(*)</td>
<td>-0.29(*)</td>
<td>-0.48***</td>
</tr>
<tr>
<td>SAT-8 right</td>
<td>-0.04</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>RT</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Note.—CPT = Continuous Performance Test; CPT-$d'$ = sensitivity of the CPT; CPT-log (B) = response bias of the CPT; ESI = Eppendorf Schizophrenia Inventory (AS = Attention and Speech Impairment; AU = Auditory Uncertainty; DP = Deviant Perception; IR = Ideas of Reference); RT = reaction time; SAT = Span of Apprehension Task; SAT-3 = hits during the 3-letter condition of the SAT; SAT-8 left = hits during the 8-letter condition of the SAT, left visual field; SAT-8 right = hits during the 8-letter condition of the SAT, right visual field; SCHf = first episode schizophrenia.

(*) $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; two-tailed

For the remaining subsample, the stability over time of the ESI subscales was investigated by calculation of retest reliability coefficients. Only the AS subscale proved to be relatively stable ($r_p = 0.42$, $p < 0.05$); the other subscales (IR, AU, and DP) showed minor stability ($r_p = 0.32$, 0.30, and 0.17 respectively, nonsignificant).

Psychopharmacology. Within the combined schizophrenia group (SCHf and SCHr, $n = 90$), neither typical or atypical NL medication nor the added dosage of typical and atypical NL treatment were related to subjective experiences. However, those patients who were on benzodiazepines ($n = 31$) reported significantly higher scores in the AS (Mann-Whitney $U$ test: $U = 568.5$, $p$ corrected for ties $< 0.01$), IR ($U = 325.4$, $p < 0.001$), and DP ($U = 544.0$, $p < 0.01$) subscales.

Further analyses yielded that the schizophrenia patients on benzodiazepine also reached significantly higher ratings in the positive and cognitive PANSS syndromes. Obviously, the administration of benzodiazepines in general was associated with a more productive psychotic state. Within the benzodiazepine subsample, the daily dosage showed nonsignificant, negative correlations with the ESI subscales (AS: $Rho = -0.01$; IR:
Rho = -0.19; AU: Rho = -0.06; DP: Rho = -0.27), probably because of the therapeutic effects of the medication.

**Sociodemographic Variables, Course of Illness.** Calculated for the combined schizophrenia group, neither age nor gender correlated with any of the ESI subscales. However, a high educational level to some extent goes along with reduced AS and DP scores (Rho = -0.21/-0.22, p < 0.05).

Duration of illness (table 1) as well as the total number of psychiatric admissions correlated only with the AS subscale (Rho = 0.27/0.28, p < 0.01). Furthermore, the age at first psychiatric admission also correlated significantly only with AS, even when the effects of age and gender were partialized out ($r_{xyz} = -0.32$, $p < 0.01$).

**Remitted Schizophrenia Subjects Versus Controls.** The groups SCH, and CON did not differ with regard to mean age, gender distribution, or school education. Comparisons with Mann-Whitney U tests yielded that the AS score of the SCH, group (mean rank) was significantly higher than that of the control group ($U = 445.0, p < 0.01$). The other ESI scores likewise were increased, but the differences failed to show statistical significance.

**Discussion**

The present analyses revealed four components of characteristic subjective experiences of schizophrenia patients. However, since in this study the only subjects with psychotic symptoms were the schizophrenia groups SCH, and SCH, it is possible that some or all of these experiences are specific not for schizophrenia but for psychotic or prepsychotic mental states. The subjective AS component resembles the symptom pattern of disturbed speech perception and distractability of concentration that was already mentioned in the vivid clinical reports of McGhie and Chapman (1961) and Chapman (1966). Freedman and Chapman (1973) and Docherty et al. (1978) also reported difficulties in language understanding as one of the subjective symptoms that were typical for schizophrenia. In a study on the diagnostic validity of the Bonn Scale for the Assessment of Basic Symptoms, Klosterkötter et al. (1996) showed that a syndrome of impaired information processing (including subjective disturbances of speech, thought, and perception) differentiates schizophrenia from organic and affective disorders. Docherty et al. (1998) investigated 10-min conversation speech samples of schizophrenia patients and their relatives and found more communication disturbances (e.g., wrong word references, unclear structure) than in the speech samples of a control group. Crow (1993) pointed out that disturbances of language function are present early in schizophrenia and play a central role.

Disorder of the form of thought (DFT) that manifests as loosening of associations (Bleuler 1950) seems to be a schizophrenia feature that is closely related to language/speech deficits (Maher 1991). Schizophrenic thoughts and utterances often show shifts of ideas and words from one subject to another merely or indirectly related subject. Accordingly, using a lexical decision paradigm, Spitzer et al. (1993, 1994) showed that schizophrenic patients with DFT exhibit more semantic priming (i.e., increase in activation or decrease in inhibition in the spreading of associations) than schizophrenia patients without DFT. Recently, Kuperberg et al. (1998) found reductions of sensitivity to the linguistic context especially in DFT schizophrenia. Since DFT is a main component of the cognitive syndrome of the PANSS, these results fit well to the significant correlation (Rho = 0.22; table 2) between the AS subscale and the cognitive syndrome found in the present study.

Several details of the present results suggest that the AS syndrome is a trait rather than a state: (1) significant 1-year retest reliability, (2) correlation with the age at first admission, and (3) increased scores of remitted schizophrenic subjects compared with healthy controls. Moreover, since only AS is linked to formal thought disorder, it possibly represents a mediating vulnerability factor according to Nuechterlein and Dawson (1984). (However, the fact that the mean AS score of the SCH, group is lower than that in the DEP, OCD, and ALC groups shows that the acuity of the psychopathological state has a significant effect on the phenomena represented by the AS subscale.)

In contrast, IR, AU, and DP show several features of reversible episode indicators: (1) moderate correlations (Rho ≈ 0.5) with the PANSS positive syndrome, (2) insignificant 1-year retest reliability, (3) no relation to onset or course of illness, and (4) return to normal level during remission. IR, AU, and DP could be interpreted as prepsychotic changes of subjective experience or "micro-productive positive symptoms in statu nascendi" (Huber 1995, p. 135). It has been suggested that schizophrenia patients with hallucinations have deficits in the ability to discriminate between real and imaginary events (Heilbrun 1980; Heilbrun et al. 1983; see also Bentall 1990, Strauss 1993); the AU subscale seems to represent a self-perception of these deficits. Experiences of perceptual disturbances and ideas of reference are well-known characteristics of schizophrenia (Conrad 1958; Chapman et al. 1978) and are represented by the IR and DP subscales, respectively.

Since especially AS seems to be connected to cognitive and negative psychotic symptoms, it is somewhat disappointing and implausible that AS merely correlates with any of the neuropsychological (NP) tests (CPT, SAT, RT). Docherty et al. (1996) showed that linguistic reference failures in a schizophrenia sample were correlated with a
combined working memory measure (time to correct completion of part B of the Trailmaking Test, number of incorrect responses during a Verbal Fluency Test); no significant correlation with an auditory CPT was found. On the assumption that linguistic performance as measured by Docherty et al. (1996) is related to the AS syndrome as identified in the present analyses, NP tests of prefrontal/working memory functions (e.g., Trailmaking, Verbal Fluency, Wisconsin Card Sorting) possibly would have yielded stronger correlations with the AS syndrome. This hypothesis is also supported by the essential role that dysfunctions of the prefrontal cortex play in the etiology of schizophrenia (Weinberger 1987; Davis et al. 1991; Andreasen et al. 1992).

The highly significant correlation between AU and SAT performance in the left visual field (Rho = -0.48; table 3) corresponds with hypotheses that auditory hallucinations might arise from right cerebral hemisphere dysfunction (Randall 1983; Cutting 1990; for a review, see David 1994), but certainly this interpretation is in need of more empirical support.

The difference between the SCHf and SCHn groups regarding the correlations between subjective experiences (i.e., ESI subscales) and NP data is an unexpected result. A possible explanation refers to the fact that SCHf represents a “negative selection” of schizophrenia patients, including mainly patients with unfavorable, chronic courses of illness; in contrast, SCHn is a mixed group, including patients who have good and poor prognoses (see Huber et al. 1980). Accordingly, the SCHn group is significantly more impaired than the SCHf group in all NP measures; the resulting restriction of variance of NP data in the SCHf group may have prevented significant correlations.

As mentioned above, self-assessment of subjective experiences has the advantage of high sensitivity to slight and early signs of psychotic developments. For example, in the present study the combined schizophrenia sample included 16 subjects without any positive psychotic symptoms (i.e., “absent” ratings for the PANSS items P1, delusions; P3, hallucinatory behavior; and G9, unusual thought content). Nevertheless, most of these patients (87.5%) reported prepsychotic subjective experiences (i.e., nonzero scores in the ESI subscales IR, AU, or DP); furthermore, the difference of the prepsychotic experiences scores between the “nonpositive” schizophrenia subsample and the CON group was statistically significant (6.4 vs. 2.1, t = -2.83, p < 0.05). For a validation of IR, AU, and DP as measures of subtle precursors of psychotic changes, a prospective study with a group of not-yet-psychotic subjects (significant numbers of which develop manifest psychotic symptoms) would be appropriate; such a study is in preparation.

Yung and McGorry (1996) pointed out the need for a systematic investigation of the evolution of psychotic episodes, especially in first episode psychosis. Concerning the sequence of subjective or behavioral changes over time in the schizophrenia prodrome, they distinguished two schools of thought: Model 1, The first prodromal symptoms are nonspecific changes (e.g., anxiety, restlessness, depression), followed by specific prepsychotic changes (e.g., disturbances in attention, perception, or speech); this model is advocated by Cameron (1938), Docherty et al. (1978), Huber et al. (1980), and others; Model 2, Specific prepsychotic changes occur first and are followed by nonspecific symptoms that may be reactions to subtle prepsychotic symptoms (McGhie and Chapman 1961; Chapman 1966). Yung and McGorry (1996) suggested a third, hybrid/interactive model that allows all possible patterns of changes. Only extensive prospective investigations can reveal the precise sequence of such prodromal features, thus allowing the adequacy of the suggested models to be tested.

Recently, McGorry (1998) emphasized the potential value of indicated prevention in psychotic disorders. Indicated preventive interventions are targeted to individuals who are identified as having minimal but detectable prepsychotic signs foreshadowing schizophrenia, or biological risk factors, but who currently do not meet diagnostic levels (Mrazek and Haggerty 1994). However, the discrimination of those specific signs from general stress responses resulting from other disorders is still a major dilemma (Falloon et al. 1996). The present results may contribute to the refinement of the measurement of specific prepsychotic signs, thus facilitating further research on subtle precursors of first schizophrenic episodes or relapses and the development and evaluation of early intervention approaches.

References


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