The Symptoms of Chronic Schizophrenia
A Re-examination of the Positive-Negative Dichotomy

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The relationships between symptoms in 40 schizophrenic patients, selected for persistence of symptoms, were examined. The symptoms segregated into three syndromes: psycho-motor poverty (poverty of speech, lack of spontaneous movement and various aspects of blunting of affect); disorganisation (inappropriate affect, poverty of content of speech, and disturbances of the form of thought); and reality distortion (particular types of delusions and hallucinations). Both the psychomotor poverty and disorganisation syndromes were associated with social and occupational impairment; in particular, the psychomotor poverty syndrome was associated with impairment of personal relationships, and the disorganisation syndrome with poor self-care and impersistence at work.

The clinical diversity of schizophrenia has prompted many attempts to define subtypes of the illness. Several recent attempts have been based on the distinction between positive and negative symptoms (Crow, 1980*a,b*; Andreasen & Olsen, 1982; Lewine *et al*, 1983). Negative symptoms reflect deficiency of a mental function which is normally present, for example blunting of affect and poverty of speech. Positive symptoms, such as delusions and hallucinations, reflect aberrant mental activity.

Recent attempts to measure negative symptoms stem from the work of Venables (1957) and Wing (1961). They found that "withdrawal in chronic schizophrenic patients is a unidimensional variable which can be reliably measured. It is defined by such items as: underactivity, slowness, lack of conversation, lack of friends, avoidance of others, poor personal hygiene, carelessness about appearance, and lack of interests" (Venables & Wing, 1962). Electrophysiological evidence that withdrawal was associated with high arousal led Venables and Wing to suggest that withdrawal might be a protective mechanism adopted to cope with a decreased ability to filter sensory input. However, emphasis shifted to the role of social factors in the genesis of negative symptoms, after the demonstration by Wing & Brown (1970) that these symptoms are common in an unstimulating environment, and furthermore are less severe after an "increase in the richness of the social environment" (Wing, 1978).

Subsequently, the evidence that schizophrenic patients with negative symptoms are more likely to have abnormalities such as cerebral ventricular enlargement and intellectual impairment (Huber, 1957; Johnstone *et al*, 1978; Andreasen & Olsen,

1982) has regenerated interest in the role of organic factors. Crow (1980*a*) proposed two types of schizophrenia: type I is characterised by positive symptoms, usually in the setting of an acute illness, while type II is characterised by negative symptoms and indices of cerebral damage, and is usually chronic. Crow did not regard the two types as mutually exclusive, but as independent dimensions reflecting different underlying pathological processes (Crow, 1980*b*).

Andreasen & Olsen (1982) adopted a different view of the relationship between positive and negative symptoms, regarding them as characteristic of two different types of illness. In a sample consisting of consecutive hospital admissions satisfying modified DSM–III criteria for schizophrenia (American Psychiatric Association, 1980), they demonstrated a negative correlation between the occurrence of positive and negative symptoms. They were able to assign about one-third of their cases to each of the positive and negative categories. These two groups of patients differed in many respects, including course of illness, evidence of cerebral ventricular enlargement, and evidence of cognitive impairment.

It is possible that the negative correlation between positive and negative symptoms demonstrated by Andreasen & Olsen (1982) arises from a difficulty in eliciting positive symptoms in the presence of negative symptoms. Another possibility is that the pattern of correlations was influenced by the mixture of acute and chronic cases in their sample. Unless subjects are homogeneous with regard to chronicity, in the sense of having symptoms of comparable persistence over time, there will be a tendency for symptoms to segregate into groups on the basis of their tendency to persist. Although segregation of symptoms on the

145

basis of persistence is of itself important, the question of whether persistent positive symptoms segregate from persistent negative symptoms in a separate issue. It is relevant to the further question of whether symptom type *per se*, rather than the persistence of symptoms, distinguishes between different types of schizophrenia. There are also unresolved issues concerning the assignment of symptoms to the negative symptom group. Andreasen (1982) included inappropriate affect in the negative group, with acknowledged misgivings, whereas Crow (1980*a*) regarded it as a positive symptom. Andreasen also included lack of volition and anhedonia in the group of negative symptoms, and assessed these unobservable attributes of the mental state by rating impairment of self-care, occupational performance, and social function. Since many different attributes of the mental state might in principle contribute to these observable impairments, the validity of this means of assessment remains to be established, and might well be limited to particular samples of patients. Finally, while Andreasen and Crow agree that disorders of the form of thought such as derailment and incoherence are positive symptoms, Lewine *et al* (1983) assign such symptoms to the negative symptom group.

This study attempted to delineate the segregation of symptoms in a sample of schizophrenic patients selected in a manner intended to discriminate in favour of cases with persistent symptoms. No prior assumptions about which symptoms should be regarded as positive or negative were made. The study also included an assessment of cognitive function and of neurological abnormalities, which will be reported separately.

Method

Selection of patients

The following criteria were adopted, with the object of selecting a sample of schizophrenic patients in a manner which discriminated in favour of those with persistent symptoms.

(a) The patient must have satisfied DSM–III criteria for the diagnosis of schizophrenia at some point in the course of the illness, and at the time of interview exhibit at least one symptom from section A or C of those criteria.

(b) The time since onset of illness must be 3–18 years. The lower limit of three years was chosen because Huber *et al* (1975) found that the pattern of illness is generally established by this stage. Cases with an extremely long duration of illness were excluded so as to decrease the likelihood that any observed segregation of symptoms would merely reflect the effects of prolonged illness; a 15-year range of illness duration was the minimum permitting the recruitment of an adequate number of cases from the population available.

(c) The patients must be under regular psychiatric care, but have had no increase in neuroleptic medication or readmission to hospital within the preceeding six months.

(d) Age must be less than 55 years, so as to minimise the influence of the effects of aging on cognitive function.

From all of the patients receiving in-patient, day-patient, or regular out-patient care from one of the seven clinical teams at Warneford Hospital, Oxford, Littlemore Hospital, Oxford, and Fair Mile Hospital, Wallingford, or receiving day or out-patient care at the Eldon Road Day Hospital, Reading, 47 patients satisfying the above criteria were identified. Of these, 7 did not reply or refused to participate in the study. The remaining 40 comprised 12 in-patients, 12 day-patients and 16 out-patients; there were 31 males and 9 females. The mean duration of illness was 10.5 years, and the mean age was 35 years (range 21–54 years).

Assessment of schizophrenic symptoms

Symptoms were rated according to section II of the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen, 1983), and sections 13–20 of the Present State Examination (PSE) (Wing *et al*, 1974). Two separate rating scales were employed because the scope of the definition of each symptom, and the range of symptoms assessed, influence the detectable pattern of correlations between symptoms, and it is therefore valuable to be able to compare the results obtained using different rating scales.

CASH was used because it is designed to provide a comprehensive rating of schizophrenic symptoms. It incorporates the Scale of the Assessment of Negative Symptoms (SANS), which consists of five sub-scales: affective flattening, alogia, lack of volition, anhedonia, and attention impairment. In addition, CASH includes comprehensive ratings of disorders of the form of thought, and of delusions and hallucinations. Most of the items in CASH are rated on a scale of 0–5, reflecting grades of severity.

A number of SANS items demand a detailed knowledge of the patient's lifestyle. Andreasen (1983) recommends that where possible this information be obtained from a third party, such as nursing staff. In this study, with in-patients in the minority, this was not always possible, However, several interviews with each patient were required to allow the administration of the cognitive test battery in a manner that avoided prolonged periods of testing, and these interviews were structured so as to allow a substantial time for informal conversation, including standard questions about the patients' activities and relationships.

The PSE was employed because it has been standardised and because its glossary provides precise definitions of the items to be rated. To avoid prolonged formal examination of the patients, the full PSE was not administered. Questions from sections 13–15 were used to elicit evidence of delusions and hallucinations, and scores were assigned to all syndromes concerned with delusions or hallucinations in

the PSE syndrome checklist. Sections 18–20 of the PSE, which involve observations of behaviour, affect, and speech, were also completed.

Data analysis

The symptom ratings were subjected to factor analysis using the program FACTOR from the Statistical Package for the Social Sciences (Nie *et al*, 1975). Initial factors were extracted by the method of principal factors, and subjected to oblique rotation. CASH and PSE ratings were analysed separately.

In the case of CASH rating single items, rather than sub-scale scores, were employed as units of analysis, to avoid having to make any initial assumptions about the relationships between items. Since major disparity in the frequency of occurrence of symptoms necessarily restricts the upper bound of the range of the correlation between items, only those items rated as definitely present in more than 10% of the patient sample were included. One consequence of this limitation was the exclusion of some specific types of delusions and hallucinations, most notably Schneiderian first-rank symptoms, because these items were individually quite rare in this sample.

Since it was not assumed that the items of an individual sub-scale could be taken as measures of the single construct embodied in that sub-scale, a problem arose in the case of the symptoms lack of volition, anhedonia, and attentional impairment. As these symptoms are represented by SANS sub-scales consisting of items measuring self-care, occupation, and social function, which might be regarded as measures of performance in daily life rather than symptoms, the relationship between these items and symptoms was examined separately by determining the Pearson correlation coefficients between these items and symptom factor scores.

In the case of the PSE ratings, the units of analysis representing sections 18–20 consisted of single items. These items record ratings of behaviour, affect, and speech observed at interview. The relatively fine distinctions between individual items in sections 13–15 of the PSE, which record delusions and hallucinations, made it necessary to employ syndrome scores embracing these items as units of analysis. In general, PSE syndromes contain a small number of symptoms which are judged on clinical grounds to be similar. These use of PSE syndrome scores as units of analysis has been justified statistically using data from the US-UK Diagnostic Project and the International Pilot Study of Schizophrenia (Wing *et al*, 1974) which confirmed that PSE symptoms have a satisfactory degree of statistical association with the syndromes to which they have been allocated.

In comparing the results of the factor analysis of the two sets of symptom ratings, it is necessary to bear in mind that the prior existence of statistically justified syndromes in the case of the PSE permits analysis of the relationships between delusions and hallucinations at a different level from that for the CASH ratings. Also, differences in the scope of the definitions of items in different rating scales is inevitable, and is the reason why two rating scales were employed in the first place.

Results

Factor analysis of CASH ratings

The factor analysis of CASH ratings revealed three factors, each having high loadings in a separate group of symptoms (Table I). The first factor loads heavily in poverty of speech, decreased spontaneous movement, and four items which might be regarded as measures of blunting of affect: unchanging facial expression, paucity of expressive gesture, affective non-responsivity and lack of vocal inflection. This group of six symptoms is designated the psychomotor poverty syndrome.

The second factor has heavy loadings in inappropriate affect, poverty of content of speech, and four items which are recognised disturbances of the form of thought: tangentiality, derailment, pressure of speech, and distractibility. This group of six symptoms is designated the disorganisation syndrome.

The third factor has heavy loadings in auditory hallucinations of voices speaking to the patient, delusions of persecution and delusions of reference. This group of symptoms is designated the reality distortion syndrome.

In this sample of patients, the three syndromes are not strongly correlated. There is a weak negative correlation ($r = -0.22$) between the factors associated with the psychomotor poverty syndrome and the disorganisation syndrome, and the other correlations are near zero. The syndromes are thus not mutually exclusive. For example, the probability that a patient has symptoms of the psychomotor poverty syndrome is independent of whether he has symptoms of the reality distortion syndrome.

Factor analysis of PSE ratings

The factor analysis of PSE ratings (Table II) reveals a pattern of segregation of symptoms similar to that obtained for the CASH ratings. The first factor loads heavily in the incongruous affect, poverty of content of speech, incoherence of speech, distractibility, and self-neglect. These symptoms are similar in character to the symptoms of the disorganisation syndrome. The second factor loads heavily in restricted quantity of speech, slowness, and blunted affect, symptoms which are similar in character to those of the psychomotor poverty syndrome.

There is evidence of a sub-division with regard to delusions and hallucinations. A third factor has heavy loadings in the PSE nuclear syndrome (which consists mainly of Schneiderian first rank symptoms) and in sexual and fantastic delusions. This group of symptoms is designated the disintegrative reality distortion syndrome. A fourth factor has substantial loadings in delusions of persecution, delusions of reference, and grandiose delusions; this group is designated the integrative reality distortion syndrome. However, delusions of reference and persecution also have a moderate dependence on the third factor, and hallucinations of voices speaking to the patient depend, albeit weakly, on both factors. Furthermore, the third and fourth factors have a moderate positive correlation ($r = 0.29$) in this sample of patients. There is therefore some justification for considering delusions and hallucinations as a group of related symptoms, irrespective of content.

TABLE I
Factor loadings obtained by factor analysis of CASH symptom ratings

Symptoms	Factor 1	Factor 2	Factor 3
Psychomotor poverty syndrome			
(high loadings on factor 1)			
Poverty of speech	0.80	−0.01	−0.03
Decreased spontaneous movement	0.95	−0.04	−0.03
Unchanging facial expression	0.85	−0.01	0.05
Paucity of expressive gesture	0.97	0.02	−0.04
Affective non-responsivity	0.82	0.02	−0.00
Lack of vocal inflection	0.90	−0.20	−0.05
Disorganisation syndrome			
(high loadings on factor 2)			
Inappropriate affect	0.19	0.84	0.09
Poverty of content of speech	−0.08	0.57	0.01
Tangentiality	−0.05	0.94	0.03
Derailment	−0.05	0.94	0.04
Pressure of speech	−0.10	0.61	0.08
Distractibility	−0.00	0.81	0.01
Reality distortion syndrome			
(high loading on factor 3)			
Voices speak to patient	0.04	−0.07	0.67
Delusions of persecution	−0.19	0.06	0.51
Delusions of reference	0.13	0.04	0.84
Somatic delusions	−0.03	−0.03	0.03

Self-care, occupation and social function

The correlations between the items of the lack of volition, anhedonia and attentional impairment sub-scales of SANS, which are ratings of self-care, occupation and social function, and the factor scores derived from the factor analysis of CASH ratings are shown in Table III. If the factor scores are regarded as measures of the corresponding syndromes, it is apparent that in this sample of patients both the psychomotor poverty and disorganisation syndromes are associated with impairment of self-care, occupation, and social function. However, the syndromes differ in the pattern of their association with these impairments.

The most widespread and severe disturbance is associated with the disorganisation syndrome. In particular, self-care and persistence at work are poor. The psychomotor poverty syndrome is associated with relatively greater impairment of recreational interests and ability to make friendships. There were no significant correlations between factor scores and age, duration of illness, or duration of hospital in-patient care.

Associations between syndromes and medication

The reality distortion syndrome was correlated to current dose of neuroleptic drugs ($r = 0.31$, $P < 0.10$), current use of anticholinergic drugs ($r = 0.53$, $P < 0.01$), and current use of benzodiazepines ($r = 0.35$, $P < 0.05$). The disorganisation syndrome was related to total duration of neuroleptic treatment only ($r = 0.31$, $P < 0.10$), and the psychomotor poverty syndrome is not associated with any of the variables related to medication.

Discussion

The segregation of symptoms in this sample of patients provides some support for the previously postulated positive-negative dichotomy. Firstly, the symptoms belonging to the Psychomotor Poverty syndrome (blunting of affect, poverty of speech and decreased spontaneous movement) are similar in character to the symptoms that are common to the

TABLE II
Factor loadings derived by factor analysis of PSE ratings

Symptom	Factor 1	Factor 2	Factor 3	Factor 4
Disorganisation syndrome				
(high loading on factor 1)				
Incoherence of speech	0.93	−0.14	0.01	−0.00
Poverty of content of speech	0.68	−0.06	0.20	−0.34
Distractibility	0.74	−0.16	0.03	−0.01
Incongruous affect	0.72	−0.00	0.05	−0.00
Self-neglect	0.80	0.24	−0.16	0.30
Psychomotor poverty syndrome				
(high loading on factor 2)				
Restricted quantity of speech	0.01	0.84	0.06	−0.01
Slowness	−0.04	0.95	−0.01	−0.05
Blunted affect	−0.08	0.79	−0.06	−0.08
Disintegrative reality distortion syndrome				
(high loading on factor 3)				
PSE nuclear syndrome[1]	0.05	−0.09	0.54	0.10
Sexual & fantastic delusions	−0.00	−0.04	0.93	−0.17
Voices to the patient	0.04	0.17	0.27	0.23
Integrative reality distortion syndrome				
(high loading on factor 4)				
Delusions of reference	−0.03	0.04	0.39	0.49
Delusions of persecution	−0.04	−0.17	0.28	0.33
Grandiose delusions	0.04	−0.10	−0.05	0.64

1. Consists of passivity experiences, alienation of thought, primary delusions and third person auditory hallucinations.

TABLE III
Correlations between factor scores obtained by factor analysis of CASH symptom ratings and measures of self-care, work performance and social function from the lack of volition, anhedonia and attentional impairment sub-scales of SANS

	Factor 1 (psychomotor poverty)	Factor 2 (disorganisation)	Factor 3 (reality distortion)
Poor grooming and hygiene	0.13	0.56****	0.15
Impersistence at work	0.06	0.38**	0.18
Physical anergia	0.52***	−0.28	0.16
Recreational interests and activities	0.29*	0.23	−0.07
Sexual interest and activity	0.21	−0.21	−0.14
Ability for intimacy	0.03	0.31*	−0.04
Relationships with friends and peers	0.35**	0.19	0.06
Social inattentiveness	0.09	0.39**	0.01

*$P < 0.10$; **$P < 0.05$; ***$P < 0.01$; ****$P < 0.001$.

negative symptom groups defined by Wing & Brown (1970), Crow (1980*a,b*), Andreason (1982) and Lewine *et al* (1983). Secondly, in accord with previous studies, this study demonstrates that delusions and hallucinations belong to a group which can be separated from the psychomotor poverty group of symptoms.

The evidence provided by the factor analysis of PSE ratings that there is a division between types of delusions and hallucinations is slender, but gives partial support to the view that first rank symptoms should be distinguished from other types of delusions and hallucinations. Nonetheless, it is important to bear in mind that the factors associated with the disintegrative reality distortion syndrome and the integrative reality distortion syndrome were positively correlated in this sample, suggesting that all hallucinations and delusions constitute a related group of symptoms.

The major difference between the findings of this study and other recent investigations of positive and negative symptoms is the identification of the disorganisation syndrome as a separate syndrome. It consists of symptoms which other investigators have variously assigned to either the positive or negative symptom groups. Disorders of the form of thought constitute a major part of this syndrome. Bleuler (1911) considered it likely that disturbances of association are primary symptoms of schizophrenia, and subsequently many clinicians have accorded them a central place among schizophrenic symptoms. Harrow *et al* (1983) attempted to assess whether disordered form of thought identifies a subgroup of schizophrenic patients with poor outcome. They found that thought disorder persisting after discharge from hospital identified a subgroup with poor outcome, but some patients without thought disorder also had a poor outcome. They concluded that "severe thought disorder is one of several major features of schizophrenia". The present study supports their conclusion.

The relationships between the three syndromes has important implications for predicted relationships between symptoms in different patient samples, and also for hypotheses concerning pathological processes in schizophrenia. In this sample the psychomotor poverty and reality distortion syndromes are not mutually exclusive; some patients have symptoms from both syndromes. This suggests that in a patient sample including a substantial number of cases without any schizophrenic symptoms, correlations between symptoms from these two syndromes would be positive. On the other hand, in a patient sample selected in a manner that favours cases having a single pure syndrome, the correlations

between symptoms from the psychomotor poverty and the reality distortion syndromes would be expected to be negative.

For example, the findings of this study predict a negative correlation between the psychomotor poverty syndrome and the reality distortion syndrome in a sample such as that studied by Andreasen & Olsen (1982). Their sample included some acute cases, likely to have reality distortion symptoms only (or perhaps disorganisation symptoms as well), and other cases likely to have psychomotor poverty symptoms only, because DSM–III criteria were modified to accept severe poverty of speech in place of positive symptoms in the mandatory symptoms section.

Furthermore, Pogue-Geile & Harrow (1984) recently studied schizophrenic symptoms recorded 18 months after the patients' discharge from hospital. It is likely that their sample of patients was similar to the patients assessed in this study with regard to persistence of symptoms. In contrast to Andreasen & Olsen, they found a negligible correlation between positive and negative symptoms, consistent with the findings of the current study.

The observation that a patient can have symptoms from more than one syndrome suggests that the syndromes do not represent distinct types of schizophrenia, but instead reflect discrete pathological processes occurring within a single disease. This suggests that there is a fundamental abnormality in schizophrenia, which in any individual case might be associated with one or more of three distinct pathological processes, depending on the patient's constitution and current environment. In principle, the putative pathological processes might be either a cause or a consequence of the fundamental abnormality.

The existence of patients who currently have symptoms of only the psychomotor poverty syndrome, despite selection criteria which demand symptoms from either the reality distortion or disorganisation syndromes at some stage in the illness, demonstrates that the syndromes detectable at any one time can change during the course of the illness. The absence of significant correlation between syndrome scores and duration of illness makes it unlikely that the syndromes follow each other in a specific sequence.

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