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Symptoms of Psychoses
A Factor-Analytic Study

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Background. The literature on the statistical analysis of symptoms of psychoses was limited to positive and negative symptoms in schizophrenia. The present study explored the relationship between positive and negative symptoms as well as affective symptoms in a wider category of psychotic disorders.

Method. The symptoms of 584 psychiatric patients, consecutively admitted to any of the 95 mental hospitals in Japan, were studied. They manifested at least one of the following: (a) delusions, (b) hallucinations, (c) formal thought disorder, (d) catatonic symptoms, or (e) negative (defect) symptoms.

Results. Factor analysis yielded five factors interpretable as (a) manic symptoms, (b) depressive symptoms, (c) negative (defect) symptoms and formal thought disorders, (d) positive (psychotic) symptoms, and (e) catatonic symptoms.

Conclusion. These results suggest that although major symptoms seen among psychotic patients can be categorised into positive, negative, manic, and depressive groups, corresponding to current knowledge of phenomenology, catatonic symptoms constitute a discrete syndrome, while formal thought disorders merge into the negative syndrome.

Varying as its definition is, the term 'psychosis' generally implies disturbed reality testing manifested as delusions, hallucinations, formal thought disorder, and catatonic and bizarre behaviour (American Psychiatric Association, 1987). Some psychopathologists (e.g. Trethowan, 1979; Sims, 1988) have proposed that some types of delusions such as passivity experience, thought broadcasting, and thought insertion should be thought of as constituting a distinct group of psychotic symptoms. These are termed ego disorder (*Ichstörung*) symptoms, and are a part of Schneider's (1959) first-rank symptoms. Thus, within the framework of psychopathology, psychotic symptoms and behaviour have been divided into four or five groups, i.e. delusions, hallucinations, formal thought disorder, catatonic symptoms, and ego disorder.

Recently, the categorisation of psychotic symptoms has been re-evaluated with operational assessment measures and statistical analyses. The last decade has seen a development of the positive–negative dichotomy of schizophrenic features, the positive corresponding to psychotic symptoms and the negative to defect symptoms (Andreasen, 1982; Crow, 1985). Disagreement, however, can be observed over some symptoms (Liddle, 1987; Liddle & Barnes, 1990; Mortimer *et al*, 1990; Arndt *et al*, 1991; Lund *et al*, 1991; Peralta *et al*, 1992; Thompson & Meltzer, 1993). Arndt *et al* (1991), studying pooled schizophrenic samples, found that delusions and hallucinations are distinct from positive thought disorder and bizarre behaviour on a principal-components analysis. Liddle (1987), Liddle & Barnes (1990), Peralta *et al* (1992), and Thompson & Meltzer (1993) found that, among schizophrenic patients, symptoms are segregated into three syndromes: psychomotor poverty (poverty of speech, blunted affect, etc.), disorganisation (formal thought disorder, poverty of content of speech, etc.), and reality distortion (delusions and hallucinations). Mortimer *et al* (1990) argued that, among schizophrenics, formal thought disorder and catatonic symptoms should be separated into the positive and negative subcategories.

A third area of symptomatologic debate is that of depressive and manic symptoms among psychotics. It has been established that patients with psychotic (positive) features often manifest affective symptoms during the course of psychosis (Kulhara & Wig, 1978; Barnes *et al*, 1989; Marneros *et al*, 1991), and nosologic entities, such as schizoaffective disorder and cycloid psychosis, have been postulated. Factor-analysing negative and depressive symptoms among patients with major psychiatric disorders, Kitamura & Suga (1991) reported that these two symptom groups can be distinguished although they coexist frequently. However, it still remains to be determined whether these affective symptoms are a distinct syndrome or merely part of the whole psychotic syndrome.

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Table 1
Factors and factor loadings of psychiatric symptoms among 584 patients

Symptoms	Factor loadings
Factor 1	
Talkativeness	0.86
Loss of inhibition	0.84
Elated mood	0.84
Hyperactivity	0.80
Grandiosity	0.78
Reduced need of sleep	0.78
Distractability	0.77
Irritability	0.74
Flight of ideas	0.73
Increased sociability	0.68
Suspicious mood	0.59
Increased sexual activity	0.54
Grandiose delusion	0.46
Factor 2	
Reduced activity/fatiguability	0.82
Loss of interest	0.81
Depressed mood	0.80
Loss of concentration	0.77
Loss of self-esteem	0.76
Insomnia/hypersomnia	0.73
Guilty feeling	0.70
Suicidal idea or attempt	0.66
Reduced or increased appetite	0.62
Retardation	0.61
Agitation	0.60
Reduced or increased body weight	0.55
Delusion of poverty	0.37
Delusion of guilt	0.32
Factor 3	
Blunted affect	0.79
Avolition	0.77
Inability to feel intimacy and closeness	0.77
Poverty of content of speech	0.77
Poverty of non-verbal communication	0.76
Physical anergia	0.76
Lack of persistence at work or school	0.73
Less attention to grooming and hygiene	0.72
Poverty of speech	0.68
Inappropriate affect	0.55
Blocking	0.41
Incoherence	0.38
Neologism	0.12
Factor 4	
Passivity experience	0.67
Thought insertion	0.66
Thought broadcasting	0.63
Thought withdrawal	0.62
Voices talking to each other	0.58
Voices giving running commentary	0.58
Gedankenlautwerden	0.56
Voices talking to the patient	0.56
Delusion of reference	0.45
Tactile hallucination	0.41
Persecutory delusion	0.41
Visual hallucination	0.33
Delusion of 'royal blood'	0.32
Other verbal hallucination	0.31
Religious delusion	0.30
Hypochondriacal delusion	0.29
Non-verbal auditory hallucination	0.29
Olfactory hallucination	0.29
Other delusions	0.27
Somatic delusion	0.19
Delusion of jealousy	0.13
Factor 5	
Stupor/muteness	0.69
Bizarre posture	0.69
Catalepsy	0.69
Negativism	0.65
Waxy flexibility	0.54
Catatonic excitement	0.53
Command automatism	0.37

The categorisation of symptoms into psychotic (positive), defect (negative), and affective groups is important not only because this is a major classificatory issue of phenomenology, but also because it is often used in the diagnostic criteria of major psychiatric disorders, and strongly influences these criteria. However, most studies in this field have focused on schizophrenic symptoms. Because both positive and negative symptoms are commonly observed among patients suffering from psychiatric disorders of any type other than schizophrenia (see, for example, Pope & Lipinski, 1978; Chaturvedi & Sarmukaddam, 1986), subjects with mixed diagnoses may clarify this issue. We report a study on the factor structure of these major symptoms among in-patients selected on the basis of manifesting psychotic (positive) symptoms regardless of nosologic categories in Japan.

Method

As a part of a nationwide multicentre field trial (Fujinawa, 1990) of the 1988 draft of the 10th revision of the *International Classification of Diseases* (ICD–10) (World Health Organization, 1988), psychiatric patients consecutively admitted to any of the 95 mental hospitals in Japan participating in the project between November 1989 and January 1990 were entered into the study if, at any time during the present episode of a psychiatric disorder, they manifested at least one of the following: (a) delusions of any type, (b) hallucinations of any type, (c) formal thought disorder, (d) catatonic symptoms,

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or (e) negative (defect) symptoms. No exclusion criteria were adopted, because one of the goals of the research was a reliability study of a wide range of ICD–10 diagnostic categories. Thus, patients with drug abuse, mental retardation, and organic brain lesions were *not* excluded.

The intake diagnostic interview was semistructured (Fujinawa, 1990), covering symptoms, courses, and causes relevant to ICD–10 diagnostic categories. The list of symptoms included 16 delusions, eight hallucinations, two kinds of formal thought disorder, seven catatonic symptoms, 11 negative symptoms, 12 depressive symptoms, and 12 manic symptoms (Table 1), each rated as 0 (absent) or 1 (present). The interviewer was requested, after collecting all clinical information, to make both ICD–10 (draft) and Japanese conventional diagnoses. The reliability of symptom assessment and diagnoses has been reported elsewhere (Kitamura, 1990).

All the symptoms were factor-analysed after varimax rotation. The number of factors was determined according to the scree test (Cattell, 1966; Zwick, 1982). In the scree test, the eigenvalues of all the factors were examined after each factor was extracted until a large jump or discontinuity was observed, after which the factors that remained were retained. For statistical analysis, the SPSS-X programme (SPSS Inc, 1986) was used.

Results

Characteristics of patients

A total of 584 in-patients were recruited for the study. They included 296 (51%) men and 261 (45%) women, with 27 cases in which the gender was unrecorded. The mean age was 39.4 (s.d. 13.7), with a range of 12–95 years. Their ICD–10 diagnoses were as follows: F0 Organic, including symptomatic, mental disorders ($n = 15$); F1 Mental and behavioural disorders caused by psychoactive substance use ($n = 20$); F2 Schizophrenia, schizotypal, and delusional disorders ($n = 516$) (of which 429 were F20 Schizophrenia); F3 Mood disorder ($n = 23$); F4 Neurotic, stress-related and somatoform disorders ($n = 4$); F7 Mental retardation ($n = 3$); and F99 Unspecified mental disorders ($n = 3$).

Factor analysis

Factor analysis yielded 18 factors with an eigenvalue greater than unity. The scree test, however, identified five factors as being most prominent. The factor structure after varimax rotation appears in Table 1 (the full table of factor loadings is available from the corresponding author on request).

The first factor was loaded by all the manic symptoms and grandiose delusion; the second factor by all the depressive symptoms and delusions of poverty and guilt; the third factor by all the negative (defect) symptoms and all types of formal thought disorder; the fourth factor by delusions and hallucinations (other than grandiose, poverty, and guilt delusions); and the fifth factor by all the catatonic symptoms.

Discussion

In the context of the literature, our study is unique in that the sample of patients was not limited to schizophrenics, but extended to a wider range of patients with psychotic symptoms regardless of diagnosis, and in that it examined not only psychotic but also other major psychiatric symptoms. This research design enabled us to examine the structure of symptoms in a wider perspective.

Four major psychiatric syndromes appeared to be discrete in the factor analysis, i.e. manic, depressive, positive, and negative symptom groups. A few areas, however, emerged as differing from the conventional classification of psychiatric symptoms.

Although most delusions aggregated under one factor, interpretable as the positive symptom group, some appeared in other factors. Thus, the category of grandiose delusion was nearer, in the factor analysis, to the manic symptoms, while delusions of poverty and guilt were nearer to the depressive symptom group. These delusions are, when observed among patients with major affective disorders, secondary to affective disorders. Our results confirm that the secondary delusions have structures different from those of the primary delusions.

In our interview, formal thought disorder was defined as incoherence of speech and neologism. These are usually thought of as positive symptoms (American Psychiatric Association, 1987), but some researchers (Arndt *et al*, 1991) dispute this view. Our results showed that formal thought disorder shared the same factor with the negative symptoms, but more detailed phenomenologic studies may be warranted on these disorders.

It is notable that catatonic symptoms, though long regarded as among the positive symptoms, appeared in our study as discrete from other symptoms in this group. This finding is in line with several recent reports (Mortimer *et al*, 1990; McKenna *et al*, 1991) that catatonic symptoms are a discrete entity, and may be a heterogeneous mixture of positive and negative features. We may test the validity of this hypothesis by comparing catatonic and non-catatonic psychotic patients, using as the external validator

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clinical, laboratory (e.g. ventricular enlargement, antipsychotic challenge test), and genetic characteristics, together with response to a particular medication.

There are three main research and clinical implications of the present findings.

Firstly, our results have confirmed the validity of conventional assessment methods of depression (Hamilton, 1967) and mania (Beigel *et al*, 1971), based on severity, in which affective delusions (grandiose, poverty, and guilt) are treated as elements of the total score. On the other hand, the scale item Unusual Thought Content in the Brief Psychiatric Rating Scale (Overall & Gorham, 1962) should be treated with caution, because it includes both primary and secondary (affective) delusions. It may be erroneous to construct a rating item with symptoms from different factorial categories.

Secondly, diagnostic criteria for psychotic disorders may be reconstructed in the light of new findings. Symptom items of currently available diagnostic criteria such as DSM-III-R (American Psychiatric Association, 1987) and ICD-10 (World Health Organization, 1992) are all selected on the basis of classical phenomenology, with some modification by expert opinion. Even though these items are intuitively acceptable in their present form, they may be refined by multivariate analyses of key symptoms. Classification of psychoses may be prompted by factor analytic studies such as this.

Thirdly, the selection of psychopharmacologic agents for treatment of the psychoses may be improved by using findings from the factorial study of symptoms. Johnstone *et al* (1988) have shown that the therapeutic effects of lithium and pimozide are dependent more on psychiatric syndromes than on nosologic entities. Further studies on the specificity to factor-analytically sophisticated symptomatology of different treatments may therefore be warranted.

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References

American Psychiatric Association (1987) *Diagnostic and Statistical Manual of Mental Disorders* (3rd edn, revised) (DSM-III-R). Washington, DC: APA.

Andreasen, N. C. (1982) Negative symptoms in schizophrenia: definition and reliability. *Archives of General Psychiatry*, **39**, 784–788.

Arndt, S., Alliger, R. J. & Andreasen, N. C. (1991) The distinction of positive and negative symptoms: the failure of a two-dimensional model. *British Journal of Psychiatry*, **158**, 317–322.

Barnes, T. R. E., Curson, D. A., Liddle, P. F., *et al* (1989) The nature and prevalence of depression in chronic schizophrenic inpatients. *British Journal of Psychiatry*, **154**, 486–491.

Beigel, A., Murphy, D. L., Bunney, W. E., *et al* (1971) The manic-state rating scale. *Archives of General Psychiatry*, **25**, 256–262.

Cattell, R. B. (1966) The scree test for the number of factors. *Multivariate Behavioral Research*, **1**, 245–276.

Chaturvedi, S. K. & Sarmukaddam, S. B. (1986) Prediction of outcome in depression by negative symptoms. *Acta Psychiatrica Scandinavica*, **74**, 183–186.

Crow, T. J. (1985) The two-syndrome concept: origins and current status. *Schizophrenia Bulletin*, **11**, 471–485.

Fujinawa, A. (1990) *Study on the Construction of Diagnostic Criteria of Psychiatric Disorders*. Ichikawa: National Institute of Mental Health (Japan) (in Japanese).

Hamilton, M. (1967) Development of a rating scale for primary depressive illness. *British Journal of Social and Clinical Psychology*, **6**, 278–296.

Johnstone, E. C., Crow, T. J., Frith, C. D., *et al* (1988) The Northwick Park "functional" psychosis study: diagnosis and treatment response. *Lancet*, *ii*, 119–125.

Kitamura, T. (1990) The Japanese clinical modification of the ICD-10. International Conference on Psychiatric Diagnosis '90 Program and Abstracts.

—— & Suga, R. (1991) Depressive and negative symptoms in major psychiatric disorders. *Comprehensive Psychiatry*, **32**, 88–94.

Kulhara, P. & Wig, N. N. (1978) The chronicity of schizophrenia in north-west India: results of a follow-up study. *British Journal of Psychiatry*, **132**, 186–190.

Liddle, P. F. (1987) The symptoms of chronic schizophrenia. A re-examination of the positive-negative dichotomy. *British Journal of Psychiatry*, **151**, 145–151.

—— & Barnes, T. R. E. (1990) Syndromes of chronic schizophrenia. *British Journal of Psychiatry*, **157**, 558–561.

Lund, C. E., Mortimer, A. M., Rogers, D., *et al* (1991) Motor, volitional and behavioural disorders in schizophrenia. I. Assessment using the modified Rogers scale. *British Journal of Psychiatry*, **158**, 323–327.

Marneros, A., Deister, A. & Rohde, A. (1991) Stability of diagnosis in affective, schizoaffective and schizophrenic disorders: cross-sectional versus longitudinal diagnosis. *European Archives of Psychiatry and Clinical Neuroscience*, **241**, 187–192.

McKenna, P. J., Lund, C. E., Mortimer, A. M. & Biggins, C. A. (1991) Motor, volitional and behavioural disorders in schizophrenia. II. The 'conflict of paradigms' hypothesis. *British Journal of Psychiatry*, **158**, 328–336.

Mortimer, A. M., Lund, C. E. & McKenna, P. J. (1990) The positive : negative dichotomy in schizophrenia. *British Journal of Psychiatry*, **157**, 41–49.

Overall, J. E. & Gorham, D. R. (1962) The Brief Psychiatric Rating Scale. *Psychological Reports*, **10**, 799–812.

Peralta, V., de Leon, J. & Cuesta, M. J. (1992) Are there more than two syndromes in schizophrenia? A critique of the positive-negative dichotomy. *British Journal of Psychiatry*, **161**, 335–343.

Pope, H. G. & Lipinski, J. F. (1978) Diagnosis in schizophrenia and manic-depressive illness: a reassessment of the specificity of 'schizophrenic' symptoms in the light of current research. *Archives of General Psychiatry*, **35**, 811–828.

Schneider, K. (1959) *Clinical Psychopathology* (trans. E. W. Anderson & M. W. Hamilton). New York: Grune & Stratton.

Sims, A. (1988) *Symptoms in the Mind: An Introduction to Descriptive Psychopathology*. London: Baillière Tindall.

SPSS, Inc. (1986) *SPSS User's Guide* (2nd edn). Chicago: SPSS, Inc.

https://doi.org/10.1192/bjp.166.2.236 Published online by Cambridge University Press

THOMPSON, P. A. & MELTZER, H. Y. (1993) Positive, negative, and disorganization factors from the Schedule for Affective Disorders and Schizophrenia and the Present State Examination: A three-factor solution. *British Journal of Psychiatry*, **163**, 344–351.

TRETHOWAN, W. H. (1979) *Psychiatry* (4th edn). London: Baillière Tindall.

WORLD HEALTH ORGANIZATION (1988) *ICD–10: 1988 Draft of Chapter V: Categories F00-F99 Mental, Behavioural and Developmental Disorders*. Geneva: WHO.

—— (1992) *The ICD–10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*. Geneva: WHO.

ZWICK, W. R. (1982) Factors influencing four rules for determining the number of components to retain. *Multivariate Behavioral Research*, **17**, 253–269.

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