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Negative Symptoms: Relationship to Other Schizophrenic Symptom Classes

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If negative symptoms represent a distinct class of schizophrenic symptoms, they should, to paraphrase Bleuler (1911), be more closely related to each other than they are to other schizophrenic symptoms. The first part of this statement, that negative symptoms are intrinsically related to each other, has received considerable experimental support (Andreasen, this volume; Mortimer *et al*, this volume). The second, that negative symptoms are unrelated to other schizophrenic symptoms, has been somewhat more unevenly investigated.

Several studies have examined the occurrence of negative symptoms in relation to the productive, florid or 'positive' symptoms of schizophrenia (e.g. Owens & Johnstone, 1980; Andreasen & Olsen, 1982; Lewine *et al*, 1983; Kay *et al*, 1986; Kulhara *et al*, 1986). These all found insignificant or even inverse correlations between the presence of positive and negative symptoms, but they are all open to methodological criticisms. For instance, the measures of negative symptoms were sometimes crude, and positive and negative symptoms were invariably not rated independently of each other. In addition, there is uncertainty over which symptoms should be considered positive. While delusions and hallucinations have, by consensus, always been considered positive, formal thought disorder has been considered at different times both positive (e.g. Crow, 1980; Andreasen, 1982) and negative (Wing & Brown, 1970; see also Wing, this volume; Liddle *et al*, this volume). The status of catatonic phenomena within the positive:negative framework has so far received little consideration.

The independence of negative symptoms from the depressive states which may complicate schizophrenia (Hirsch, 1982; Johnson, 1986) is another area of crucial theoretical importance to the construct of negative symptoms. There are equally obvious practical implications of this issue, particularly with regard to the reliability and validity of measurement of negative symptoms. However, investigaton of the distinction of those two syndromes has so far been slight (Lewine *et al*, 1983; Prosser *et al*, 1987).

Finally, the concept of negative symptoms refers to a constellation of deficits in schizophrenia; but they are by no means the only deficits seen in the disorder. It seems established beyond reasonable doubt that some schizophrenic patients show wide-ranging dementia-like cognitive impairments (Payne, 1973; Crow & Stevens, 1978). An association of negative symptoms and cognitive impairment in schizophrenia has been found in some studies (Owens & Johnstone, 1980; Andreasen & Olsen, 1982; Kay *et al*, 1986). More recent work, on the other hand, has suggested that cognitive impairment shows a more complex pattern of affiliation (Bilder *et al*, 1985; Robertson & Taylor, 1985; Liddle, 1987).

Study I

In the first of two studies reported here, the relationship of negative symptoms to positive symptoms and depression in schizophrenia was examined systematically, and under blind conditions.

Method

The sample consisted of 62 patients drawn from acute, rehabilitation and long-stay services of two hospitals, and encompassing all grades of severity and chronicity. All patients met DSM–III criteria for schizophrenia except for a small number who did not clearly fulfil the criterion of deterioration; these all met Research Diagnostic Criteria. Ages ranged from 20 to 72; all were of normal premobid intelligence and had no history of drug or alcohol abuse. All patients were taking neuroleptic medication and, in order to minimise masking of negative symptoms by florid exacerbations of psychosis, were rated when they had been relatively stable for at least 2 months.

One interviewer rated negative symptoms using the High Royds Evaluation of Negativity (HEN) scale (Mortimer *et al*, this volume) and the Scale for the Assessments of Negative Symptoms (SANS) (Andreasen, 1982). A second interviewer blind to this information, then completed the Comprehensive Psychopathology Rating Scale (CPRS) (Asberg *et al*, 1978) a 65-item inventory covering all aspects of psychiatric sympomatology, and the Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979) observer rated scale for depression. Those patients who were capable completed the self-rated Hospital Anxiety and Depression Scale (HAD) (Zigmond & Snaith, 1983) questionnaire for depression and anxiety.

Three measures of positive symptoms were derived from the CPRS: CPOS (*narrow*) consisted of summed scores on nine delusion and hallucination items; CPOS (*intermediate*) comprised these plus six further items encompassing other abnormal ideas, first-rank symptoms and formal thought disorder; CPOS (*broad*) consisted of these plus six other items describing non-neurotic, non-affective symptoms (e.g. derealisation, agitation,

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mannerisms and postures) which might reasonably be considered to accompany acute exacerbations of schizophrenia. Depression was measured as the total score on the MADRS and on the depression subscale of the HAD.

Results

Individual scores were correlated using Spearman's non-parametric method. Neither HEN nor SANS summary scores showed any significant correlation with positive symptoms, however these were defined. (See Table I).

TABLE I
Correlations between negative and positive symptoms

	CPOS (narrow)	*CPOS (intermediate)*	*CPOS (broad)*
HEN summary score	0.10 (NS)	0.08 (NS)	0.05 (NS)
SANS summary score	0.08 (NS)	0.09 (NS)	0.06 (NS)

HEN summary scores showed no significant correlation with either measure of depression. On the other hand, SANS summary scores showed a modest correlation with MADRS scores ($r = 0.29$; $P = 0.03$) and a stronger correlation with the depression scale of the HAD ($r = 0.41$; $P = 0.006$) (see Table II).

TABLE II
Correlation between negative symptoms and depression

	MADRS	*HAD (D)*
HEN summary score	0.03 (NS)	0.12 (NS)
SANS summary score	0.30 ($P = 0.03$)	0.41 ($P = 0.006$)

Study II

The principal aim of this study was to examine the relationship of negative symptoms to formal thought disorder, motor disorder and cognitive impairment. It was also desired to explore possible interactions of factors like severity and chronicity of illness, which might be important determinants of the expression of some symptoms.

Method

Using the HEN and the SANS 77 schizophrenic patients demographically similar to those in Study I and meeting the same criteria were rated. This rater also completed part of the CPRS, in order to allow ratings of CPOS (*narrow*) to be made. A second interviewer, blind to this information, rated formal thought disorder using the positive formal thought disorder and alogia scales in the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen, 1979; Andreasen, unpublished), and cognitive impairment using the Mini-Mental Status (MMS) (Folstein *et al*, 1975). Ratings of motor disorder were also made by this interviewer using the scale developed by Rogers (1985). This allows a detailed, non-prejudicial, evaluation of all clinically observable motor disorders, from extrapyamidal symptoms to catatonic phenomena. The scale allows extraction of subscores for productive phenomena (i.e. those distinguished by their presence) and deficit phenomena (i.e. those distinguished by the absence/diminution of a normal function).

Severity of illness was measured using the scale of Endicott *et al* (1976), and chronicity was taken as the average number of years between maximum (first discernible psychotic symptoms) and minimum (first psychotic admission to hospital) durations.

Results

Both HEN and SANS summary scores showed highly significant associations with both severity ($r = 0.72$ and 0.63; $P < 0.001$) and chronicity ($r = 0.54$ and 0.43; $P < 0.001$).

Correlations between negative symptoms, positive symptoms, and formal thought disorder are summarised in Table III. Both HEN and SANS summary scores showed no significant correlations with CASH positive formal thought disorder, but highly significant correlations with CASH alogia. Positive symptoms showed an exactly inverse pattern of correlations with these items. Both positive formal thought disorder and alogia were significantly correlated with severity ($r = 0.39$; $P = 0.001$ and $r = 0.25$; $P = 0.02$), but not with chronicity ($r = 0.14$ and 0.14 NS), controlling for these made no difference to the significance of the correlations.

HEN and SANS scores were highly significantly correlated with total motor disorder scores on the Rogers scale. This remained true on division into productive and deficit subscores. However, motor disorder was highly significantly correlated with both severity ($r = 0.64$; $P < 0.001$) and chronicity ($r = 0.44$; $P < 0.001$). As both HEN and SANS total scores were

TABLE III
Correlations between negative symptoms and formal thought disorder

	Positive FTD	*Alogia*
HEN summary score	0.16 (NS)	0.61 ($P < 0.001$)
SANS summary score	0.11 (NS)	0.58 ($P < 0.001$)
CPOS (narrow)	0.41 ($P < 0.001$)	0.03 (NS)

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also correlated with these variables (see above) it was possible that the true correlations between negative symptoms and motor disorder were being masked by their mutual association with severity and chronicity. In fact, when severity and chronicity were controlled for, the partial correlations between HEN and SANS scores and Rogers total score were reduced to marginal significance; there were no longer any significant correlations with productive motor disorder; there were, however, highly significant correlatons with deficit motor scores. (See Table IV).

MMS total score showed significant inverse correlations with HEN and SANS scores ($r = -0.63$ and -0.58; $P = 0.001$); there was no correlation with CPOS (*narrow*) ($r = 0.13$; NS). In addition MMS showed significant correlations with both positive formal thought disorder ($r = -0.35$; $P = 0.004$), 'alogia' ($r = -0.22$; $P = 0.05$), and Rogers total scores ($r = -0.56$; $P = 0.001$). Controlling for severity and chronicity resulted in a marked weakening in the correlation of MMS score and HEN summary score ($r = -0.31$; $P = 0.03$) and the virtual disappearance of this with the SANS ($r = -0.16$; $P = 0.17$). The relationships with CPOS (*narrow*) positive formal thought disorder, alogia and motor disorder remained essentially unchanged.

Discussion

The two studies reported here add further documentation to the findings of several previous studies (Owens & Johnstone, 1980; Andreasen & Olsen, 1982; Lewine *et al*, 1983; Rosen *et al*, 1984; Pogue-Geile and Harrow, 1985; Kay *et al*, 1986; Kulhara *et al*, 1986), that occurrence of negative symptoms is uncorrelated, or even inversely correlated with that of positive symptoms. The validity of the positive:negative dichotomy in schizophrenia appears to be established beyond any reasonable doubt, though it may remain something of an oversimplification.

The present study and Barnes *et al* (this volume) also strengthen previous findings (Lewine *et al*, 1983; Prosser *et al*, 1987) that negative symptoms are separable from depression in schizophrenia. In our study there was no significant correlation between HEN scores and two indices of depression. The significant associations between SANS scores and both these measures could argue against such a conclusion, but might alternatively reflect a 'contamination' of the SANS scale by depression items: the SANS includes a section devoted to anhedonia, plus items to be rated subjectively by the patient, both of which might plausibly measure depressive symptoms. Taken as a whole, the available evidence suggests that negative symptoms and depression in schizophrenia are two largely independent domains of pathology.

The results of our second study, in particular, provide the first evidence that the concept of productive and deficit in schizophrenia extends considerably beyond the traditionally defined positive and negative symptom clusters. Thus, Andreasen's positive formal thought disorder clearly emerged as positive, and alogia as negative symptoms on statistical grounds. Motor disorder initially showed a significant association with negative symptoms (Andreasen & Olsen, 1982; Manschreck *et al*, 1982), but this appeared to be an artefact of their mutual association with severity and chronicity of illness. When severity and chronicity were controlled for, a striking pattern of correlation between negative symptoms and deficit, but not productive motor disorder emerged. A parallel, but somewhat more complex pattern of correlations between positive symptoms and productive but not deficit motor disorder was also seen. This and further findings will be described in full in a subsequent communication (Mortimer *et al*, 1990).

TABLE IV
Correlations between negative symptoms and motor disorder

	Rogers total	*Rogers productive*	*Rogers deficit*
HEN summary score	0.70 (P 0.001)	0.54 ($P < 0.001$)	0.62 ($P < 0.001$)
SANS summary score	0.63 (*P 0.001)*	*0.44* ($P < 0.001$)	0.62 ($P < 0.001$)
	Controlling for severity and chronicity		
HEN summary score	0.26 (P 0.056)	−0.07 (NS)	0.56 ($P < 0.001$)
SANS summary score	0.14 (NS)	−0.15 (NS)	0.55 ($P < 0.001$)

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The findings relating to cognitive impairment, however, remain difficult to accommodate within the positive:negative framework. Several studies (e.g. Owens & Johnstone, 1980; Andreasen & Olsen, 1982; Kay *et al*, 1986) have found highly significant associations between negative symptoms and cognitive impairment, as might be anticipated on the basis that they are both deficits. However, in our study there were additional significant associations with formal thought disorder (of both productive and deficit types) and motor disorder. Controlling for severity and chronicity, in fact, weakened the particular association with negative symptoms to the point of equivocality. It seems clear that an association with negative symptoms is only one aspect of a broader and ill-understood pattern of affiliations of cognitive impairment in schizophrenia, a conclusion also reached by other authors (Bilder *et al*, 1985; Robertson & Taylor, 1985; Liddle, 1987).

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