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The Positive and Negative Syndrome Scale (PANSS): Rationale and Standardisation

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Over 75 years ago, Bleuler (1911) confronted psychiatry with the question of 'schizophrenia' or 'schizophrenias'. Today we recognise the heterogeneity of the condition, but we are still groping at efforts to clarify the different subtypes or subprocesses. Over the decades there have been various attempts to subclassify schizophrenia and tease apart the syndromes, none of which has been entirely successful. More recently, as a result of the work by Crow (1980) in England and Strauss *et al* (1974) in the USA, it has been proposed that two distinct syndromes can be discerned from the phenomenological profiles. The positive syndrome consists of productive features superadded to the mental status, such as delusions, hallucinations, and disorganised thinking. The negative syndrome represents absence of normal functions, such as deficits in the cognitive, affective, and social realms.

It has been speculated that these syndromes bear aetiological, pharmacological, and prognostic import (Andreasen, 1982). Specifically, the positive syndrome is thought to be an aspect of hyperdopaminergia, hence neuroleptic responsive, in contrast to a structural brain deficit thought to underlie the negative symptoms. Yet the studies assessing these hypotheses have yielded diverse and often conflicting results (cf. Angrist *et al*, 1980; Bishop *et al*, 1983; Rosen *et al*, 1984; Bilder *et al*, 1985). Thus, researchers still disagree on the distinctiveness of these syndromes, their relatedness to neuropathology, their different response to neuroleptics, and their stability over different phases of illness.

Research findings, of course, are no more trustworthy than the measures on which they are based. Instruments that are unreliable or lack validity can be expected to yield weak or inconsistent results (a Type II error) or, worse yet, misleading data (a Type I error). Therefore, the methods used for positive–negative assessment can be a fundamental source of error variance between studies and even within studies. Well characterised and standardised techniques are a clear prerequisite for meaningful study of these syndromes, their relationship to other features of schizophrenia, and their response to medication.

Although several positive–negative scales have recently been devised, none has undergone a thorough process of psychometric standardisation. Such a process implies provision of strict operational criteria to permit objective measurement; reliability analysis that includes internal, interrater, and longitudinal, or retest, reliabilities; and validation along the several dimensions of content, construct, criterion-related, and predictive validity (Kay *et al*, 1986*b*).

The widely used procedures for positive–negative assessment usually report only on interrater agreement as the index of reliability and on the criterion-related validity, i.e. on the relationship of the scales to similar measures. Meanwhile the longitudinal reliability, the stability, and the content and construct validity of these instruments have gone largely unexplored (Sommers, 1985). In particular, the construct validity of such scales has been problematic. A frequent criticism in assessing the negative syndrome is that no distinction is made between 'primary' negative symptoms, those which represent a genuine deficit state, and 'secondary' negative symptoms, those which might derive reciprocally from positive features (Carpenter *et al*, 1985). For example, the Scale for the Assessment of Negative Symptoms (SANS) (Andreasen, 1982; see also Andreasen this volume) includes 'attention disorder'. This impairment may be a function of hyperarousal (Kay, 1981), a positive symptom, and in fact has been shown to correlate equivalently with both positive and negative clusters (Bilder *et al*, 1985; Cornblatt *et al*, 1985). Iager's Negative Symptom Rating Scale (Iager *et al*, 1985) likewise includes 'poor attention' and also 'disorientation', despite the relatedness of disorientation to either confusion — a positive symptom — or withdrawal — a negative symptom (Kay *et al*, 1986*b*).

More importantly, the construct validation of these scales has not taken into account the overwhelming covariance of both positive and negative syndromes with global severity of psychopathology (Opler *et al*, 1987) or with its exacerbation during the course of illness (Rosen *et al*, 1984). This consideration is crucial since, logically, a patient who is more profoundly ill may be expected to feature greater symptoms, regardless of their nature.

A first step in achieving sound reliability and validity is provision of strict operational criteria, which allows one to objectively elicit, define, and measure symptoms. This basic framework for psychiatric assessment has been lacking in the available positive–negative scales. Even the most widely used methods do not provide specific guidelines for the psychiatric interview, which is the actual source of data. Nor do the scales offer adequately detailed definitions to decide between different levels of symptom severity, e.g. between mild

v. moderate v. moderate-severe. Other limitations in most of the reported scales include:

(a) imbalance in the number of items comprising positive and negative syndromes; this affects their comparability and creates a disparity in their potential reliabilities;
(b) inapplicability of the scales for both typological and dimensional assessment;
(c) no evidence of consistency over time nor sensitivity for monitoring drug-related changes;
(d) no composite assessment to measure the relative predominance of positive v. negative symptoms. The researcher needs to know, for instance, that findings on the negative syndrome are specific to that syndrome, and not also true for the positive syndrome, nor simply due to greater severity of illness.

To address these limitations, our group has developed the Positive and Negative Syndrome Scale (PANSS) (Kay *et al*, 1987). This 30-item, 7-point severity scale was based originally on the 18-item Brief Psychiatric Rating Scale (Overall & Gorham, 1962) and 12 items from our Psychopathology Rating Schedule (Singh & Kay, 1975). The PANSS adaptation, however, introduced strict operational criteria for conducting the clinical interview, for defining all 30 symptoms, and for rating each of seven levels of psychopathology, covering a range between absent and extreme.

The selection of items was guided by three main considerations:

(a) items must be consistent with the theoretical concept of positive and negative psychopathology;
(b) they should include symptoms that can be unambiguously classified and are considered primary rather than derivative features;
(c) to optimise content validity, they should sample from diverse realms of functioning, such as the cognitive, affective, social, and communicative.

In this way, groups of seven positive and seven negative symptoms were formed (see Appendix I), and their respective sums provide the scores for the positive and the negative syndromes.

The remaining 16 items which cannot be linked decisively to either syndrome constitute a general psychopathology scale. This scale serves as a reference point, or control measure, for interpreting the syndrome scores. Finally, the difference between positive and negative scores yields a composite scale, which expresses the extent of predominance of one syndrome over the other. This bipolar index reveals the degree of so-called 'positivity' or 'negativity' shown on balance, and it may further serve for purpose of patient classification.

All ratings are performed in consultation with the PANSS Rating Manual, which includes detailed definitions and specific criteria for all rating points.[1] An example of the item on 'Hallucinatory Behaviour' is shown in Appendix II. As a rule, the severity of a symptom is gauged according to its prominence, its extensiveness, its frequency, and above all, its disruptive impact on daily functioning. The ratings in general are based on the totality of information from the previous week. This derives both from reports by primary care staff or family and from a formalised 30–40 minute clinical interview, also described in the PANSS Rating Manual. The interview permits direct observation of affective, motor, cognitive, perceptual, attentional, integrative, and interactive functions. It may be conceptualised as involving four phases that progress systematically from non-directive to more structured and directive inquiry. The general aims and strategies for each phase are outlined in Table I.

We have undertaken to standardise the PANSS on the basis of several studies involving a total of 240 DSM–III diagnosed schizophrenics. These investigations helped to establish the scale's reliability, its stability, its drug sensitivity, and various aspects of validity, including criterion-related, content, construct, and predictive. The details of methods and results may be found in the various articles to be cited.

The distribution pattern of the four scales from the PANSS, as administered to 101 chronic schizophrenic in-patients, revealed characteristic bell-shaped curves (Kay *et al*, 1987). This indicates that the scores are distributed along normal continua and can be subjected to powerful parametric statistics. It also allows for conversion of raw scores into percentile ranks (cf. Kay *et al*, 1987), which then provides for normative tables that permit interpretation of an individual's profile in relation to the reference group.

The interrater reliability of the PANSS (see Table II) was between 0.83 and 0.87 for the four scales, with all correlational values highly significant ($P<0.001$) (Kay, *et al*, 1988). The internal reliability of the method was examined by coefficient alpha (Kay *et al*, 1986*c*). The results indicated that each of the items within the positive and negative scales correlated strongly with the scale total. Overall the alpha coefficients were 0.73 and 0.83, respectively, and no gains could be achieved by discarding any individual items. The mean item-total correlations were 0.62 and 0.70, respectively, in contrast to nonsignificant cross-correlations of 0.17 and 0.18. The general psychopathology scale similarly

1. The PANSS Rating Manual is available on request from the authors.

TABLE I
Organisation of the PANSS interview

Phase	*Strategy*	*Objectives*	*Approximate time (min)*
I	Non-directive	Establish rapport Observe spontaneous behaviour Identify areas of concern	5–10
II	Semi-structured	Systematic elicitation of symptoms and their severity	15–20
III	Structured	Assess mood, anxiety, orientation, and abstract reasoning	5–10
IV	Directive	Clarify information Test limits and response to stress Assess full range of psychopathology	5–10

showed a satisfactory alpha coefficient of 0.79 as well as a split-half reliability coefficient of 0.80. All of these observed values were significant beyond $P<0.001$.

It was possible to assess test-retest reliability and stability on a cohort of chronic schizophrenics who were unresponsive to neuroleptic treatment and, therefore, remained hospitalised on our unit (Kay *et al*, 1987). Across a 3–6 month period we found no significant change in level of scores, while the longitudinal correlations were quite high: 0.80 for the positive scale and 0.68 for the negative scale.

For purpose of criterion validation, we analysed the association of the PANSS with the Andreasen (1982) method of positive–negative assessment, the SAPS and the SANS (Kay *et al*, 1988). The results (Table II) showed significant correlations between corresponding scales: $r=0.77$ for positive and $r=0.77$ for negative. Similarly, the general psychopathology scale of the PANSS correlated significantly with the Clinical Global Impressions Scale of the National Institute of Mental Health (Guy, 1976), $r=0.52$, $P<0.001$.

As a method of construct validation, we looked at the associations among our positive, negative, and general psychopathology scales (Kay *et al*, 1987). The two syndrome scales were directly related to severity of illness and also to each other (see Table II). Once their

TABLE II
Reliability and validity studies of the PANSS

	PANSS Scales			
Type of analysis	*Positive*	*Negative*	*Composite*	*General psychopathology*
Reliability analysis				
interrater (*r*)	0.83***	0.85***	0.84***	0.87***
internal (alpha)	0.73***	0.83***	—	0.79***
test-retest (*r*)	0.80***	0.68**	0.89***	0.60*
Validity analysis				
r with Andreasen or CGI	0.77*** (SAPS)	0.77*** (SANS)	—	0.52*** (CGI)
r with PANSS GPS	0.68***	0.60***	0.07	—
PANSS positive–negative intercorrelation	0.27** (simple *r*) −0.23* (*r* after partialing out GPS)			

*$P<0.02$; **$P<0.01$; ***$P<0.001$.
Based on Kay *et al* (1987, 1988). See text for explanation.
Abbreviations: PANSS: Positive and Negative Syndrome Scale; SAPS: Scale for Assessing Positive Symptoms; SANS: Scale for Assessing Negative Symptoms; CGI: Clinical Global Impressions Scale; GPS: General Psychopathology Scale.

shared variance with general psychopathology was partialled out, however, the positive and negative scales proved in fact to be *inversely* correlated ($P<0.02$). This suggests that, on face value, the two syndromes tend to co-vary, because sicker patients probably show greater manifestations of all kinds. Yet when controlling for degree of illness, positive and negative syndromes tend to be mutually exclusive, i.e. the higher the one, the lower the other. Therefore, these constructs as measured on the PANSS appear to represent discrete, non-overlapping aspects of the schizophrenic illness.

Our study of 101 chronic schizophrenics also supported the discriminant and convergent validity of the PANSS syndromal assessment in relation to independent clinical, genealogical, psychometric, and historical measures (Kay *et al*, 1986*c*). The findings from this dimensional study and a separate typological investigation of chronic schizophrenics (*infra*) are broadly summarised in Table III. The positive scale was significantly distinguished by unusual thoughts, anxiety, anger, preoccupation, disorientation, labile affect, more frequent episodes of hospitalisation in a 2½-year follow-up, and greater likelihood of sociopathy in first-degree relatives. By contrast, the negative scale was uniquely associated with slowed motor activity, deficits on affective measures, impoverished thinking, lesser education, dysfunction on cognitive developmental tests, and family history of psychosis but not affective disorders. Neither scale correlated with extraneous variables such as race, cultural group, chronicity of illness, or depressive symptoms. We concluded, accordingly, that the negative scale appears to assess a syndrome that is distinguished by familial, early developmental, and current multimodal deficits. These co-variates of the negative syndrome imply a more pernicious disease process, one devolving from genealogical and ontogenetic sources (Kay *et al*, 1985; Opler & Kay, 1985; Kay & Opler, 1987).

The criterion-related validity of the PANSS as used for typological distinction was supported in two separate studies of 37 acute and 47 chronic schizophrenics. Significant inverse relationships between positive and negative items were obtained in both studies ($r=-0.62$ and -0.55, respectively, $P<0.01$). In the acute sample (Lindenmayer *et al*, 1984), patients who were classified as negative subtype (i.e. at least three 'moderate' negative symptoms on the PANSS) differed significantly from the positive subtype in terms of lesser education, poorer work adjustment, likelihood of non-paranoid subdiagnosis, and various deficit symptoms that encompassed the cognitive, social, affective, and motor spheres. The chronic study (Opler *et al*, 1984) found the negative subtype distinguished by lesser education, likelihood of winter birth, earlier onset of illness, more primitive cognitive developmental test profile, and slower psychomotor rate, despite similar intelligence, visual-motor test scores, chronicity of illness, general psychopathology scale scores, and demographic characteristics (sex, race, cultural background). As in the dimensional study, therefore, the typological analyses supported the validity of the PANSS in relation to both antecedent and concurrent variables.

Three treatment studies provided evidence for the drug sensitivity and/or predictive validity of the PANSS. In a single-subject experimental study involving a 27-week double-blind reversal design (Kay & Opler, 1985), we

TABLE III
Distinguishing features of positive and negative syndromes in chronic schizophrenia

Area	*Positive syndrome*	*Negative syndrome*
Family history	Sociopathy (present)	Probable schizophrenia (present) Major affective illness (absent)
Pre-morbid history	Relatively unremarkable	Lesser education Cognitive developmental deficits
Course of illness and demographics	More previous hospitalisations Longer subsequent hospitalisation	Earlier onset of illness Older Winter birth Predominantly male
Clinical	Florid presentation Bizarre thinking Affective lability and anger Anxiety, preoccupation, and disorientation	Multimodal deficits Impoverished and rigid thinking Affective dulling Motor retardation

Based on Kay & Opler (1987).

compared the benefit of L-DOPA when used adjunctively with neuroleptics (Weeks 16–23) v. placebo-neuroleptic combination (Weeks 12–15 plus 24–27). Significant improvement with L-DOPA was found on the negative scale of the PANSS ($P<0.05$) as well as on two individual negative items (difficulty in abstract thinking and passive/apathetic social withdrawal). In contrast, no significant changes were achieved on the positive scale nor any of its items ($P>0.50$).

A second investigation employing a similar placebo-controlled reversal design focused on the specificity of adverse clinical responses to anti-cholinergic drugs (cogentin or trihexyphenidyl) when taken with neuroleptics (chlorpromazine or haloperidol) (Singh *et al*, 1987). The results with 47 schizophrenics indicated that only the positive scale was adversely influenced by anti-cholinergics ($P<0.02$) and that the positive and negative scales did *not* covary in their response to this intervention. Furthermore, only the patients who had been prospectively classified by the PANSS during a drug-free baseline as 'positive subtype', as defined by a composite scale score above zero, showed subsequent clinical worsening when anti-cholinergics were later introduced ($P<0.02$).

Thirdly, we assessed changes on the PANSS in ten neuroleptic–refractory schizophrenics who openly were tried on pimozide, a neuroleptic marketed in the USA for treating Gilles de al Tourette's syndrome (Feinberg *et al*, 1988). When pimozide was introduced after a 2-week baseline on a standard neuroleptic, significant symptomatic amelioration was observed on the PANSS negative scale after 4–6 weeks ($P<0.001$), while no changes were incurred on the positive scale. The results were consistent with the European literature, which suggests that pimozide targets the deficit features of schizophrenia (Falloon *et al*, 1978; Pinder *et al*, 1976), and supported the instrument's ability to reflect differential syndromal response to medications.

The predictive validity of the PANSS has been evident also from longitudinal follow-up studies of young acute schizophrenics with up to 2 years history of psychiatric illness since onset (Kay & Lindenmayer, 1987; Lindenmayer *et al*, 1986). These prospective investigations indicate that high negative scores in the early presentation seem to be of favourable consequence. At this stage a negative syndrome co-varied with lesser incidence of schizophrenia in the patient's family and greater incidence of affective psychosis. The PANSS negative scale also anticipated better adjustment on the Strauss & Carpenter (1974) Multidimensional Outcome Scale when the acute schizophrenics were followed up after 2 years (see Table IV). Some of the predictive correlations were surprisingly high, such as a Pearson r of 0.73 between baseline negative score and follow-up quantity of useful work. However, when assessed concurrently 2 years later, as patients traversed into the chronic phase, both positive and negative scores were associated with poorer functioning.

These differences according to phase of illness were corroborated by large-scale cross-sectional comparisons of acute, chronic, and long-term chronic schizophrenics, involving a sample size of 134 inpatients (Kay *et al*, 1986*a*). Our analyses, in brief summary, supported the

TABLE IV

Association of outcome measures with positive and negative syndromes assessed prospectively (baseline) and concurrently (follow-up)

	Baseline (predictive r)			*Follow-up (contemporaneous r)*		
Outcome measures on the Multidimensional Outcome Scale	*Positive score*	*Negative score*	*Positive v. negative difference*	*Positive score*	*Negative score*	*Positive v. negative difference*
Duration of non-hospitalisation	−0.13	0.53*	$P<0.10$	−0.30	−0.20	
Frequency of social contacts	0.04	0.39		−0.52*	−0.36	
Quality of social relations	0.02	0.48*	$P<0.10$	−0.67**	−0.45	
Quantity of useful work	0.26	0.73***	$P<0.05$	−0.60**	−0.56*	
Quality of useful work	−0.09	0.61**	$P<0.01$	−0.68**	−0.67**	
Absence of symptoms	−0.08	0.48*	$P<0.05$	−0.83***	−0.61**	
Ability to meet own basic needs	0.17	0.29		−0.05	−0.53*	$P<0.05$
Fullness of life	0.05	0.59**	$P<0.02$	−0.53*	−0.71***	
Overall level of functioning	0.04	0.47*	$P<0.10$	−0.69**	−0.69**	

*$P<0.05$; **$P<0.01$; ***$P<0.001$.
Based on Lindenmayer *et al* (1986).

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good genealogical, phenomenological, and prognostic import of an early negative profile. Such a presentation was associated with absence of schizophrenia in the family and with clinical features characteristic of catatonic and depressed states. These correlations, however, appeared to reverse in the more chronic phases, at which points a negative syndrome carried the expected ominous implications.

In aggregate, this series of studies provided evidence of suitable psychometric properties of the PANSS for typological and dimensional assessment of distinct syndromes in schizophrenia. The scales proved to be normally distributed and internally consistent, and they demonstrated stability and high reliability when assessed by coefficient alpha, split-half method, interrater concordance, and test-retest index. The validation of the PANSS was supported in terms of construct and criterion-related validity, including its differential association with historical, genealogical, phenomenological, psychometric, pharmacological, and prospective follow-up measures.

We conclude that the principles by which the PANSS was developed, especially the operational criteria for the interview and ratings, contributed to its strength as a psychometric instrument and its promise for measuring distinct syndromes in schizophrenia. We hope that its use will reduce error variance in the study of positive and negative dimensions, enabling a clearer focus on the significance of these parameters for schizophrenia.

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Appendix I
Items represented in the positive and negative syndrome scale

Positive Syndrome Scale

P1. Delusions
P2. Conceptual disorganisation
P3. Hallucinatory behaviour
P4. Excitement
P5. Grandiosity
P6. Suspiciousness/persecution
P7. Hostility

Negative Syndrome Scale

N1. Blunted affect
N2. Emotional withdrawal
N3. Poor rapport
N4. Passive/apathetic social withdrawal
N5. Difficulty in abstract thinking
N6. Lack of spontaneity and flow of conversation
N7. Stereotyped thinking

General Psychopathology Scale

G1. Somatic concern
G2. Anxiety
G3. Guilt feelings
G4. Tension
G5. Mannerisms and posturing
G6. Depression
G7. Motor retardation
G8. Uncooperativeness
G9. Unusual thought content
G10. Disorientation
G11. Poor attention
G12. Lack of judgment and insight
G13. Disturbance of volition
G14. Poor impulse control
G15. Preoccupation
G16. Active social avoidance

Appendix II
Sample item from the PANSS

P3. Hallucinatory behaviour

Verbal report or behaviour indicating perceptions which are not generated by external stimuli. These may occur in the auditory, visual, olfactory, or somatic realms.

Basis for rating
Verbal report and physical manifestations during the course of interview as well as reports of behaviour by primary care workers or family.

1. *Absent.* Definition does not apply.
2. *Minimal.* Questionable pathology; may be at the upper extreme of normal limits.
3. *Mild.* One or two clearly formed but infrequent hallucinations, or else a number of vague abnormal perceptions which do not result in distortions of thinking or behaviour.
4. *Moderate.* Hallucinations occur frequently but not continuously, and the patient's thinking and behaviour are affected only to a minor extent.
5. *Moderate severe.* Hallucinations are frequent, may involve more than one sensory modality, and tend to distort thinking and/or disrupt behaviour. Patient may have a delusional interpretation of these experiences and respond to them emotionally and, on occasion, verbally as well.
6. *Severe.* Hallucinations are present almost continuously, causing major disruption of thinking and behaviour. Patient treats these as real perceptions, and functioning is impeded by frequent emotional and verbal responses to them.
7. *Extreme.* Patient is almost totally preoccupied with hallucinations, which virtually dominate thinking and behaviour. Hallucinations are provided a rigid delusional interpretation and provoke verbal and behavioural responses, including obedience to command hallucinations.

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