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The Positive and Negative Syndrome Scale (PANSS) for Schizophrenia

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Abstract

The variable results of positive-negative research with schizophrenics underscore the importance of well-characterized, standardized measurement techniques. We report on the development and initial standardization of the Positive and Negative Syndrome Scale (PANSS) for typological and dimensional assessment. Based on two established psychiatric rating systems, the 30-item PANSS was conceived as an operationalized, drug-sensitive instrument that provides balanced representation of positive and negative symptoms and gauges their relationship to one another and to global psychopathology. It thus constitutes four scales measuring positive and negative syndromes, their differential, and general severity of illness. Study of 101 schizophrenics found the four scales to be normally distributed and supported their reliability and stability. Positive and negative scores were inversely correlated once their common association with general psychopathology was extracted, suggesting that they represent mutually exclusive constructs. Review of five studies involving the PANSS provided evidence of its criterion-related validity with antecedent, genealogical, and concurrent measures, its predictive validity, its drug sensitivity, and its utility for both typological and dimensional assessment.

Schizophrenia has long been regarded as a heterogeneous entity, and over the decades researchers have sought consistent subpatterns that might explain different aspects of this complex disorder. Most recently, Crow (1980*a*, 1980*b*) and Andreasen (1982; Andreasen and Olsen 1982) have proposed that two distinct syndromes in schizophrenia can be discerned from the phenomenological profiles. The Type I, or positive, syndrome is composed of florid symptoms, such as delusions, hallucinations, and disorganized thinking, which are superimposed on the mental status. The Type II, or negative, syndrome is characterized by deficits in cognitive, affective, and social functions, including blunting of affect and passive withdrawal.

It has been speculated that these syndromes in schizophrenia bear etiological, pharmacological, and prognostic import. Thus, Crow (1980*a*) conceived of the positive symptoms as an aspect of hyperdopaminergia (hence, a neuroleptic-responsive disorder) in contrast to a structural brain deficit that was thought to underlie the negative symptoms. The research to date has provided some indirect support for this model (e.g., Johnstone et al. 1976, 1978*a*, 1978*b*; Andreasen and Olsen 1982), but the diversity of results has defied clear-cut interpretations. For example, Angrist, Rotrosen, and Gershon (1980) noted that one of the three negative symptoms assessed *improved* with neuroleptics, and Andreasen et al. (1982) found none of five negative symptoms to be associated with ventricular size as assessed by computed tomography of schizophrenic patients. The distinctiveness of the syndromes and their stability over different phases of illness also have been questioned. Whereas Andreasen and Olsen (1982) contended that positive and negative syndromes are "at opposite ends of a continuum," Pogue-Geile and Har-

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row (1984) observed a significant interrelationship during the posthospitalization phase. Lindenmayer, Kay, and Friedman (1986) further demonstrated that the external correlates of positive and negative syndromes among acute schizophrenics change over the course of 2 years.

Research findings, of course, are at best only as reliable and valid as the measures on which they are based. Thus, a fundamental source of variability that can account for the disparate results is the instrument used for positive-negative assessment. Well-characterized and standardized 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 carefully conceived scales have been devised recently (e.g., Andreasen and Olsen 1982; Lewine, Fogg, and Meltzer 1983; Heinrichs, Hanlon, and Carpenter 1984; Iager, Kirch, and Wyatt 1985), none have undergone the thorough process of psychometric standardization that is necessary to address fundamental, and as yet highly contested, issues of content and construct validity (Sommers 1985). It has also been a matter of concern that to achieve satisfactory reliability and validity, more rigor is needed in providing strict operational criteria for eliciting, defining, and measuring symptoms (Zubin 1985). Other limitations in some of the reported methods include the following: (1) evaluation of the presence but not severity of component symptoms, (2) imbalance in the number of items representing positive and negative facets, (3) inapplicability for both typological and dimensional assessment of syndromes, (4) no evidence of sensitivity for monitoring drug-related changes, (5) no measurement of the relative preponderance of positive versus negative symptoms, and (6) no measure of general psychopathology and its possible influence on the severity of positive and negative syndromes.

The purpose of this study was to develop and standardize a well-defined instrument for positive-negative assessment that attends to these methodological and psychometric considerations. In addition, we recognized the need for a procedure that can be applied in relatively brief time (40–50 minutes), with minimal retraining and reorientation for the clinician, and that can be used repeatedly for longitudinal or psychopharmacological assessment. We report here on the development and initial standardization of the Positive and Negative Syndrome Scale (PANSS) involving 101 schizophrenics and review evidence of its validity from five separate studies.

Methods

Subjects and Design. Patients with an unqualified diagnosis of schizophrenia were surveyed to assess the distribution, reliability, construct validity, and criterion-related validity of the PANSS. The medical charts of inpatients from long-term psychiatric units in a university-affiliated urban hospital were screened consecutively to select those having a formal *DSM–III* diagnosis of schizophrenia (American Psychiatric Association 1980). All cases with questionable diagnosis, known organic disorder, or mental retardation were excluded. The remainder were interviewed on their own wards by one of two research psychiatrists to ascertain independently whether patients met *DSM–III* criteria for schizophrenia. If diagnoses were thus confirmed, patients underwent the semiformalized PANSS interview *(infra)* and were then assessed on the PANSS scales plus a series of measures deriving from clinical interview, cognitive testing, motor assessment, and careful review of medical and historical records. These measures are described in separate articles that chiefly address their relationship to positive and negative syndromes (Kay, Opler, and Fiszbein 1986; Opler, Kay, and Fiszbein 1986).

The assessments were conducted by two research psychiatrists, one of whom collected data on 47 patients and the other on 54. Both psychiatrists first underwent intensive training in the PANSS interview and rating methods until satisfactory team concordance was achieved, and subsequently they rated patients individually. The raters held no a priori assumptions about the outcome of data and were unaware of results on the PANSS, which was undertaken before other measures but scored only after the conclusion of study.

The final sample consisted of 101 subjects of ages 20–68 (mean = 36.81, SD = 11.16), including 70 males, 31 females, 33 whites, 43 blacks, and 25 Hispanics. Twelve patients were married, 10 divorced, and the remainder single. Mean education was 10.09 years (SD = 2.92), with the range extending to 4 years of college in four cases. Twenty-nine subjects had a first-degree relative who was previously hospitalized for psychiatric treatment; schizophrenia was specified in five cases and affective disorder (depressive, manic, or bipolar) in 10 cases; alcohol abuse was reported in the nuclear family of 16 patients; and among 13 subjects there was evidence of family sociopathy, as judged by record of criminal behavior and prosecution.

On the average, patients were

first hospitalized at age 22.39 years (SD = 8.63) and had since been ill for 14.41 years (SD = 8.95), with a median of six separate admissions. Over the past year and a half, 67.4 percent of the sample experienced continuous hospitalization, while for the remainder the mean duration of inpatient stay was 195 days. All were receiving neuroleptic medication in standard dose ranges at the time of study.

Assessment Procedure. The PANSS ratings are based on all information pertaining to a specified period, usually the previous week. The information derives from both clinical interview and reports of primary care staff (if institutionalized) or family members. The latter is the essential source for assessing social impairment, including items of impulse control, hostility, passive withdrawal, and active social avoidance. All other ratings accrue from a 30- to 40-minute semiformalized psychiatric interview that permits direct observation of affective, motor, cognitive, perceptual, attentional, integrative, and interactive functions. The interview may be conceptualized as involving four phases.[1]

In the first 10–15 minutes, patients are encouraged to discuss their history, circumstances surrounding their hospitalization, their current life situation, and their symptoms. The object of this phase is to establish rapport and allow the patient to express areas of concern. Therefore, the interviewer at this point assumes a nondirective, unchallenging posture to observe, as unobtrusively as possible, the nature of thought processes and content, judgment and insight, communication and rapport, and affective and motor responses.

Deviant material from the first segment of the interview is probed during the second phase, lasting another 10–15 minutes, through prototypic leading questions that progress from unprovocative, nonspecific inquiry (e.g., How do you compare to the average person? Are you special in some ways?) to more direct probe of pathological themes (e.g., Do you have special or unusual powers? Do you consider yourself famous? Are you on a special mission from God?). The object now is to assess productive symptoms that can be judged from the patient's report and elaborations thereof, such as hallucinations, delusional ideation, suspiciousness, and grandiosity. For this purpose, the interviewer attempts to establish first the presence of symptoms and next their severity, which is generally weighted according to the prominence of abnormal manifestations, their frequency of occurrence, and their disruptive impact on daily functioning.

The third and most focused phase of the interview, requiring another 5–10 minutes, involves a series of specific questions to secure information on mood state, anxiety, orientation to three spheres, and abstract reasoning ability. The evaluation of abstract reasoning, for example, consists of a range of questions on concept formulation (e.g., How are a train and bus alike?) and proverb interpretation, which are varied in content when using the PANSS for repeated assessment.

After all the essential rating information is obtained, the final 5–10 minutes of the interview are allocated for more directive and forceful probing of areas where the patient appeared defensive, ambivalent, or uncooperative. For example, a patient who avoided forthright acknowledgment of having a psychiatric disorder may be challenged for a decisive statement. In this last phase, therefore, the patient is subjected to greater stress and testing of limits, which may be necessary to proceed beyond the social demand characteristics inherent in the interview situation and to explore susceptibility to disorganization.

The interview procedure thereby lends itself to observation of physical manifestations (e.g., tension, mannerisms and posturing, excitement, and blunting of affect), interpersonal behavior (e.g., poor rapport,uncooperativeness, hostility, and impaired attention), cognitive-verbal processes (e.g., conceptual disorganization, stereotyped thinking, and lack of spontaneity and flow of conversation), thought content (e.g., grandiosity, somatic concern, guilt feelings, and delusions), and response to structured questioning (e.g., disorientation, anxiety, depression, and difficulty in abstract thinking).

Positive and Negative Syndrome Scale (PANSS). Data elicited by this assessment procedure are applied to the PANSS, a 30-item, 7-point rating instrument that has adapted 18 items from the Brief Psychiatric Rating Scale (BPRS) (Overall and Gorham 1962) and 12 items from the Psychopathology Rating Schedule (PRS) (Singh and Kay 1975*a*). Each item on the PANSS is accompanied by a complete definition as well as detailed anchoring criteria for all seven rating points, which represent increasing levels of psychopathology: 1 = absent, 2 = minimal, 3 = mild, 4 = moderate, 5 = moderate-

[1]Full text of the PANSS Rating Manual, which includes the interview procedure, item definitions, anchoring point descriptions, and rating form, is available on request from the authors.

severe, 6 = severe, and 7 = extreme. Four sample items from the PANSS appear in the Appendix, and scoring is performed on a separate rating form in consultation with the Rating Manual.

In assigning ratings, one first refers to the item definition to determine presence of a symptom. The severity of an item, if present, is then judged by using a holistic perspective in deciding which anchoring point best characterizes the patient's functioning, whether or not all elements of the description are observed. The highest applicable rating point is always assigned, even if the patient meets criteria for lower ratings as well.

Of the 30 psychiatric parameters assessed on the PANSS, seven were chosen a priori to constitute a Positive Scale, seven a Negative Scale, and the remaining 16 a General Psychopathology Scale (see table 3 for the listing of component items).

The selection of items was guided by five considerations, in the following order of importance: (1) Items must be consistent with the hypothetical construct, i.e., with the theoretical concept of positive and negative psychopathology as representing productive features superadded to the mental status vs. deficit features characterized by loss of functioning (cf. Andreasen and Olsen 1982). (2) As per Carpenter, Heinrichs, and Alphs (1985), items should comprise symptoms whose classification as positive or negative is unambiguous and which, by most accounts, are regarded as primary rather than derivative (as, for example, impaired attention, disorientation, and preoccupation may be secondary to arousal disorder or hallucinations). (3) They should be representative of different spheres of functioning (e.g., cognitive, affective, social, and communicative) to optimize content validity. (4) To the extent possible, they should include symptoms consensually regarded as crucial to the definition of the positive syndrome (e.g., hallucinations, delusions, and disorganized thinking) and negative syndrome (e.g., blunted affect, emotional withdrawal, and apathetic social withdrawal). (5) For practical and psychometric reasons, such as facilitating cross-comparisons and equalizing reliability potential, the numbers of items included in the positive and negative scales should be the same.

Insofar as this approach was determined by theoretical and heuristic considerations, there was no certainty that all chosen items would be equally well suited or that all suitable items had been chosen; the internal validity of the scales' composition was to be determined empirically by the data herein assembled.

The General Psychopathology Scale was included as an important adjunct to the positive-negative assessment since it provides a separate but parallel measure of severity of schizophrenic illness that can serve as a point of reference, or control measure, for interpreting the syndromal scores. It was not assumed that this scale is statistically or conceptually distinct from the positive-negative assessment (an issue which also was to be determined by this study), but only that it may be used as a yardstick of collective nonspecific symptoms against which to judge severity of distinct positive and negative manifestations.

In addition to these three scales, a bipolar Composite Scale was conceived to express the direction and magnitude of difference between positive and negative syndromes. This score was considered to reflect the degree of predominance of one syndrome over the other, and its valence (positive or negative) may serve for typological characterization.

The PANSS is scored by summation of ratings across items, such that the potential ranges are 7–49 for the Positive and Negative Scales and 16–112 for the General Psychopathology Scale. The Composite Scale is arrived at by subtracting the negative from positive score, thus yielding a bipolar index that ranges from –42 to +42.

Results

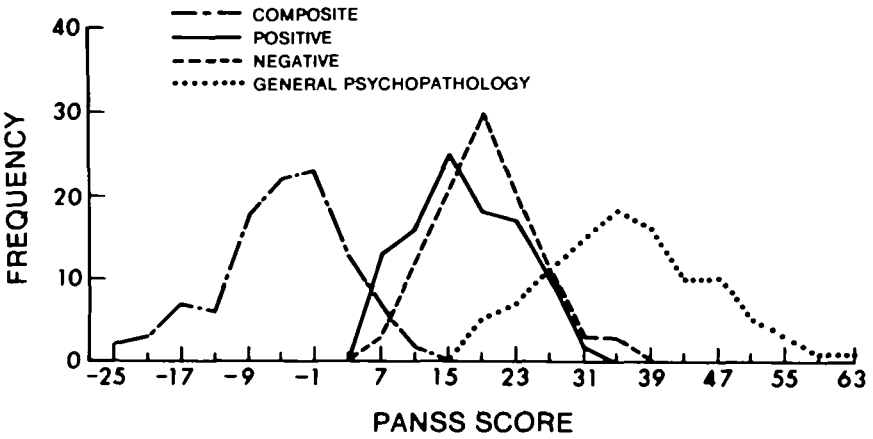
Distribution of Scores. Table 1 summarizes the distribution characteristics of the four scales from the

Table 1. Distribution characteristics of the PANSS for 101 schizophrenics

Distribution characteristics	PANSS scale			
	Positive	Negative	Composite	General psychopathology
Mean	18.20	21.01	− 2.69	37.74
Median	18	20	− 2	36
SD	6.08	6.17	7.45	9.49
Range (potential)	7 to 49	7 to 49	−42 to +42	16 to 112
				19 to 63
Range (obtained)	7 to 32	8 to 38	−25 to +13	
Skewness	.07	.48	− .45	.23
Kurtosis	−.97	.06	.13	−.30

Note.—PANSS = Positive and Negative Syndrome Scale.

Figure 1. Frequency polygraph of distributions on the 4 scales of the Positive and Negative Syndrome Scale (PANSS)



PANSS, and the full spectrum of scores is illustrated in figure 1. All four measures exhibited a roughly normal distribution pattern, without substantial skewness or kurtosis. This observation suggested that the constructs in question represent typical continua and that their measurement is amenable to parametric statistical treatment. The obtained range of scores in all cases was considerably less than the potential range, suggesting that the scales were of ample breadth to avoid ceiling restrictions. The medians of the Positive and Negative Scales were strikingly close (18 and 20, respectively), and therefore the Composite Scale, representing their differential, exhibited a median of -2, which indicated an almost equal contribution by positive and negative items.

On the basis of the normality of distribution, it was possible to convert raw scores for each of the PANSS scales to percentile ranks (table 2). This process enables provisional interpretation of individual scores with reference to a medicated chronic schizophrenic sample.

Internal Consistency and Test-Retest Reliability. The reliability of the PANSS was examined using coefficient α to analyze its internal consistency and the contribution of the component items. As detailed in table 3, each of the items making up the Positive and Negative Scales correlated very strongly with the scale total ($p < .001$), and the mean item-total correlations of .62 and .70, respectively, far exceeded the cross-correlations of .17 (Positive items with Negative Scale) and .18 (Negative items with Positive Scale). The α coefficients with single items removed ranged from .64 to .84, and no perceptible gain on either scale

Table 2. PANSS distribution based on sample of 101 schizophrenics: Conversion of raw scores to percentile ranks

Percentile rank	Raw score on PANSS scale			
	Positive	Negative	Composite	General psychopathology
99.9	37	40	21	67
99	33	36	15	60
98	31	34	13	58
95	29	32	10	54
90	26	29	7	50
85	25	28	5	48
80	24	27	4	46
75	23	26	3	44
70	22	25	2	43
65	21	24	1	42
60	20	23	0	40
55	19	22	− 1	39
50	18	21	− 2	38
45	—	—	− 4	36
40	17	20	− 5	35
35	16	19	− 6	34
30	15	18	− 7	33
25	14	17	− 8	31
20	13	16	− 9	30
15	12	15	−11	28
10	11	14	−13	26
5	8	11	−15	22
2	7	8	−18	18
1	—	7	−20	16
0.1	—	—	−25	—

Note.—PANSS = Positive and Negative Syndrome Scale.

Table 3. Internal reliability analysis of the PANSS

Individual scale items	Mean	SD	Item-total correlation	p	α coefficient with item deleted
Positive Scale					
Delusions	3.18	1.52	.78	<.001	.64
Conceptual disorganization	3.03	1.42	.48	<.001	.73
Hallucinatory behavior	2.50	1.70	.66	<.001	.70
Excitement	2.35	1.24	.55	<.001	.71
Grandiosity	2.36	1.56	.64	<.001	.73
Suspiciousness	2.70	1.24	.61	<.001	.69
Hostility	2.10	1.14	.59	<.001	.70
Scale total	18.20	6.08	(α = .73, p<.001)		
Negative Scale					
Blunted affect	2.94	.93	.63	<.001	.81
Emotional withdrawal	3.03	1.08	.78	<.001	.78
Poor rapport	2.58	1.44	.76	<.001	.79
Passive-apathetic social withdrawal	2.78	1.19	.79	<.001	.78
Difficulty in abstract thinking	3.95	1.34	.61	<.001	.82
Lack of spontaneity & flow of conversation	2.87	1.45	.86	<.001	.76
Stereotyped thinking	2.90	1.30	.50	<.001	.84
Scale total	21.01	6.17	(α = .83, p<.001)		
General Psychopathology Scale					
Somatic concern	2.39	1.21	.48	<.001	.77
Anxiety	2.43	1.20	.60	<.001	.77
Guilt feelings	1.72	1.06	.23	<.02	.79
Tension	2.35	1.19	.70	<.001	.76
Mannerisms & posturing	1.54	1.12	.33	<.001	.79
Depression	1.90	.97	.24	<.02	.79
Motor retardation	2.09	1.10	.27	<.01	.79
Uncooperativeness	2.11	1.21	.51	<.001	.78
Unusual thought content	3.42	1.49	.51	<.001	.78
Disorientation	2.09	1.14	.42	<.001	.78
Poor attention	2.45	1.28	.65	<.001	.76
Lack of judgment & insight	3.82	1.31	.35	<.001	.79
Disturbance of volition	2.10	1.30	.66	<.001	.76
Poor impulse control	2.17	1.31	.66	<.001	.76
Preoccupation	2.71	1.18	.60	<.001	.76
Active social avoidance	2.48	1.18	.43	<.001	.78
Scale total	37.74	9.49	(α = .79, p <.001)		

Note.—PANSS = Positive and Negative Syndrome Scale.

could be achieved by discarding any item. Overall, the α coefficients for the Positive and Negative Scales were .73 and .83, respectively ($p < .001$).

As expected, both scales correlated strongly with the Composite Scale, and they yielded coefficients of similar magnitude ($r = .59$ and $-.61$, respectively, $p < .001$). This again indicated that the two scales contributed equivalently to the com-

posite score, which thus represented a reasonable balance between positive and negative features.

The General Psychopathology Scale similarly revealed high internal consistency, producing an α coefficient of .79 ($p < .001$). Each of the 16 component items contributed homogeneously to the scale (α ranged from .76 to .79 with single items removed) and correlated significantly with the total score (table 3).

The internal reliability of the General Psychopathology Scale could further be evaluated by the split-half method comparing odd and even items. When the Spearman-Brown prophesy formula was used, the reliability coefficient from the sample of 101 was .80 ($p < .001$). This scale correlated substantially also with the Positive and Negative Scales (r = .68 and .60, respectively, $p < .001$), whereas its correlation with the Composite Scale was nonsignificant (r = .07). Accordingly, both positive and negative symptoms seemed to be potentiated by severity of global illness, and in a nondifferentiating manner.

From within the full sample it was possible to study the test-retest stability and reliability of the PANSS 3–6 months later in a cohort of 15 unremitted patients who remained hospitalized on a research ward and, by inference, proved refractory to their ongoing neuroleptic treatment. Their initial assessment revealed somewhat higher than average scores on the Positive, Negative, and General Psychopathology Scales (mean = 21.07, 25.60, and 46.67, respectively). Despite measurable clinical gains during the intervening phase, as indicated by a small but significant drop of 4.74 points on the General Psychopathology Scale (correlated $t = 2.59$, $p < .05$), the positive and negative scores were not noticeably affected (mean = 21.13 and 26.27, respectively, $p > .40$). More importantly, the relative ordering of PANSS scores between baseline and followup held fairly constant over this extended period, despite the inevitable clinical variations and secular trends. For the Positive, Negative, Composite, and General Psychopathology Scales, respectively, the test-retest Pearson correlations were .80 ($p < .001$), .68 ($p < .01$), .66 ($p < .01$), and .60 ($p < .02$), which corresponded to reliability indexes ranging from .77 to .89 as estimates of their theoretically true values (Garrett 1964).

Construct Validity. A direct interrelationship of modest size was found between the Positive and Negative Scales (r = .27, $p < .01$), suggesting that the two syndromes are not independent. However, their common association with general schizophrenic pathology, as described above, raised the possibility that severity of the disorder mediated the covariation between two otherwise distinct scales. This proposition was supported by a partial correlation which, upon extracting the shared variance from the General Psychopathology Scale, revealed a significant *inverse* correlation between positive and negative scores ($r_{12.3} = -.23$, $t_{98} = 2.37$, $p < .02$). Thus, once the influence of severity of illness was removed statistically, the Positive and Negative Scales tended to be mutually exclusive. Because of the pervasive contribution of general severity of psychopathology, of course, the two syndromes clinically can be expected to overlap to some degree.

Criterion-Related Validity. The discriminant and convergent validity of the PANSS was supported by its correlations with a series of clinical, genealogical, psychometric, and historical assessments, as reported by Kay, Opler, and Fiszbein (1986). These data were analyzed using second-order partial correlations to adjust for age and extrapyramidal syndrome, as measured by the Abnormal Involuntary Movement Scale (National Institute of Mental Health 1974) and Extrapyramidal Rating Scale (Alpert et al. 1978), since these two parameters covaried significantly with the negative pole of the Composite Scale ($r = -.25$ and $-.26$, respectively, $p < .02$). The results indicated that the Positive, Negative, and Composite Scales of the PANSS were not influenced by extraneous variables such as race, cultural group, chronicity of illness, depressive symptoms (BPRS) or sad affective tone (Manifest Affect Rating Scale; Alpert and Rush 1983), verbal intelligence (Quick Test; Ammons and Ammons 1962), temporal attention (Span of Attention Test; Kay and Singh 1974), and perceptual-motor development (Progressive Figure Drawing Test; Kay 1982).

On the other hand, as summarized in table 4, the Positive and Negative Scales produced distinctive profiles across the various spheres of assessment, and many of the differences were substantiated by significant correlations of dependent variables with the Composite Scale. Thus, the positive syndrome was distinguished by unusual thoughts, anxiety, anger, preoccupation, disorientation, labile affect, more frequent episodes of hospitalization, and greater likelihood of sociopathy in first-degree relatives. Conversely, the negative syndrome was characterized by slowed motorium, deficits on several affective measures, thought impoverishment, lesser education, and dysfunction on developmentally based cognitive tests.

Table 4. Relationship of the PANSS to external variables

Variable	Significant partial correlation ($p<.05$)			
	Positive	Negative	Composite	General psychopathology
Demographic/historical				
Number of hospital admissions	.20			
Years of education		−.29	.33	
Male gender		.21		
Family history of illness				
Sociopathy	.21			
Unspecified psychosis		.29		.28
Major affective disorder		−.21		
Total psychiatric illness				.20
Cognitive/psychometric				
Egocentricity of Thought Test (CDB)		−.34	.24	
Random number fluency		−.33	.39	
Color Form Preference Test (CDB)			.27	
Affective (MARS)				
Angry affective tone	.46		.23	.47
Affective lability	.31			
Total affective impairment		.64	−.41	
Dull facial expression		.54	−.40	.24
Impoverished thought content		.52	−.49	
Global unrelatedness		.50	−.42	.27
Lack of vocal emphasis		.49	−.40	.30
Slow response latency		.47	−.36	.39
Global immobility		.43	−.43	
Lack of expressive gestures		.41	−.37	
Soft voice level		.32	−.30	
Poor eye contact				.46
Increased noncommunicative movements				.41
Clinical (BPRS)				
Unusual thought content	.73		.50	—
Anxiety	.38		.33	—
Preoccupation	.28			—
Disorientation	.26			—
Motor retardation		.22	−.28	—
Somatic concern		.20		—

Note.—Based on study of 101 chronic schizophrenics (Kay, Opler & Fiszbein 1986). Shown are the significant ($p<.05$) nonovertapping covariates of the Positive and Negative Scales and the correlates of the Composite and General Psychopathology Scales, excluding those clinical items that enter into the latter scale. *Abbreviations.*—CDB = Cognitive Diagnostic Battery (Kay1982); MARS = Manifest Affect Rating Scale (Alpert and Rush 1983); BPRS = Brief Psychiatric Rating Scale (Overall and Gorham 1962); PANSS = Positive and Negative Syndrome Scale.

It prevailed especially among males from families with history of psychotic disorder but not affective illness. The positive-negative distinction on the PANSS, accordingly, was sustained along familial, antecedent, and concurrent assessments and suggested a more pernicious disease process for the negative syndrome, one devolving from genealogical and ontogenetic sources (Kay, Opler, and Fiszbein 1985; Opler and Kay 1985; Opler, Kay, and Fiszbein 1986). A comparison of results with simple vs. partial correlations suggested that these findings were not mitigated by neuroleptic-induced side effects (Kay, Opler, and Fiszbein 1986).

Because of the number of correlations performed, the reliability of individual coefficients must be interpreted with due caution. The finding of a statistically significant relationship in a large sample, moreover, does not presuppose substantial shared variance between measures, which may be judged by the magnitude of the squared coefficients of correlation. What stands out as important for the present purposes, however, is the general pattern of correlations rather than the individual values. The extensiveness of significant associations, the consistency across different spheres and methods of assessment, the conceptual cohesiveness, and the corresponding unrelatedness of PANSS scores to extraneous variables may be regarded as evidence toward convergent and discriminant validity.

The General Psychopathology Scale, by comparison, yielded fewer external correlations and a nonspecific profile that encompassed both positive and negative characteristics (table 4). As a measure of severity of illness, the scale was significantly associated with seven of the affective symptoms reflecting

both a productive syndrome (i.e., anger and increased noncommunicative movements) and deficits (e.g., dull facial expression, poor eye contact, and emotional unrelatedness). In terms of family psychiatric disorder, it correlated with psychosis as well as prevalence of any major disturbance among first-degree relatives (i.e., history of schizophrenia, affective illness, alcoholism, sociopathy, or suicide). Alternatively, it bore no significant relationship with the various control measures such as age, sex, marital status, cultural group, chronicity of illness, verbal intelligence, or neurological soft signs.

In keeping with the impression from the correlational analyses, stepwise multiple regression revealed no overlap among the parameters that best accounted for the Positive and Negative Scales. The Positive Scale, with 74 percent of its variance explained, was contributed to primarily by unusual thought content (i.e., bizarre quality of ideation), family history of sociopathy, angry affective tone, and global psychopathology. The Negative Scale, with 81 percent of its variance explained, was accounted for chiefly by general affective impairment on the Manifest Affect Rating Scale, family history of psychosis, cognitive developmental deficit on the Egocentricity of Thought Test (Kay 1982), impoverished thought content, lack of insight, and active social withdrawal. For the Composite Scale, which denotes tendency toward the positive or negative pole, 69 percent of the variance was predicted by unusual thought content, emotional unrelatedness, impoverished thought content, years of education, and conceptual development on the Color Form Representation Test (Kay 1982). The multiple correlation values for the three scales were .86, .90, and .84, respectively, all highly significant ($p < .001$).

Pharmacological Validation. The validity and drug sensitivity of the PANSS were examined experimentally by assessing differential response of syndrome scores to drug treatment.

In a single-subject experimental study, we analyzed changes on the PANSS when the dopamine precursor, L-dopa, was used adjunctively with neuroleptics (Kay and Opler 1985–86). The investigation followed a 27-week double-blind, placebo-controlled, reversal design. After 2 weeks of treatment with neuroleptics alone, a haloperidol + placebo combination was instituted for 13 weeks, followed by a haloperidol + L-dopa combination for the next 8 weeks, and then a return to haloperidol + placebo in the remaining 5 weeks. When the intervening L-dopa phase was compared against the preceding and following 4-week phases, significant improvement was found on the Negative Scale of the PANSS ($p < .05$) as well as two of the individual negative items, difficulty in abstract thinking ($p < .025$) and passive-apathetic social withdrawal ($p < .05$). By contrast, neither the Positive Scale nor any of its individual items showed change during the L-dopa challenge ($p > .50$).

A second investigation considered the specificity of adverse clinical reaction to anticholinergic drugs when used with neuroleptics. This work was predicated on the findings of Singh and Kay (1975*a*, 1975*b*, 1979) that antiparkinsonian agents tend to worsen psychiatric symptoms of neuroleptic-treated schizophrenics, and the more recent qualification by Johnstone et al. (1983) that the phenomenon obtains mainly to positive features of the illness. Thus, Singh, Kay, and Opler (1987) reanalyzed their earlier data on 47 well-defined schizophrenics who had received, under double-blind conditions, antiparkinsonian medication (benztropine or trihexyphenidyl) for 2 to 4 weeks along the course of neuroleptic treatment (haloperidol or chlorpromazine). Clinical ratings during the antiparkinsonian phase were contrasted against the preceding and following 2-week periods of neuroleptic alone, thus controlling for the time-series factor via an ABA′ design (Singh and Kay 1978). The PANSS clusters were used to inspect the data, which was possible since ratings on both the BPRS and PRS had been conducted originally. Our results indicated that only the Positive Scale was adversely influenced by the anticholinergic intervention ($t = 2.58$, $p < .02$). The correlation between positive and negative clusters in their direction and magnitude of change proved nonsignificant, suggesting that the two scales did not covary in their response to anticholinergics.

Typological Validation. The PANSS has been applied also as a method of characterizing schizophrenic patients with a predominantly positive vs. a predominantly negative syndrome. We considered patients who scored "moderate" or higher on at least three of the seven positive items as positive-type schizophrenics and those with the reverse pattern ("moderate" on at least three negative items) as negative-type schizophrenics; patients who qualified for both groups or neither were labeled as mixed type. This system was applied in separate studies involving 37 acute (< 2 years of illness) and 47 chronic schizophrenics, all with confirmed *DSM–III* diagnosis (Lindenmayer, Kay,

and Opler 1984; Opler et al. 1984).

The results supported the validity of the PANSS for isolating groups that differ on both antecedent and concurrent variables. A significant inverse relationship between positive and negative symptoms was obtained in both studies ($r = -.62$, $p < .001$, and $r = -.55$, $p < .01$, respectively). In the acute sample (Lindenmayer, Kay, and Opler 1984), patients classified by the PANSS as negative differed from the positive group in premorbid functioning (lesser schooling, $p < .02$; poorer work adjustment, $p < .10$), likelihood of nonparanoid subdiagnosis ($p < .02$), and various deficit symptoms that encompassed the cognitive, social, affective, and motor spheres. The chronic study (Opler et al. 1984) also found the negative type to have achieved less education ($p < .02$) and, on other historical dimensions, to be characterized more by winter birth ($p < .02$) and early onset of illness ($p < .05$), as judged by age of initial hospitalization. On objective psychometric tests, this group was distinguished by a developmentally more primitive cognitive style ($p < .01$) and slower psychomotor pace ($p < .05$) on the Cognitive Diagnostic Battery (Kay 1982), despite similar scores on tests of intelligence and visual-motor deficits. In both studies, no group differences were obtained on control variables such as sex, race, ethnic background, chronicity of illness, and level of general psychopathology.

Typological comparisons were rendered also in the Singh, Kay, and Opler (1987) study of clinical response to antiparkinsonian agents. From the baseline drug-free assessment with the PANSS, schizophrenic patients were prospectively classified as predominantly positive ($n = 25$) or negative type ($n = 22$) according to the valence of their Composite Scale score (i.e., positive minus negative value above zero being positive and below zero being negative). It was found that only those classified as positive type showed subsequent clinical worsening when antiparkinsonian drugs were introduced ($p < .02$), while the negative group was essentially unaffected. Thus, complementing the studies of Lindenmayer, Kay, and Opler (1984) and Opler et al. (1984), which supported the validity of the PANSS typology in relation to antecedent and concurrent measures, the Singh, Kay, and Opler (1987) finding introduced evidence of predictive validity.

Discussion

We have described the development and initial standardization of the 30-item PANSS as an instrument for measuring the prevalence of positive and negative syndromes in schizophrenia. A major impetus of its development was the need for a psychometrically sound procedure to serve typological and dimensional assessment. Perhaps its most important contributions are the provision of specified interview guidelines and assessment criteria, and the inclusion of two additional scales that consider positive-negative syndromes relative to one another and relative to general severity of psychopathology.

The PANSS method derives from two established psychiatric rating scales for which interrater agreement and treatment sensitivity have been demonstrated. As such, it proceeds from reliable techniques that are familiar to clinicians and researchers, requiring relatively little additional training. For the purpose of the PANSS, however, precise operational definitions were introduced for all items at every rating level. These guidelines, by enhancing the objectivity and replicability of observations, are expected to augment concordance among raters. Although this aspect of reliability could not be measured in the present study,[2] the various other indicators of reliability, stability, and validity from a sample of 101 schizophrenic patients suggested that the goal of developing objective and replicable scales was met.

The PANSS scales, as already discussed, were assembled mainly on the basis of theoretical and psychometric considerations (e.g., definition of construct, content sampling, and balancing of items). The present empirical analyses indicated that the items selected were appropriate to the constructs and were internally coherent, yet it also emerged that other clinical variables could well have been included. Specifically, according to correlational and multiple regression analyses, a positive syndrome was strongly associated with unusual thought content and anxiety, while a negative syndrome seemed to encompass motor retardation, lack of judgment and insight, and active social avoidance.

As based on the initial item selection, however, the validation process supported the use of this instrument for positive-negative assessment. All four scales from the PANSS produced normal Gaussian distribution curves, which suggested amenability to powerful parametric statistics—hence, reduced risk of Type II error in clinical re-

[2]Since this article went to press, we have reported interrater reliabilities in a range between .83 and .87 for the four PANSS scales on a sample of 31 acute schizophrenics (Kay, Opler, and Lindenmayer, in press).

search. The reliability of the PANSS was upheld by coefficient α, split-half analysis, and test-retest methods, which also provided some evidence of stability in a refractory chronic schizophrenic cohort. Its validity was considered on the basis of five separate studies in which it served typological and/or dimensional assessment of schizophrenics. The studies supported its construct and criterion-related validity with respect to both antecedent and concurrent variables that involved historical, genealogical, clinical, and psychometric assessments.

The reliance on individual rather than team ratings raises the question of whether the outcomes may have been influenced by an individual's preconceptions. Such a possibility was mitigated by several safeguards in the design: the participation of two independent psychiatrists, each gathering data on approximately half the sample; their lack of knowledge of PANSS scores when collecting other data; their perception of the research as exploratory rather than hypothesis testing; the use of multiple external criteria, including such measures as psychometric tests and historical records that are objective and derive from separate and independent sources; and, above all, the convergence of several different studies, involving different raters and designs, which supported various aspects of validation.

The pattern of findings also accorded with the results of other studies, employing different investigative tools, which have similarly implicated lesser education, premorbid impairments, poor cognitive performance, and genealogical predisposition in the characterization of a negative schizophrenic syndrome (Andreasen and Olsen 1982; Andreasen et al. 1982; Dworkin and Lenzenweger 1984; Pogue-Geile and Harrow 1984). In these respects, there is some evidence of cross-validation. In addition, predictive validity and sensitivity to change were indicated by the significance of the Positive and Negative Scales for anticipating and reflecting differential response to medication. The PANSS research, therefore, was undertaken as a sequential programmatic series of studies that included multimethod and experimental approaches and, as such, heeded the methodological requisites discussed by Sommers (1985) and Zubin (1985) for validation of relatively uncharted constructs.

The premise of our work was that some of the disparities in the research on positive-negative distinctions may reflect the application of imprecise instruments, which promotes Type II error by reducing the chance of observing true variance, and may be due also to the very diversity among studies in methods of assessment.

There has been considerable disagreement, for example, surrounding the issue of content validity, i.e., what symptoms, how many, and even which spheres of functioning best represent positive and negative syndromes (Sommers 1985). Thus, Angrist, Rotrosen, and Gershon (1980) have measured these two syndromes by using clusters of 10 and 3 symptoms, respectively, while Andreasen and Olsen (1982) described instead 4 and 5 symptoms and Lewine, Fogg, and Meltzer (1983) incorporated a compilation of 22 and 11 symptoms. Whereas Owens and Johnstone (1980) originally conceived of the negative syndrome as entailing flat affect and impoverished speech, Crow (1980*a*) expanded the concept to include avolition, and Andreasen (1982) modified it by excluding poverty of speech and introducing alogia, anhedonia-asociality, and attentional impairment. Elsewhere we have proposed that attentional dysfunction in schizophrenia is multidetermined and at least partly a function of arousal disorder (Kay 1981; Kay and Singh 1974), and studies by our group and others have since confuted its specificity to either the negative or positive syndrome (Opler et al. 1984; Bilder et al. 1985; Cornblatt et al. 1985; Kay, Opler, and Fiszbein 1986). By contrast to other descriptions of the negative syndrome, the PANSS excludes attentional impairment but embraces deficits along five major spheres of functioning: the cognitive, affective, social, interpersonal, and communicational.

Aside from variation in content of scales, there has been little study and much disagreement about the construct validity of positive and negative syndromes (Zubin 1985). Researchers have differed in their opinion of whether these syndromes are independent of one another—hence, distinct constructs—and generally have ignored their relationship to overall psychopathology. Andreasen and Olsen (1982), for example, have argued that the positive and negative aspects represent opposite poles of a continuum, whereas Pogue-Geile and Harrow (1984) have concluded that they are overlapping features of schizophrenia. Our analysis of the PANSS not only supported the cohesiveness of the separate positive and negative clusters via coefficient α, but provided evidence of their distinctiveness from one another by revealing low, nonsignificant item-total cross-correlations (means of .17 and .18) and nonoverlap of determinants identified through multiple regression analysis. However, the relationship between positive and negative dimensions was observed

to be strongly mediated by their shared association with level of psychopathology. Thus, a significant direct correlation was initially found between the Positive and Negative Scales, but when their correlations with the General Psychopathology Scale were statistically extracted, they bore a significant inverse correlation. This disclosure of the mutually exclusive nature of the Positive and Negative Scales not only supports their conceptual separateness, i.e., construct validity, but provides a compelling rationale for pursuing typological study based on this distinction.

In view of the pattern of PANSS correlations with historical, cognitive developmental, and genealogical variables, we have proposed that the negative syndrome is distinguished by a familial predisposition for psychosis and early ontogenetic failures, particularly in the cognitive realm, which foreshadow premorbid adaptational difficulties and, eventually, enduring multimodal deficits (Kay, Opler, and Fiszbein 1985, 1986; Opler, Kay, and Fiszbein 1986). The results and interpretations are congruent with the pivotal role ascribed to developmental dysfunction in the pathogenesis of certain expressions of schizophrenia (cf. Walker and Emory 1983; Aylward, Walker, and Bettes 1984; Pogue-Geile and Harrow 1984) and with our dual-process model that posits separate developmental (neuroleptic-resistant) and arousal-related, disorganizational (neuroleptic-responsive) components to the schizophrenic cognitive abnormality (Kay and Singh 1979).

Clearly, a systematic program of study will be needed to pursue this emerging model. Further research on the PANSS also is necessary, including drug-free assessments and expansion of the data base for establishing norms. The latter objective entails comparisons of scores among schizophrenic subtypes, such as classified by subdiagnosis and chronicity of illness, as well as in relation to nonschizophrenic groups.

It should be cautioned that generalization of results depends on the representativeness of the sample, which in the present case was a chronic group in whom neuroleptic treatment could not be withdrawn. With regard to chronicity, however, our analyses indicated no significant correlation between years since initial hospitalization and positive syndrome ($r = -.03$), negative syndrome ($r = -.09$), or the composite index ($r = .04$) (Kay, Opler, and Fiszbein 1986). Evidence from our typological comparisons also revealed no covariation between length of illness and the positive-negative dimension as observed within an acute (Lindenmayer, Kay, and Opler 1984) or chronic schizophrenic population (Opler et al. 1984). In addition, we recently concluded two studies which further suggest that positive and negative syndromes prevail to a similar extent across various stages of schizophrenia. A 2-year followup of 19 acute schizophrenics (Lindenmayer, Kay, and Friedman 1986) revealed negligible change ($p > .20$) in positive score (17.26 to 18.37), negative score (22.05 to 21.16), composite index (-4.29 to -2.79), or general psychopathology (39.04 to 38.56). By contrast to the present report of stability among refractory patients during the chronic phase, the correlates were low and nonsignificant when scores were tracked from the acute into the subacute phase, i.e., before the more established course of illness (cf. Brown 1960). Thus, some patients evidently improved clinically, some worsened, and some were unchanged. In a cross-sectional investigation of 134 schizophrenics (Kay et al. 1986), which pooled data from an acute sample (Lindenmayer, Kay, and Opler 1984) with the present group, we compared PANSS scores in the acute (0–2 years), chronic (3–10 years), and long-term chronic stages of illness (> 10 years). Analysis of variance revealed nonsignificant differences ($F \leq 1$) of means among these respective groups on all scales: Positive (18.76, 19.71, 17.98), Negative (21.42, 21.21, 21.27), Composite (-2.66, -1.50, -3.29), and General Psychopathology (39.58, 37.40, 38.13).

The assessment of neuroleptic-treated patients poses an interpretational problem for this as for other published studies on the positive-negative dimension. Particularly in evaluating the negative syndrome, it has been proposed that neuroleptics may produce a seeming indifference to the environment, and their side effects can be misconstrued as motor, affective, verbal, or motivational deficits (Rifkin, Quitkin, and Klein 1975; Van Putten and May 1978). To guard against systematic rating errors attributable to extrapyramidal reaction, we separately assessed these symptoms on two side effects scales and statistically partialed out their influence on PANSS scores. It was seen that the criterion-related validity was not diminished as a result (Kay, Opler, and Fiszbein 1986). The general impact of medication and dose, however, could not be statistically adjusted due to incomplete and unreliable information in many cases. In our typological studies, where this information was available, neuroleptic dose was unrelated to the positive-negative distinction in acute schizophrenics (Lindenmayer, Kay, and Opler 1984) and, contrary to the proposed direction of confound, was only half as

high for those with a preponderance of negative features in a chronic sample (Opler et al. 1984).

We are presently examining the influence of neuroleptic treatment and withdrawal on positive and negative scores, their variations over the course of illness, their prognostic implications, and their relationship to neurological status. In proceeding with our study of the reliability and validity of the PANSS, we also have begun to collect simultaneous ratings from paired observers using this instrument as well as corresponding assessment with Andreasen's (1982) method, which will permit analysis of interjudge concordance and cross-comparison of scales (Kay, Opler, and Lindenmayer, in press). Should the validity of the PANSS be upheld by future studies and independent investigators, its use might be expected to promote uniformity and reliability in research findings.

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Appendix

Sample Items From the Positive and Negative Syndrome Scale

P1. **Delusions.** Beliefs which are unfounded, unrealistic, and idiosyncratic. Basis for rating: thought content expressed in the inteview and its influence on behavior.

1. *Absent*—Definition does not apply.

2. *Minimal*—Questionable pathology; may be at the upper extreme of normal limits.

3. *Mild*—Presence of one or two delusions that are vague, uncrystallized, and not tenaciously held. Delusions do not interfere with thinking, social relations, or behavior.

4. *Moderate*—Presence of either a kaleidoscopic array of poorly formed, unstable delusions or of a few well-formed delusions that occasionally interfere with thinking, social relations, or behavior.

5. *Moderate-severe*—Presence of numerous well-formed delusions that are tenaciously held and occasionally interfere with thinking, social relations, or behavior.

6. *Severe*—Presence of a stable set of delusions that are crystallized, possibly systematized, tenaciously held, and clearly interfere with thinking, social relations, and behavior. Patient at times acts inappropriately and irresponsibly on the basis of unrealistic beliefs.

7. *Extreme*—Presence of a stable set of delusions that are either highly systematized or very numerous, and dominate major facets of the patient's life. This frequently results in inappropriate and irresponsible action, which may even jeopardize the safety of the patient or others.

P2. **Conceptual disorganization.** Disorganized process of thinking characterized by disruption of goal-directed sequencing, e.g., circumstantiality, tangentiality, loose associations, non sequiturs, gross illogicality, or thought blocking. Basis for rating: cognitive-verbal processes observed during the course of interview.

1. *Absent*—Definition does not apply.

2. *Minimal*—Questionable pathology; may be at the upper extreme of normal limits.

3. *Mild*—Thinking is circumstantial, tangential, or paralogical. There is some difficulty in directing thoughts toward a goal, and some loosening of associations may be evidenced under pressure.

4. *Moderate*—Able to focus thoughts when communications are brief and structured, but becomes loose or irrelevant when dealing with more complex communications or when under minimal pressure.

5. *Moderate-severe*—Generally has difficulty organizing thoughts, as evidenced by frequent irrelevancies, disconnectedness, or loosening of associations even when not under pressure.

6. *Severe*—Thinking is seriously derailed and internally inconsistent, resulting in gross irrelevancies and disruptions of thought processes, which occur almost constantly.

7. *Extreme*—Thoughts are disrupted to the point where the patient is incoherent. There is marked loosening of associations, which results in total failure of communication, e.g., "word salad" or mutism.

N1. **Blunted affect.** Diminished emotional responsiveness as characterized by a reduction in facial expression, modulation of feelings, and communicative gestures. Basis for rating: observation of physical manifestations of affective tone and emotional responsiveness during the course of interview.

1. *Absent*—Definition does not apply.

2. *Minimal*—Questionable pathology; may be at the upper extreme of normal limits.

3. *Mild*—Changes in facial expression and communicative gestures seem stilted, forced, artificial, or lacking in modulation.

4. *Moderate*—Reduced range of facial expression and few expressive gestures.

5. *Moderate-severe*—Affect generally appears "flat," with few changes in facial expression and a paucity of communicative gestures.

6. *Severe*—Marked flatness and deficiency of emotions exhibited most of the time. There may be unmodulated extreme affective discharges, such as excitement, rage, or inappropriate uncontrolled laughter.

7. *Extreme*—Changes in facial expression and evidence of communicative gestures are virtually absent. Patient seems constantly to show a barren or "wooden" expression.

N6. **Lack of spontaneity and flow of conversation.** Decrease in the normal flow of communication associated with apathy, avolition, defensiveness, or cognitive impairment. This is manifested by diminished fluidity and productivity of the verbal-interactional process. Basis for rating: cognitive-verbal processes observed during the course of interview.

1. *Absent*—Definition does not apply.

2. *Minimal*—Questionable pathology; may be at the upper extreme of normal limits.

3. *Mild*—Conversation shows little initiative. Patient's answers tend to be brief and unembellished, requiring direct and leading questions by the interviewer.

4. *Moderate*—Conversation lacks free flow and appears uneven or halting. Leading questions are frequently needed to elicit adequate responses and proceed with conversation.

5. *Moderate-severe*—Patient shows a marked lack of spontaneity and openness, replying to the interviewer's questions with only one or two brief sentences.

6. *Severe*—Patient's responses are limited mainly to a few words or short phrases intended to avoid or curtail communication (e.g., "I don't know," "I'm not at liberty to say"). Conversation is seriously impaired as a result, and the interview is highly unproductive.

7. *Extreme*—Verbal output is restricted to, at most, an occasional utterance, making conversation not possible.