

## Motor, Volitional and Behavioural Disorders in Schizophrenia 1: Assessment Using the Modified Rogers Scale

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The assessment of catatonic symptoms, unlike that of other schizophrenia symptoms, has not acquired accuracy and phenomenological rigour, and their distinction from extrapyramidal side-effects is not always easy. The Modified Rogers Scale can rate abnormalities in movement, volition, speech, and overall behaviour in schizophrenia. It is detailed, reliable and valid, and permits the isolation of a score for non-extrapyramidal and hence presumably catatonic phenomena.

Leaving aside purely neurological motor disorders, as well as those understandable as the expression of psychic events, there still remains, as Jaspers (1959) put it, a large number of surprising phenomena. The more striking of these were first brought together by Kahlbaum (1874) in the original description of catatonia. When Kraepelin (Brownrigg, 1901; Kraepelin, 1913) incorporated catatonia into the general category of dementia praecox, he identified and categorised these abnormalities more systematically. But it was Bleuler (1911) who, under the heading of catatonic symptoms, gave the fullest account of schizophrenic abnormalities in movement, volition, overall behaviour and speech. His set of symptoms was enlarged somewhat by Kleist (1943, 1960), and a synthesis of Bleuler's and Kleist's views in 1962 by Fish (Hamilton, 1984) subsequently became the standard descriptive classification of catatonic phenomena. The large number of individual abnormalities subsumed by these authors under the term 'catatonic' can be conveniently, if somewhat artificially, divided into: simple disorders of movement; more complex disorders of volition; very complex disorders of overall behaviour; and disorders of speech.

The leading representatives of simple disorders of movement are stereotypies, mannerisms and posturing, which in practice can be difficult to distinguish from one another. Closely related to these are facial grimacing and manneristic gaits; other simple motor catatonic disorders include blocking, freezing, and waxy flexibility. Kleist (1943, 1960) also identified iterations, a monotonous, rhythmical repetition of motor acts, and, rather more controversially, parakinesia, a continuous irregular jerking and twitching reminiscent of chorea, athetosis and tics.

More complex disorders of volition, although often expressed in relatively simple motor acts, appear to reflect a disturbance in the will behind the movement rather than in the movement itself.

They include a range of disorders of co-operation: simple, more motor examples are *mitgehen*, a tendency to co-operate overly with passive movements, and its opposite *gegenhalten*, a 'springy' resistance to passive movements which increases as increasing force is exerted. These shade off into more obviously volitional disorders like excessive compliance and automatic obedience on the one hand, and negativism on the other. Catatonic phenomena which would also appear to be classifiable at this level are ambitendence, echopraxia, handling, intertwining, and the various forced touching movements termed 'hypermetamorphosis' by Jaspers (1959).

Very complex disorders of overall behaviour include alterations in level of activity, which can range from a more or less pronounced under- or overactivity to the extremes of catatonic stupor and excitement. Invariably classed alongside these is catatonic impulsiveness, where a patient (often stuporose) suddenly rouses himself to perform some completely senseless or violent act, afterwards being able to give no, or only a facile, explanation. Bleuler (1911) considered that the phenomena of stereotypy and mannerism could sometimes manifest themselves at this level, as in patients whose daily routine came to be carried out with almost photographic sameness, or whose whole demeanour became stilted, pompous, a caricature of some subcultural style. According to this author, negativism also showed a gradation of complexity to a state where a peculiar and pointless contrariness came to pervade all aspects of behaviour. Analogous complex forms of excessive compliance might also exist in phenomena like 'advertance' (Hamilton, 1984), where a patient turns towards whoever approaches and begins talking nonsense.

Disorders of speech, at their simplest, may take the form of grunting, hawking, or other vocalisations, or delivery may be in a flat monotone, with peculiar scanning, or affected intonations. In speech stereotypies and mannerisms, a word or phrase is inserted

into discourse repeatedly and inappropriately; the patient may affect all kinds of accents, speak in infinitives and diminutives, add 'ism' or '-io' to every word. Other catatonic speech abnormalities include echolalia, palilalia, mutism and verbigeration (in the original sense of the term to denote indistinct utterances in which a few repetitive words and phrases can be made out).

These descriptions were made before the introduction of neuroleptic drugs. The extrapyramidal side-effects of these added a new dimension to schizophrenic motor disorder, but at the same time they began to complicate the interpretation of many of the phenomena seen in individual patients. On external appearances, a resemblance is apparent between the akinetic phenomena of Parkinsonism and those described by Bleuler (1911) in incomplete stuporose states (Marsden *et al*, 1975). Similarly, when a slowing and clumsiness of movement is observed in drug-free schizophrenic patients, this has been considered attributable either to the disorder itself (Manschreck *et al*, 1982) or to residual Parkinsonian side-effects (Marsden, 1982). Classifying abnormal movements as mannerisms/stereotypies or dyskinesias can also be difficult. Marsden *et al* (1975) noted that while schizophrenic stereotypies tend to be more complex and purposeful, a resemblance to the dyskinesias seen in neurological disorders is sometimes evident. Owens (1986, 1990) argues that when trying to determine whether abnormal movements and postures are due to drug or disease processes, appearances can be deceptive and there are pitfalls in a purely phenomenological approach.

Current approaches to the description and assessment of catatonic phenomena lack the accuracy and phenomenological rigour developed for other classes of schizophrenic symptom. A number of interview schedules include sections for the rating of disorders of behaviour (e.g. Wing *et al*, 1974; Spitzer & Endicott, 1978; Andreasen, 1987; Atakan & Cooper, 1989). However, only a small part of each of these is devoted to catatonic symptoms, which are not in general sharply distinguished from other, less specific behavioural abnormalities. Also, the practical problem of distinguishing catatonic symptoms from extrapyramidal side-effects on a phenomenological basis is not addressed by any of these scales.

The aim in the present study was to develop a scale for assessing all the kinds of motor, volitional and behavioural disorder currently encountered in schizophrenia. The scale was designed to be detailed and quantitative to focus on those abnormalities traditionally referred to as catatonic, and to allow the isolation of these in a way that avoids the difficulties

alluded to by Marsden (Marsden *et al*, 1975; Marsden, 1982) and Owens (1986, 1990).

### Method

The non-prejudicial method of rating motor disorder devised by Rogers (1985) formed the basis of the approach taken. Based on examination of schizophrenic patients, supplemented by questioning of nursing staff, Rogers rated various types of motor disorder, while avoiding any assumptions about their designation as neurological or psychiatric. Abnormalities were rated as present or absent under headings for posture, tone, purposive movement, spontaneous movement, gait, speech and overall behaviour; items assessed included those that would normally be considered extrapyramidal (e.g. flexed posture, loss of arm swing, simple involuntary movements), as well as those that would usually be regarded as psychiatric, if not frankly catatonic (e.g. persistence of postures, *gegenhalten*, mutism). There was also scope for rating disorders which were not easily assigned to either category (e.g. complex tics, abruptness/rapidity of movement).

Rogers' original scale was modified in two ways. First, a greater breadth of classically described catatonic phenomena was incorporated. Secondly, a simple 0–1–2 measure of severity was introduced, where 1 signified the definite presence of an abnormality and 2 required that it be severe and/or pervasive. Pilot versions of the scale were used to rate motor disorder in long-stay schizophrenic in-patients, and modifications and refinements were made. In particular, it became clear that in order to identify and quantify abnormal phenomena as precisely as possible, it would be necessary to redefine some disorders whose classic description was vague using contemporary terminologies (e.g. 'aprosodic speech'), and to separate some intimately related phenomena (e.g. *gegenhalten* and negativism) into explicit motor and behavioural components.

A means of examination of patients was developed that was essentially an elaboration of that used for rating extrapyramidal side-effects, described for example by Simpson and co-workers (Simpson & Angus, 1979; Simpson *et al*, 1979). This was expanded to incorporate tests for motor compliance (the patient being asked to raise a finger and then an arm), *mitgehen* (the examiner raising each of the patient's outstretched arms in turn with one finger, after instructing him/her to resist this), and echopraxia (the examiner scratching his own head, then patting his chest and legs, after first instructing the patient to stand with his arms by his sides). Immediately after the examination the patient was discreetly observed on the ward for a short period, whenever possible.

### Isolation of a subscale for catatonic phenomena

The Modified Rogers Scale (Appendix 1 of the following paper, this issue, pp. 333–334) was designed to rate both extrapyramidal and catatonic abnormalities, as well as those potentially classifiable as either. As well as removing any need to try to decide this at the time of rating, it was considered that the non-prejudicial approach permitted a

score to be derived for catatonic symptoms which was uncontaminated by extrapyramidal phenomena. This was achieved by excluding from consideration all items having the potential to rate extrapyramidal phenomena. Thus, according to a fixed scheme, scores on all items rating disorders that could represent, were affiliated with, or might in some circumstances be confused with tardive dyskinesia and Parkinsonism were disregarded. Scores on the remaining items were considered to be phenomenologically non-extrapyramidal and therefore, by default, representative of catatonic disorder.

Items on the Modified Rogers Scale identified as potentially extrapyramidal included those rating phenomena characteristic of Parkinsonism (e.g. increased tone, slowness/feebleness of movement, reduced associated movement, slow/shuffling gait) and those typically associated with involuntary movement disorders (e.g. decreased tone, simple abnormal movements). To these were added others which, while not strictly extrapyramidal in the phenomenological sense, have at various times been explicitly or implicitly associated with extrapyramidal syndromes (e.g. abruptness/rapidity of movement, exaggerated quality to movement, exaggerated associated movement). Items of reported behaviour were also excluded because of uncertainties of interpretation.

The remaining items were considered to rate phenomena falling outside the range of neuroleptic-induced Parkinsonism and dyskinesia (Marsden *et al.*, 1975, 1986; Lees, 1985), except perhaps in exceptional circumstances (see under 'Discussion'). They also approximated, within the constraints of objective rating, fairly closely to classically described catatonic symptoms. The items comprised: complex abnormal posture, persistence of imposed postures, *gegenhalten*, *mitgehen*, complex mannerism stereotypy-like movements, iterations of spontaneous movements, manneristic/bizarre gait, aprosodic speech, mutism, indistinct/unintelligible speech, marked over- and underactivity, excessive compliance/automatic obedience, poor/feeble compliance, and the phenomena classified under the 'other' headings (see Appendix 2 of the following paper, this issue, p. 334–335).

#### Reliability of the scale

To examine the reliability of the scale as a whole, each of its constituent items was subject to an analysis of inter-rater reliability. Data were obtained by two pairs of raters (PJM and CEL; PJM and AMM), each of whom examined 25 and 30 schizophrenic patients respectively. The patients were drawn from the acute and chronic wards of two hospitals and included many with significant extrapyramidal side-effects as well as a number (mainly long-stay patients) who exhibited ostensible catatonic symptoms to a marked degree. Each patient was simultaneously and independently assessed by both raters. One of the raters first carried out the above examination, the other then made a more limited examination; after a further period of observation both then made ratings without any conferring.

An examination of the test-retest reliability of the scale was also undertaken; this was restricted to the catatonic subscale, chiefly because this was the major area of interest, but also because of the potential variability of extrapyramidal

symptoms (especially Parkinsonism) over time. As part of the present and another study (McKenna *et al.*, 1990), a number of schizophrenic patients were re-examined using the Modified Rogers Scale one to six months after their original assessment. Of these, 23 long-stay patients and nine out-patients were selected on the basis (a) that their clinical condition had remained largely unchanged between the first and second examinations, and (b) that the ratings were made by different examiners on the two occasions.

#### Validity of the scale

Because the scale as a whole measures at least two distinct classes of disorder, examination of its validity was restricted to its concurrent validity, the degree of corroboration by independent measures of assessment. Establishing the validity of the catatonic subscale was considered difficult because this is a largely uncharted area, and also because any such attempt inevitably blurs into establishing the validity of the construct of catatonic symptoms itself. Accordingly only a preliminary examination was undertaken, which investigated the relationship of the various different classes of catatonic phenomena in the scale to the overall catatonic score (criterion validity), and to one another.

Concurrent validity of the scale as a whole was examined in 40 schizophrenic in-patients by reference to two independent measures, one 'cross-sectional' and the other 'longitudinal'. Cross-sectionally, the patients were examined by two raters: one assessed motor disorder using the Modified Rogers Scale as described above, the other independently carried out a fuller mental-state examination and completed the Behavioural Observation Schedule (BOS) of Atakan & Cooper (1989). This evaluates a wide range of objective mental-state abnormalities; individual abnormalities are assessed on a 0–2 scale, and these are grouped into 15 sections which receive 'overall impression' scores of 0–5. Some sections are devoted to self-presentation, arousal, attention, affect and co-operativeness; others cover psychic tempo, facial expression, body language, and articulation. In the latter sections there are a number of individual items rating presumed extrapyramidal side-effects (e.g. involuntary facial movements) and presumed catatonic phenomena (e.g. stereotypies, mannerisms and posturing). It was hypothesised that scores on the Modified Rogers Scale would correlate with scores on the BOS, and especially with scores on sections and individual items devoted to motor, volitional and behavioural disorders.

Longitudinally, for each of the above patients, nursing staff completed the Social Behavioural Schedule (SBS) of Wykes & Sturt (1986). This 28-item questionnaire assesses the kinds of disturbances of behaviour seen among long-stay patients, and rates, on a 0–4 scale, their occurrence over the preceding month. Four of its constituent items (overactivity and restlessness, posturing and mannerisms, slowness, and underactivity) were designated as corresponding reasonably closely to abnormalities rated on the Modified Rogers Scale; a further item (behaviours not otherwise specified which impede progress) was also so considered if a disorder such as ritualistic behaviour was rated under it.

The remaining 16 mental-state items, relating to incoherence of speech, social mixing, suicidal behaviour, personal appearance and hygiene, etc., were considered to rate behaviour not relevant to the Modified Rogers Scale. Here it was hypothesised that scores on the Modified Rogers Scale would correlate with the former, but not the latter, subset of SBS ratings.

Validity of the catatonic subscale was assessed with the same 40 schizophrenic patients. Their scores on the catatonic items in each category of the Modified Rogers Scale were summed to yield six 'category' subscores (the category for abnormal ocular movements contains no catatonic items; in order to avoid categories containing only one item, the two categories for abnormal movements and that for gait were combined into a single 'abnormal movement' category). Each of these 'category' subscores was examined for its correlation with the total catatonic subscale score, and with other category subscores.

### Results

The scale was easy to use and most patients were able to comply with the examination. Even when this was impossible, for instance with excited or uncooperative patients, many items could be completed on the basis of observation alone. With a number of patients, revealing abnormalities were noted on discreet observation after he/she had returned to the ward. In some, relevant disorders were not uncovered during the examination but were disclosed only on questioning of nursing staff.

### Reliability

Agreements for the two pairs of raters using Kendall's *W* are shown in Table 1. Most items showed high inter-rater reliability, the lowest mean *W* value being 0.67 for abnormal tone. (One of the two pairs of raters showed agreement of 0.57 for complex abnormal posture, but in the other the value was 0.85.) Items without reliability figures were scored as present too infrequently to allow statistical comparison; even so, visual inspection made it clear that the agreement in these cases was close; in the final version of the scale most such items were subsumed under the 'other' headings.

In the analysis of test-retest reliability for the catatonic subscale, generally there were no marked changes for the out-patients or the long-stay patients, or for those with initial low and high scores. Only four of the 32 patients showed more than minor changes (all long-stay patients) over the test period. The two sets of scores were not significantly different ( $\chi^2=110.61$ , 96 d.f., NS) and the correlation (using Spearman's method) between them was 0.67 ( $P<0.001$ ), compared with 0.87 for simultaneous ratings made on the same patients.

### Validity

For the whole scale, total scores on the Modified Rogers Scale were highly significantly correlated (using Spearman's method) with total BOS scores, taken as the sum of the 'overall impression' scores for each of the 15 sections of the BOS ( $r=0.66$ ,  $P<0.001$ ). The correlation with the summed overall impression scores for the seven sections

Table 1  
Reliabilities of items on the Modified Rogers Scale

Item	Pair 1 <i>W</i>	Pair 2 <i>W</i>
Simple abnormal posture	0.87	0.83
Complex abnormal posture	0.85	0.57
Persistence of imposed postures	0.85	0.82
Abnormal tone	-	0.67
<i>Gegenhalten</i>	0.99	-
<i>Mitgehen</i>	0.87	0.92
Simple brief movements (face/head)	0.76	0.83
Simple sustained movements (face/head)	0.96	0.92
Complex movements (face/head)	0.81	0.89
Simple brief movements (trunk/limbs)	0.86	0.88
Simple sustained movements (trunk/limbs)	0.84	0.84
Complex movements (trunk/limbs)	0.90	0.93
Increased blinking	0.99	0.83
Decreased blinking	-	0.63
Eye movements	-	0.90
Abruptness/rapidity of movement	0.96	0.72
Slowness/febleness of movement	0.88	0.91
Exaggerated quality to movement	0.95	0.84
Iterations	0.88	0.86
Exaggerated associated movement (gait)	0.99	0.91
Reduced associated movement (gait)	0.80	0.90
Slow/shuffling gait	0.79	0.75
Manneristic/bizarre gait	0.99	0.89
Aprosodic speech	0.91	0.79
Mutism	0.86	-
Indistinct/unintelligible speech	0.87	0.78
Marked overactivity	0.96	0.83
Marked underactivity	0.71	0.86
Excessive compliance/automatic obedience	0.96	0.91
Poor/feeble compliance	0.83	-
Reported overactivity	0.93	0.92
Reported underactivity	0.82	0.94
Reported other	0.85	0.86

Items without *W* values were rated too infrequently to permit meaningful analysis.

containing substantial numbers of motor, volitional and behavioural items was even higher ( $r=0.69$ ,  $P<0.001$ ). The highest correlation of all, however, was between total scores on the Modified Rogers Scale and summed scores on individual BOS items abstracted as rating specific motor, volitional and behavioural disorders ( $r=0.79$ ,  $P<0.001$ ).

Total scores on the Modified Rogers Scale were also highly significantly correlated with nurses' ratings on the motor, volitional and behavioural subset of the SBS ( $r=0.70$ ,  $P<0.001$ ). The correlation with the subset made up of the remaining items was much lower, and of marginal significance ( $r=0.27$ ,  $P=0.051$ ).

For the catatonic subscale, each of the 'category' subscale scores, calculated as above, was highly significantly correlated with the total catatonic score (posture:  $r=0.67$ ,  $P<0.001$ ; tone and motor compliance:  $r=0.49$ ,  $P=0.002$ ; abnormal movements:  $r=0.81$ ,  $P<0.001$ ; purposive movement:

$r=0.66$ ,  $P<0.001$ ; speech:  $r=0.69$ ,  $P<0.001$ ; behaviour during interview:  $r=0.75$ ,  $P<0.001$ ). On the whole, the individual 'category' scores were also intercorrelated with each other at significance levels of between  $P=0.05$  and  $P<0.001$ . The only exceptions involved the correlations of 'tone and motor compliance' (which was composed of only two relatively uncommonly rated items) with 'posture' ( $r=0.13$ ,  $P=0.13$ ), 'speech' ( $r=0.17$ ,  $P=0.15$ ), and 'purposive movement' ( $r=0.25$ ,  $P=0.06$ ).

### Discussion

It is widely accepted that patients with schizophrenia show abnormalities in movement, volition and behaviour; these range from the more or less inconspicuous (e.g. Manschreck *et al*, 1982) to the plethora of unusual movements, postures and gaits exhibited by long-stay patients (Lohr & Wisniewski, 1987). Some of this disorder is undoubtedly attributable to the extrapyramidal side-effects of neuroleptic drugs. Some also almost certainly represents catatonic disorder, whose continued presence in chronic schizophrenia has been repeatedly documented (Jones & Hunter, 1969; Pfohl & Winokur, 1982; Rogers, 1985). What remains unclear, and is the subject of frequent debate, is the contribution made by each class of disorder in individual cases.

The Modified Rogers Scale offers a means of assessing all kinds of schizophrenic motor, volitional and behavioural disorder which, as well as being detailed and quantitative, avoids this problem. The scale shows good inter-rater reliability and also performs well on test-retest reliability. The scale also shows good concurrent validity. As discussed by Hall (1980), this is the usual way of establishing that a scale measures what it purports to measure; it is also perhaps the only meaningful approach for a scale which assesses at least two conceptually distinct classes of phenomena. Even so, steps were taken to make this validation comprehensive, by comparing the Modified Rogers Scale with other scales both cross-sectionally and longitudinally, and by utilising both medical and nursing ratings.

The particular value of the Modified Rogers Scale is that it allows the isolation of a group of disorders that are not extrapyramidal as the term is currently understood, and which thus avoid the objections to their designation as catatonic voiced by Marsden (1982) and Owens (1986, 1990). This is achieved by first rating all abnormalities under headings which do not pre-empt their designation as neurological or psychiatric. Then, according to a fixed scheme, all items that could conceivably rate extrapyramidal

disorders are excluded. The remaining items refer to phenomena in the realms of posture, motor compliance, purposive movement, speech and overall behaviour, all of which correspond fairly closely to those found in the classic accounts of schizophrenia. The validity of the catatonic subscale of the Modified Rogers Scale cannot be considered to be established (it lacks anything against which it can be compared), but its component items show preliminary evidence of being intercorrelated to a significant degree.

Such an approach to isolating non-extrapyramidal phenomena can never, of course, be perfect: it is acknowledged that tardive dyskinesia can produce 'stamping', 'sailor' (Simpson *et al*, 1979), or other complex abnormal gaits (Lees, 1985), and that tardive dystonia may give rise to 'silly' speech intonations (Owens, 1990); these, however, are generally considered to be uncommon. Schizophrenic hypokinetic disorders may closely resemble corresponding Parkinsonian abnormalities in external appearances (Marsden *et al*, 1975). An absolute distinction between the two is probably not achievable, and the small number of items in the Modified Rogers Scale taken as representing the former are perhaps best regarded as those most unlikely to be confused with the latter. Similarly, even though the scale item for overactivity aims to rate an essentially bizarre phenomenon, its differentiation from akathisia, especially the 'pseudo-akathisia' of Barnes & Braude (1985), may not always be feasible. These residual areas of potential overlap are, however, counterbalanced by a stringency elsewhere: excluded from the catatonic subscale are phenomena like grimacing, abruptness and exaggeration of movement, which were all described by Kraepelin (1913) and Bleuler (1911) as forming part of the untreated picture of schizophrenia.

The abnormalities isolated by this procedure are by and large specific, discrete phenomena, which approximate fairly closely to classic descriptions of catatonic symptoms. In one important sense, however, this correspondence is probably not complete. While the scale aims to rate discontinuously as far as possible, some disorders do not lend themselves to dichotomisation as present or absent. The points at which gait, activity level, and prosody of speech become abnormal are arbitrary, and these phenomena will show an unavoidable tendency to be rated when they are indisputably present but not to the striking degree usually associated with catatonia. This is a problem that applies to all rating scales that attempt to quantify the dimension of severity, and wherever possible safeguards have been built into the scale to minimise this.

Acknowledgements, reference list and authors' details will be found at the end of the following paper, pp. 333–336.