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DETECTION OF MALINGERING THROUGH THE USE OF RAVEN'S STANDARD PROGRESSIVE MATRICES

CHITTARANJAN ANDRADE, JOHN F. THARAKAN & SHARMILA CHARI

ABSTRACT

Raven's Standard Progressive Matrices (SPM) has been suggested to assist in the detection of malingering, and a putatively validated formula method for defining genuine and fake performances is available. In the present study, 47 normal individuals were asked to fake cognitive impairment on the SPM; a day later, their genuine performances were obtained. As expected, the genuine performances were significantly superior to the faked performances; however, the formula method failed to distinguish between the two. The present study used logistic regression analysis to model genuine and faked performances; the method resulted in a 74.5% accurate classification. It is concluded that, while the SPM may be useful in certain cases, it cannot reliably detect malingering.

Key words : Malingering, Raven's standard progressive matrices, cognition

Mental health professionals occasionally encounter persons who deliberately lie when providing personal information, or when completing questionnaires or other assessments. Usually, the untruthfulness is in the direction of denial of personal weaknesses and enhancement of personal qualities When the falsification relates to clinical behaviour, cross-checking with reliable informants, or inpatient observation, can guide the clinician to a more accurate assessment. When the falsification occurs in questionnaires or similar assessments, a built-in lie scale can help in the detection of the deception. For example, the Eysenck Personality Inventory has a lie scale which helps identify socially desirable responses; a subject who obtains high scores on this scale is likely to have given socially desirable responses on the other scales as well.

Sometimes, the deception is in the direction of increasing the expression of mental disability; that is, malingering Subjects may feign mental disability for several reasons to obtain compensation, such as after a head injury; to claim mental incompetence in legal situations; to avoid being drafted into the armed forces, etc. When subjects malinger on cognitive tests, detection can be very difficult. One method that has been proposed to detect malingering and feigned impairment on cognitive tests involves the use of the Raven's Standard Progressive Matrices (SPM).

The SPM is a commonly used test of intelligence. It comprises 5 sets (A, B, C, D, and E) of 12 visuospatial problems per set The problems are arranged in order of increasing difficulty. Therefore, a subject who completes the SPM usually obtains progressively lower scores as he advances through the sets. The guide to the SPM (Raven et al., 1998) contains a table of expected scores for each of these 5 sets given a particular total score. If a subject's performance shows scatter, that is, if it differs substantially in composition from the expected scores in one or more sets, it is likely that the subject has not performed true to form Feigning on a test is one explanation for scatter, but depression, fluctuating motivation, and other explanations must also be considered.

Over a decade ago, Gudjonsson and Shackleton (1986) suggested a simple and appealing method to detect individuals who feign impairment on cognitive tests. Their method also involved the use of the SPM, and was based on certain of the arguments proposed by Kaufman (1978):

1. Individuals who feign impairment do not know when to start feigning in order to make their poor test performance appear convincing.
2. Such malingerers may make the mistake of failing simple items while passing items of greater difficulty.
3. Such malingerers are likely to make different kinds of errors from persons with general impairment.
4. Such malingerers may not be able to downscale their level of performance to their claimed level of disability.

Gudjonsson and Shackleton (1986) asked individuals to 'fake substantially and convincingly' on the SPM, and compared these performances with performances from the same and other groups in 'non-faking' conditions. Basically, in the 'non-faking' conditions, subjects' performances were good in the initial sets and progressively decayed across the 5 sets. In sharp contrast, in the 'faking' condition, subjects' performances were noticeably and uniformly poor across the first 4 sets, and very poor in the last. Thus, the findings supported certain of the arguments of Kaufman (1978).

Gudjonsson and Shackleton (1986) also proposed a simple mathematical method to objectively determine whether a subject showed the expected decay in performance across the 5 sets. They computed a decay score for each subject using the formula Decay = (2A+B) - (D+2E), where A, B, D and E were the scores obtained by the subject in the respective SPM sets (set C scores are not considered in this formula). As expected, decay scores were high in the 'non-faking' condition, showing that performance decreased as the difficulty of the problems in the sets increased. In contrast, decay scores were low in the 'faking' condition, indicating that the subjects performed uniformly badly irrespective of the difficulty of the problems.

Gudjonsson and Shackleton (1986) proposed certain decay score cut-offs to identify suboptimal performances; these cut-offs had very high sensitivity and specificity in the sample studied, and exceeded the sensitivity and specificity of the expected score deviation method originally suggested by Raven.

There are at least 3 limitations to the findings and proposals of Gudjonsson and Shackleton :

1. The fakers in their study were instructed to 'fake substantially and convincingly'. The findings are therefore probably inapplicable when persons judiciously fake impairment with a view to lowering performances without running a risk of being detected.
2. Mathematical models, including cut-off scores, best fit the data from which they are derived. Such methods therefore need to be validated in independent samples.
3. Although the SPM is generally considered to be a culture-free test, ideal cut-offs are likely to vary across populations as a function of diverse sociodemographic variables.

The first two of these limitations were addressed by a very recent validation study. McKinzey et al. (1999) replicated the method of Gudjonsson and Shackleton (1986) in a sample of 46 experimental malingerers, and 381 subjects whose data were obtained from a standardization sample. The malingerers were instructed to fake the most severe disability possible without making the deception obvious to the examiner. The results were disappointing : there was a high misclassification rate of 31%.

Both Gudjonsson and Shackleton (1986) and McKinzey et al. (1999) used a between subjects research design. Logically, the real test of the usefulness of SPM in detecting malingering is to use a within subjects research design to ascertain whether subjects respond differently under malingering and truthful conditions, and whether such differences in test responses can be reliably detected. It is also important to ascertain how useful the SPM is when subjects fake judiciously. The present study therefore sought to examine the usefulness of the SPM in identifying carefully feigned cognitive impairment in a sample of normal volunteers who were tested under both malingering and truthful conditions.

MATERIAL AND METHOD

A random sample of normal volunteers was recruited from a government office (n=23), and from a sports club (n=24); all subjects had a graduate degree. The SPM was administered to these subjects in a group setting. The subjects were instructed to feign impairment in their performances so as to exhibit obvious mental impairment but without running a risk of detection. A day later, they were instructed to complete the test once again, performing the task as well as they could. The instructions given to the subjects are providing in the Appendix.

Subjects' SPM performances were subsequently scored as the absolute number of correct responses in each of the 5 sets under feigned and truthful conditions. Decay scores (McKinzey et al.,1999) were then computed for each subject under the two conditions. Using the cut-offs suggested by Gudjonsson and Shackleton (1986), the decay scores were compared with the total scores to ascertain whether subjects' performances should be classified as feigned or truthful.

Statistical methods : Performances in the 5 sets of the SPM were compared between feigned and truthful conditions using repeated measures multivariate analysis of variance (RMANOVA). There were two within subjects factors SPM sets (A to E) and occasion (feigned vs truthful).

Decay scores were compared between feigned and truthful conditions using the paired 't' test. A forward stepwise logistic regression analysis sought to classify performances into feigned and truthful categories using the absolute scores from the 5 sets, and the decay scores.

RESULTS

The age of the sample ranged from 19 to 49 years. There were 30 males and 17 females in the sample. The SPM performances under feigned and truthful conditions are presented in table 1. The mean total truthful score (48.6) was approximately 36% above the mean feigned score (35.7), indicating a reasonably large magnitude of feigning by the sample.

TABLE 1
MEAN (STANDARD DEVIATION) SPM SCORES UNDER FEIGNED AND TRUTHFUL CONDITIONS (N=47)

Set	Feigned	Truthful
A	9.0 (3.0)	11.4 (1.0)
B	7.9 (2.7)	10.8 (1.2)
C	7.4 (2.6)	9.6 (1.4)
D	7.5 (2.4)	9.9 (1.4)
E	3.9 (2.8)	6.9 (2.9)
Total	35.7 (10.7)	48.6 (5.8)

There was a significant main effect for occasion of testing ($F=77.39$, $d.f.=1,46$, $p<0.0001$), indicating that scores in the 5 sets were significantly lower during the feigned as compared with the truthful condition. There was a significant main effect for set (Pillai's trace=0.80, $F=43.00$, $d.f.=4,43$, $p<0.0001$), indicating that scores dropped significantly with advance from set A to set E. The occasion x set interaction was not significant (Pillai's trace=0.19, $F=2.52$, $d.f.=4,43$, NS), indicating that the pattern of performance across sets did not differ significantly between feigned and truthful conditions.

The mean (standard deviation) decay scores were 10.4 (7.3) and 9.9 (5.8) under feigned and truthful conditions, respectively. The scores did not differ significantly ($t=0.50$, $d.f.=46$, NS). Using the decay scores cut-offs for respective total SPM scores suggested by McKinzey et al. (1999), subject's observed performances under feigned and truthful conditions were reclassified; 59.6% of feigned performances were classified as truthful, and 10.6% of truthful performances were classified as feigned. The overall misclassification rate with the McKinzey et al. method was 35.1%.

The logistic regression yielded the following classification equation $Y=0.54B+0.56D-10.25$. In this equation, B and D are the absolute correct scores in sets B and D, respectively. The equation correctly classified 74.5% of subjects (Table 2).

TABLE 2
CLASSIFICATION OF PERFORMANCES USING LOGISTIC REGRESSION

	Classified	
	Feigned	Truthful
Observed		
Feigned	33	14
Truthful	10	37

DISCUSSION

The study addressed normal volunteers because it is likely that individuals who malinger are psychometrically within reasonably normal limits. A control group of cognitively impaired subjects was not employed in this study because impairments vary in cause and magnitude, and this is likely to occasion varying patterns of impairment on the SPM, which might complicate the interpretation of results. A within subjects research design was selected to determine whether the SPM method can reliably detect differences between fake and truthful performances in the same individual; furthermore, such a design minimizes variance due to confounding variables. While the sample in this study is unlikely to be representative of the general population, there is no reason to believe that the bias would confound the conclusions of the study in a within subjects design.

The RMANOVA results showed that the feigned scores were significantly lower than the truthful scores: this indicates that the subjects correctly understood the instructions, and responded accordingly. The magnitude of feigning was adequate : the mean total truthful score was approximately 36% greater than the mean total feigned score. Performances significantly decayed across sets; this indicates that, in accordance with expectations, subjects performed more poorly as the sets increased in difficulty. However, the occasion x set interaction was not significant; this indicates that the decay in performances across sets did not differ between feigned and truthful conditions. Confirming this finding, the decay scores also did not differ significantly between test conditions. This finding contrasted with the observations of Gudjonsson and Shackleton (1986) and McKinzey et al. (1999), both of whom observed that decay was significantly greater under genuine as compared with faking conditions.

Also contrasting with previous research was the finding in this study of a high misclassification rate with the decay formula method, 59.6% of feigned performances were classified as truthful, and 10.6% of truthful performances were classified as feigned. The overall misclassification rate was 35.1%. The logistic regression formula yielded a lower misclassification rate for the false positives and false negatives, and a better overall classification rate (Table 2); however, all regression methods yield the best results on the data upon which they are based. A validation study using this formula can therefore be expected to yield higher rates of misclassification.

A likely reason for the contrasting result between this and the earlier studies is that this study required subjects to fake judiciously, whereas both the earlier studies required their subjects to fake substantially. Thus, the bottomline is that the SPM may be helpful in the detection of malingering that is exaggerated, but is of little use when subjects feign with care. While such a conclusion may seem self-evident, it must be remembered that the majority of malingers are likely to be prudent, therefore, a battery of tests may be more helpful in their identification (Rogers et al.,1993; Lezak,1995; McKinzey & Russell, 1997; McKinzey et al.,1997).

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**CHITTARANJAN ANDRADE, MD, Additional Professor & Head, JOHN F. THARAKAN, MBBS, Research Assistant & SHARMILA CHARI, Ph.D. Research Assistant, Deaprtment of Psychopharmacology. National Institute of Mental Health and Neurosciences, Bangalore - 560 029.*

** **Correspondence***