Chapter 22

Detection of Adult Malingering on Raven's *Standard Progressive Matrices*: A Cross-Validation*

R. Kim McKinzey, Marvin H. Podd,
Mary Ann Krehbiel, and John Raven**

Abstract

A formula for detecting faked Raven's SPM profiles was cross-validated on 46 experimental malingerers and 381 people from the standardization sample. The formula yielded a cross-validated 26% false negative rate and a 5% false positive rate.

*****

David Faust (Faust, 1996; Faust, Ziskin, & Hiers, 1991) and Richard Rogers (Rogers, Harrell, & Liff, 1993) have documented the need for detection of neuropsychological malingering. To solve the problem, Gisli Gudjonsson and Harriet Shackleton (Gudjonsson & Shackleton, 1986) validated a formula using Raven's *Standard Progressive Matrices* (Raven, 1958). The formula has the distinct advantage of being usable on protocols given in the past, as it requires no special administration procedures.

The validation group consisted of 29 experimental malingerers (mean age 24 years), 56 normals (mean age 21-24 years), and 25 forensic patients (mean age 29 years) who had been referred for neuropsychological

* This article was previously published in the *British Journal of Clinical Psychology* (1999), 38, 435-439. © British Psychological Society and is reproduced with their permission.
** The authors would like to thank Victoria Campagna for her help in data collection.

evaluation. The formula compares the number of correct answers on the first 24 items against the number of correct answers in the last 24 items (the "rate of decay"), using a set of cut-off numbers derived from the expected, theoretical, rate of decay. Of the 29 malingerers, 5 (17%) were missed (i.e., were false negatives). Of the 81 honest patients and normals, 4 (5%) were incorrectly classified as faking (false positives).

However, malingering formulas have had a disappointing record of maintaining adequate accuracy on cross-validation (e.g., McKinzey & Russell, 1997a; McKinzey & Russell, 1997b). The formula was therefore replicated with a much larger, varied, sample.

Method, Results, and Discussion

Subjects

All 427 participants came from the community. Women comprised 56% of the sample. Age range was 17-91 (M = 44, SD = 17). The normal group consisted of 381 people drawn from the Dumfries standardization sample (Raven, Raven, & Court, 2000, updated 2004). Their ages ranged from 17 to 91, (M = 45, SD = 17). Women comprised 57%.

The standardization sample used socioeconomic status (SES) as measured by the Hall-Jones Scale of Occupational Prestige for Males. This scale ranks occupations on a 1-8 scale, with professionals ranked 1 and executives, skilled nonmanual workers, skilled and semi-skilled manual workers, and unskilled manual workers ranked progressively lower. Using this scale, the normal group's SES range is 1-8 (M = 5.24, SD = 1.84).

The malingering group consisted of 46 adults, age range 18 to 70, (M = 38, SD = 14). Their level of education (in years) was 4 to 20, (M = 14, SD = 3). Women comprised 52%.

Procedure

All Ss were given the Raven Standardized Progressive Matrices, using the 1998 norms (Raven et al., 1998). The test was administered according to standard instructions. The additional instructions given to the fakers were:

Pretend you have suffered head injuries in an accident caused by another person or persons. Assume you are involved in litigation to determine how much financial compensation you will obtain from the people responsible for the accident and/or from the insurance companies

involved. Imagine that your everyday functioning in and outside of school and/or work has been much worse since your accident, that your potential earning power has been substantially reduced, and that you deserve all the money that the courts will allow you. The results of this test will help determine how large your settlement will be, so fake the most severe disability that you can without making it obvious to the examiner that you are faking.

The Raven answers were applied to the formula (2A + B) - (D + 2E), where A, B, D, and E refer to the number of correct responses in each of the Raven subsets (Gudjonsson & Shackleton, 1986). The result of the formula is termed the "rate of decay", and is compared to the rate of decay by total score cutoffs (Table 22.1) validated in the original study. Since the current study has a larger, more varied, sample than in the original study, a gradual tapering was done to the originally abrupt cutoffs at the extremes of the total score range: The original study's cutoffs suggested that any perfect score (which gets a rate of decay of 0) must be a fake!

Results

Age, education, and total score were not significantly correlated with the formula's accuracy. The formula's classifications are presented in Table 22.2. The formula replicated Gudjonsson & Shackleton's false positive rate of 5%. The false negative rate changed from 17% to 26%, as expected for a cross-validation. If the base rate of malingering in a given population is assumed to be 10% (as it is in this sample), then a formula-based result of normal has a 97% chance of being correct, and a formula-based result of faked has a 63% chance of being correct. If the base rate is assumed to be truly unknown, and therefore assumed to be 50%, then a normal result has a 78% chance of being correct, and a faked result has a 93% chance of being correct. The hit rate would be 84%. While the formula will miss some people, a formula result of faked should be given considerable interpretive weight.

The false negative rate was not artificially elevated by the Ss' inability to fake the test. Other studies (e.g., Heaton, Smith, Lehman, & Vogt, 1978; McKinzey, Podd, Krehbiel, Mensch, & Trombka, 1997) have found that some Ss are unable to fake a given test sufficiently to produce abnormal results, a problem referred to as a "threat to external validity" (Rogers & Cruise, 1998). This problem can only be corrected when the

Table 22.1. Cutoff Values for Each Total Score

Total score	Cutoff	Total score	Cutoff	Total score	Cutoff	Total score	Cutoff	Total score	Cutoff
		13	9	25	11	37	10	49	6
2	1	14	9	26	11	38	8	50	6
3	2	15	9	27	11	39	8	51	6
4	3	16	9	28	12	40	8	52	6
5	4	17	9	29	12	41	8	53	2
6	5	18	10	30	12	42	8	54	2
7	6	19	10	31	12	43	7	55	2
8	7	20	10	32	12	44	7	56	2
9	7	21	10	33	10	45	7	57	0
10	7	22	10	34	10	46	7	58	0
11	7	23	11	35	10	47	7	59	-1
12	7	24	11	36	10	48	6	60	-1

Note. The rate of decay is calculated by comparing the number of correct answers in each subset according to the formula ((2*A)+B) - (D+(2*E)). The cutoff is determined by the total score. The Raven is considered invalid if the rate of decay is below the cutoff listed for each total score.

Table 22.2. Cross-Validation of the Formula: Classifications

	Formula Result		
	Raven faked: n (% of row)	Raven not faked: n (% of row)	Totals
Malingering group	34 (73.9)	12 (26.1)	46 (100)
Normal group	20 (5.25)	361 (94.75)	381 (100)
n	54	373	427

Note. Percentages are rounded. The chi-square statistic is highly significant: Chi-square = 175 (1), $p < .0001$.

test has a clear measure of abnormality, such as the Halstead Impairment Index. Such ineffectual faking attempts are of little consequence in interpretation, since the difference between the true and actual scores will be minimal. However, all of the 12 faking Ss missed by the formula (false negatives) yielded IQ scores in the 65-95 range, with seven of the 12 getting scores below 70. On the other hand, all but 4 of the 20 false positives coming from the standardization sample got IQ scores in the 98-135 range, with only one below 74. Any extremely low score should therefore be consistent with the available history and testing before being considered valid, even when the formula is negative.

Discussion

There are few methods of detecting faked IQ test results. Other, more accurate, methods are available to detect malingering of neuropsychological deficits: the Test Of Malingered Memory, a commercial product designed to detect neuropsychological malingering, is a stand-alone measure with a 2% false negative rate (Rees, Tombaugh, Gansler, & Moczynski, 1998). The Luria-Nebraska Neuropsychological Battery is a comprehensive neuropsychological test whose malingering formula has a 17% false negative rate (McKinzey et al., 1997). However, neither is an IQ test, and do not have the same place in a battery as the Raven.

There are many identifiable groups that were not included in the cross-validation. For example, there were no neurologically impaired patients, developmentally delayed participants, or forensic samples. The current subjects are all English-speaking, although the Raven is widely used with non-English speaking people. The faking formula should be cross-validated with such groups in future research, and interpretive caution employed until such research is done.

References

Faust, D. (1996). Neuropsychological (Brain Damage) Assessment. In J. Ziskin (Ed.), *Coping with Psychiatric and Psychological Testimony*, (5 ed., Vol. 2, pp. 916-1044). Los Angeles: Law and Psychology Press.

Faust, D., Ziskin, J., & Hiers, J. (1991). *Brain damage claims: coping with neuropsychological evidence*. Los Angeles: Law & Psychology Press.

Gudjonsson, G., & Shackleton, H. (1986). The pattern of scores on Raven's Matrices during faking bad and non-faking performance. *British Journal of Clinical Psychology, 25*, 35-41.

Heaton, R. K., Smith, H. H., Lehman, R. A., & Vogt, A. T. (1978). Prospects for faking believable deficits on neuropsychological testing. *Journal of Consulting & Clinical Psychology, 46* (5), 892-900.

McKinzey, R. K., Podd, M. H., Krehbiel, M. A., Mensch, A. J., & Trombka, C. C. (1997). Detection of malingering on the Luria-Nebraska Neuropsychological Battery: An initial and cross-validation. *Archives of Clinical Neuropsychology, 12* (5), 505-512.

McKinzey, R. K., & Russell, E. W. (1997a). Detection of malingering on the Halstead-Reitan Battery: A Cross-validation. *Archives of Clinical Neuropsychology, 12* (6), 585-590.

McKinzey, R. K., & Russell, E. W. (1997b). A partial cross-validation of a Halstead-Reitan Battery malingering formula. *Journal of Clinical and Experimental Neuropsychology, 19* (4), 484-488.

Raven, J., Raven, J. C., & Court, J. H. (2000, updated 2004). *Manual for Raven's Progressive Matrices and Vocabulary Scales. Section 3: The Standard Progressive Matrices*. San Antonio, TX: The Psychological Corporation.

Raven, J. C. (1958). *The Standard Progressive Matrices*. London: H. K. Lewis. (An earlier version of this test was known as *Progressive Matrices (1938),* and also published by H. K. Lewis. The test was subsequently published by OPP Ltd. (Oxford) and now by Harcourt Assessment, San Antonio, TX.)

Rees, L. M., Tombaugh, T. N., Gansler, D. A., & Moczynski, N. P. (1998). Five validation experiments of the Test of Memory Malingering (TOMM). *Psychological Assessment, 10* (1), 10-20.

Rogers, R., & Cruise, K. R. (1998). Assessment of malingering with simulation designs: Threats to external validity. *Law and Human Behavior, 22* (3), 273-285.

Rogers, R., Harrell, E. H., & Liff, C. D. (1993). Feigning neuropsychological impairment: A critical review of methodological and clinical considerations. *Clinical Psychology Review, 13* (3), 255-274.