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Assessing the validity of NART-estimated premorbid IQs in the individual case

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The National Adult Reading Test (NART: Nelson, 1982) has become the standard means of estimating premorbid intelligence. The danger in using the NART for this purpose is that it yields an invalid estimate if a client's performance on the test has suffered impairment. In the present study a sample of 659 healthy subjects was used to build a regression equation for the prediction of NART scores from demographic variables (i.e. years of education, social class, age and sex). The multiple correlation between these demographic variables and the NART was .70 *(p* < .0001). Comparing a client's obtained and predicted NART score will permit the clinician to assess objectively whether NART performance is impaired, and thus whether or not the NART will provide a valid estimate of premorbid intelligence.

In order to detect and quantify intellectual impairment it is necessary to compare clients' IQ test performance with an estimate of their premorbid intellectual level. At present, the most widely recommended measure of premorbid intelligence is the National Adult Reading Test (NART; Nelson, 1982). The obvious danger in using *any* current ability test for this purpose is that the 'true' premorbid IQ will be underestimated if a client's performance on the test has suffered impairment. Although the NART holds better than alternative premorbid indices such as the Vocabulary subtest of the WAIS, there are a number of reports of impaired NART performance in various clinical conditions (Crawford, 1989).

The aim of the present study was to build a regression equation to predict NART performance from demographic variables (i.e. education, social class, age and sex). Comparing predicted NART error score derived from such an equation with obtained NART score will permit clinicians or researchers to assess objectively whether a client's performance is consistent with his/her background demographic details. A sizeable discrepancy in favour of obtained NART error score would indicate impaired NART performance, and would therefore alert the clinician to the fact that the NART will not provide a valid estimate of premorbid IQ for that individual.

Subjects *(N* = 659; 296 males and 363 females) who were free of neurological, psychiatric or sensory disability, were administered the NART and had their demographic details recorded (age, sex, years of education and occupation). All subjects resided in the North-East of Scotland and were recruited from a variety of sources, i.e. local and national companies, community centres, clubs (e.g. pensioners' clubs, angling clubs) etc. Social class was derived from a subject's occupation using the OPCS (1980) Classification of Occupations. Housewives/househusbands were coded by their previous occupation. If not previously employed, they were coded by their spouse's occupation. Mean age of the sample was 47.1 (SD = 20.0) with an age range of 16-90. Mean years of education were 11.8 (SD = 3.0). Mean NART errors were 21.5 (SD = 9.7) with a range of 0-45. The percentage of the adult UK population in each social class was determined from the 1981 census, as was the percentage in three arbitrary age bands (16-34, 35-54, 55-90). These figures are presented below in parentheses along with the respective percentages in the present sample. The social class percentage distribution of the sample was as follows: social class 1 = 9 (5), 2 = 30 (23), 3 = 40 (48), 4 = 15 (18), 5 = 6 (6). The percentages of the sample

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in the three age bands were as follows: 1 = 36 (27), 2 = 26 (35), 3 = 38 (38). It can be seen from the above that the sample did not diverge markedly from the adult UK population in terms of social class and age distribution. To render the data suitable for regression, sex was coded as a dummy variable, with males = 1 and females = 2. NART error score was regressed on years of education, social class, age and sex.

The multiple correlation between the four predictor variables and the NART was .70 ($p < .0001$). The resultant regression equation is presented below with its accompanying standard error of estimate (SE_{est}): Predicted NART *error* score = 37.9-1.77 (educ) + 2.7 (class)-0.07 (age)-0.03 (sex) SE_{est} = 6.93.

The highly significant multiple correlation indicates that the above equation is a reasonable predictor of NART performance. Although it would be useful to examine the predictive accuracy of the equation in a cross-validation sample, the size and reasonable representativeness of the present sample should permit it to be used with confidence. By evaluating the likelihood of impaired NART performance, this equation enables one to assess the validity of using clients' NART scores as an estimate of their premorbid intelligence. In practice, clients' NART error score should be compared with their predicted error score and any difference interpreted in terms of the regression equation's SE_{est}. The SE_{est} represents the standard deviation of scores around the regression line. A difference between obtained and predicted scores of more than 1.65 SE_{est} units is required for one-tailed significance at the .05 level. In the case of the present equation, an *obtained* NART error score which is more than 11.4 points *higher* than the *predicted* score would indicate that a client's NART performance was significantly ($p < .05$) poorer than would be expected from his or her demographic details (a difference of 8.9 points would be significant at the .1 level).

The above equation weights demographic variables to produce the optimal predictive accuracy. Therefore, it should be used in preference to 'educated guesses' based on the same predictor variables. Since most of us do not have the opportunity to test significant numbers of subjects drawn from the general population, these educated guesses are liable to be derived from vague or distorted impressions of the relationship between NART performance and demographic variables. Finally, in order to ease calculation of predicted NART scores, the social-class codings for commonly encountered occupations are presented in Table 1.

Table 1. Social class codings for commonly encountered occupations

1 (professional):	architect; chartered accountant; dentist; doctor; economist; lawyer; lecturer; pilot; church minister
2 (intermediate):	computer programmer; estate agent; librarian; manager – advertising, public relations, purchasing, marketing; nurse; social worker; teacher
3 (skilled):	carpenter; chef; clerk; driver – bus, lorry, train; electrician; fire(wo)man; hairdresser; plumber; police(wo)man; salesperson; secretary; telephone operator; toolmaker
4 (semi-skilled):	assembly line worker; barperson; fisher(wo)man; glazier; hospital porter; storekeeper; telephone receptionist; traffic warden; waiter
5 (unskilled):	cleaner; docker; kitchen porter; labourer; refuse collector; sewage worker

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