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A Performance Learning Measure for the Aged

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The absence of a motor-perceptual learning measure which has a control or partialled out effect for age and general intellectual level has become obvious and the need for such a measure has been seen to be urgent in relation to the assessment of cognitive functioning in the elderly. Work by Savage and his colleagues (1971) has highlighted the fact that the measurement of intellectual *levels* and intellectual *learning ability* for both verbal and performance or motor-perceptual aspects of cognitive functioning is essential if the normal and abnormal structure and changes in cognitive functioning at any age is to be more fully understood. This paper reports on the development of the Block Design subtest of the WAIS as such a performance learning test. To our knowledge, there has so far been no measure of motor-perceptual or performance learning which has built into it an acceptable level or process of automatic control for general or performance intelligence and for age.

The present investigation was carried out on elderly subjects, but has important implications for work with younger groups. It was initially decided to experiment with the development of two of the WAIS performance subtests, Digit Symbol and Block Design, as learning tests. From a preliminary analysis of our results, however, the Digit Symbol test was found to be unsuitable, as there was a narrow range or limit on the amount of possible improvement.

The Block Design subtest seems suitable for modification into a learning test particularly because it allows control for level of performance intelligence. Furthermore, an additional advantage is gained from the fact that this subtest in its standard form is part of the short form of the WAIS devised and recommended by Britton and Savage (1966) for use with the aged.

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Methodology

Subjects

Ninety-four elderly subjects were assessed, whose ages ranged from 61 to 89, with a mean age of 76·7 years and a standard deviation of 6·1. At the time of assessment an independent mental illness classification was obtained for each subject from a consultant psychiatrist with considerable experience in psychogeriatrics. These diagnoses were made according to the internationally recognized categories suggested by Roth (1955). The 40 who were classified as psychiatrically normal were all obtained from the community samples of Kay *et al.* (1964). The 34 subjects suffering from a functional disorder included 23 with affective states and 11 with schizophrenia. Eighteen of the affective states were drawn from the Kay *et al.* samples (1964); the remaining five affectives and all the schizophrenics were sampled from the lists of patients who had been in St. Nicholas' Hospital, Gosforth, since 1959. The remaining 20 patients received diagnoses of generalized organic disorders of mild or moderate severity; 7 of these came from the community samples and the other 13 from St. Nicholas' Hospital.

Administration

The standard WAIS Block Design (BD) subtest was administered to all subjects, as well as the short form WAIS recommended specifically for the elderly (Britton and Savage, 1966). Testing on the Block Design subtest was discontinued after three consecutive failures, as prescribed in the WAIS manual. In order to incorporate a partial control for intelligence into the proposed learning test, the first of these failures was chosen as the learning task. Learning could therefore be measured at a difficulty level beyond that of the estimated intellectual level obtained in the WAIS BD subtest—a concept similar to that used in the Modified Word Learning Test (Walton and Black, 1957).

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It was, in fact, recorded in terms of the reduction in the time taken to complete the 'learning' BD item correctly over a number of trials. The subject was asked to attempt the first of the designs which he had failed in the standard WAIS assessment. It was emphasized that no time limit would be imposed, although the subject knew the performance would be timed. The time was noted when the subject had correctly completed the design. The first learning trial constituted the baseline against which further improvement could be measured. The subject was then asked to repeat the same design five more times, and the time taken to complete the design on each occasion was recorded. If a subject fails to complete the first learning trial correctly within ten minutes the assessment can be terminated with a very high degree of confidence that severe motor perceptual learning deficit is present.

The *actual instructions* were 'I am going to ask you to do one of these designs you found difficult earlier. It doesn't matter how long you take to do it'. After the subject had completed the design—'Now I would like you to do it again'. The *learning score* for an individual subject was obtained by calculating *the percentage ratio of improvement* on the last trial over the baseline first trial in the following manner:

$$100 \quad \frac{T_1 - T_6}{1}$$

where T_1 is the number of seconds required to complete the design on the baseline trial and T_6 is the number of seconds required on the final sixth trial. This can briefly be referred to as the percentage improvement or learning score.

Results and Discussion

The mean and standard deviation for the Block Design Learning Test (BDLT) improvement score for the total group are presented in Table I. It can be seen that the development of the WAIS BD subtest into a motor-perceptual learning task in this way allows a good range of improvement in performance. When the total group is split up into its three diagnostic groups, it is found that the organic subjects obtained significantly lower improvement scores than both the normals and functionals (both at $p < 0{\cdot}05$). Although the mean scores of the normals and functionals could not be distinguished, the functionals showed a much greater variability in score than the normals.

Table I

Block design learning test
Diagnostic group improvement scores

	Normals (N = 40)	Functionals (N = 34)	Organics (N = 20)	Total (N = 94)
M	51·44	50·66	26·41	45·83
S.D.	21·93	39·26	43·59	35·21

One of the major criticisms made of the other motor-perceptual learning tests such as Elithorn Mazes (Elithorn, 1955) is that performance correlates highly with non-verbal intelligence. A clear advantage of the present test is that its correlation with non-verbal intelligence is negligible (0·065), as is its correlation with the WAIS BD subtest from which it was developed (0·054). In addition, the correlation between age and the BDLT is almost zero (−0·055). These correlations suggest that within the age range used in the present study (60+) this task is suitable for measuring performance learning. Successful performance does not seem to depend on the level of intelligence, nor is it affected by increased chronological age. The difficulty level of the learning task is reasonably graded according to IQ level.

The main purpose of this paper is to present a performance learning measure developed for assessment of the aged, but relevant to other age level groups. It is hoped that others will use this technique and, if at all possible, communicate any data, problems, etc. to Dr. Savage so that a wide standardization of the procedure can be developed. With this technique, a battery of measures covering the main areas of cognitive functioning in the elderly is now available which has relevance for the investigation of cognitive development and impairment in the normal aged and those aged with mental illness of a functional type or disorders of organic origin. The primary purpose of cognitive assessment in the aged has implications for the handling of patients irrespective of any individual or psychiatric classification. It should be used *in conjunction* with such diagnosis, not as an aid or alternative. For this reason, per cent organic classifications and the like by this measure are

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not presented. General intellectual level, verbal and performace IQ levels can be assessed efficiently and adequately by the WAIS short form presented by Britton and Savage (1966) using the WAIS manual and material (Wechsler, 1955). Verbal learning ability may be assessed by the Modified Word Learning Test of Walton and Black (1957) with the Bolton *et al.* aged norms (1967), and performance learning by the Block Design Learning Test presented here to give a thorough and useful assessment of intellectual functioning in the aged.

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