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A new Block Design test: An exploratory study

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Abstract

The present paper draws on the specific results of a vocational guidance battery of tests which are relevant to a newly created test of Block Design. This study involved 366 pupils at secondary school and high school levels (average mean of age was 16.1 years old, SD 1.80) and reveals information on the intrinsic psychometric qualities of the new Block Design Test. In addition, it offers insight into the specific aspects of the test that come as a result of its inter-relationship with other tests of the battery of intelligence used.

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Keywords: Block Design test; intelligence; vocational guidance.

1. Introduction

The Block Design test was originated by Kohs (1923) who created it as a comprehensive measure of nonverbal intelligence. Matarazzo appreciates that “The initial enthusiasm by its originator seems fully justified (…) and our own experience shows that it conforms to all criteria of a ‘good’ test.” (1980, p. 212). In 1930 Arthur incorporated Kohs designs in her Performance Scale. Later, adaptation of this test appear in a number of intelligence scales, like in Wecshler’s original or revised scales (W-B I, WAIS, WISC and WPPSI), in Stanford-Binet Fourth Edition (SB-IV) intelligence scales or in Bonnardel scales (B20, B101).

The adaptation of Kohs’s test resulted from the need to obtain a form that preserves the basic quality of the test, that of being an excellent tool of assessing visuo-spatial ability and perceptual organization, however taking into account the modification of the testing and scoring processes, thus creating a more manageable, faster, and overall better test. Its use was nonetheless limited by the fact that the test requires additional support (the blocks) and can only take place face to face, thus requiring more testing time. The test itself demands high levels of attention from both parties: the person being tested and the test administrator who runs the testing and the scoring sessions. To these potential difficulties, additional incidental factors may require consideration, such as any consistent previous experience with block or similar joining games of the testee, his/her level of attention focus, tiredness, any mental

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illness condition. Furthermore, dexterity can influence scores positively, particularly for those using a trial-and-error approach. The administration time can be very lengthy and a learning set may be observed to influence scores.

The balance between the possible disadvantages that may be encountered and the advantages of this test positively leans towards the latter. Thus, through all the abbreviated forms of the W-B I, WAIS or WISC, it is a consistent recommendation that the block design test ought to be included in the duads, triads and tetrads, as it is considered to be the most representative of the non-verbal, performance, or perceptual organization sub-tests (Matarazzo, 1980, p. 253; Glasser & Zimmerman, 1967, pp. 134-144; Wechsler, 2002, p. 94).By attempting to reduce the disadvantages mentioned above of the block design sub-test, the Wechsler scales of intelligence that have been developed since have used a lower number of patterns with an easier scoring process, which are in turn more rigorous in offering bonuses for speed of execution and improving the use of the answer sheet when scoring. However, the critical observations of Zimmerman and Woo-Sam (1973), for both the Block Design from the original WAIS and from the WISC have remained valid: high ceiling effect for young ages and low intelligence levels and low ceiling effect for older testees with higher intelligence levels.

2. Purpose of the study

The primary aim of the present paper was to develop a test of blocks (cubes) which would maximize its psychometric qualities and reduce some of the limitations noted previously. The impetus to build a new test of blocks had the specific aim of creating a substantial growth in the test's diagnostic value through:

a. a careful selection of patterns which can be rigorously grouped by difficulty and complexity in three levels, consisting of three series of four models each;
b. the three series, ordered by difficulty, should be representative for early childhood, puberty and adolescence and should include starting items (first series) easy enough for young ages and exit items (series three) difficult enough to increase the ceiling effect of the test for older participants with higher levels of performance;
c. essential changes in the scoring algorithm in order to significantly increase the overall variability of the scores;
d. a uniform and highly differentiated method of granting bonuses for the speed of execution which would become the primary source of variability of the total scores.

An additional aim of our research was to create a test of blocks which could be administered independently as a visuo-spatial intelligence test and, at the same time, could be included as a sub-test in a more complex battery of intelligence tests. These requirements have had an impact on the construction, administration, scoring and calibration processes of the test as a whole. The 12 patterns of the Block Design test that we have created are completely new. The first series of two-by-two blocks includes lines which separate and individualize each of the blocks, which in turn results in the easy identification of a suitable working mode. The second series is still a two-by-two blocks design however this series eliminates the separating lines and proposes models with more perceptually complex shape-fond relationships. The third series has a three-by-three blocks design and brings the most complex, demanding and productive patterns of the test. In order to reduce the search time, all models use blocks with white and red sides only (two with white sides, two with red ones and finally two bicolor ones). The achievement of the second objective (three series ordered by difficulty, with low output and high output ceiling) is to be analyzed next. To significantly increase the variability of the scores, special attention was given to the scoring method. Experience up to date in administering this test indicates that there is a low likelihood of participants not being able to complete all the patterns in the time given. The general rule of ending the testing episode after three consecutive failed attempts was rarely used. It can therefore be inferred that should the testing time be sufficiently large, almost most participants can solve the 12 models. Thus, this would suggest that the main differentiator between participants lies in the method of awarding bonus points for the speed of execution. The bonus for the speed of execution for the first series of patterns is of 45 seconds, for the second series 75 seconds and for the third series 150 seconds. For each interval of 15 seconds one bonus point is awarded, therefore the first series can award two bonus points, the second series can award four and the final series can award nine bonus points for the speed of execution. This results in a maximum of 60 bonus points for a quick, correct and full completion of a pattern. However, since not all patterns can be fully completed by all participants, another source of increased variability in scores comes from scoring the patterns which are only partially completed. Thus, for each uncoloredside that is picked and fitted in the correct place the participant receives a point. Another point is awarded for each bicolor side