

Hand Dominance Influences on WAIS-R Block Design performance

Running title: Influence of hand dominance on block design task.

ABSTRACT

Background :

While there are several studies on various factors affect on block design (BD) test performance, but yet no study on hand dominance affect on BD performance. Visuospatial function is important to assess by BD test among different handed groups as the results might effect on treatment and management of different patient groups. Therefore we aimed to detect the BD score difference between right and left handed groups for the better management of the patient group.

Method

Total 20 normal healthy subjects were recruited. There were two groups ; right and left handed groups (n=10 in each group). Age and education were matched for both groups. BD test was done for all participants to assess visuospecial function. Mean BD scores were calculated and analyzed between two groups.

Results

There were no significant difference of mean scores of BD test between two groups. We observed slight elevation of mean score of BD test in right handed group comparing with the left handed group.

Conclusion

Visuospatial memory is similar between right and left handed groups but seems a bit better performance in right handed groups. We need a large sample size to get a reliable result in future study.

Keywords : *Block design test ; hand dominance ;WAIS-R ; visuospatial memory.*

1. INTRODUCTION

Block Design (BD) test is one of the subtest among many IQ batteries [1, 2]. BD is sensitive during assessment of intelligence [1], neuropsychological functions [3] and central nervous system dysfunction [3]. During this test, the test takers use their hand activities to reorganize the blocks to match the colors. Therefore it is thought that BD test is the accurate test to assess the spatial visualization ability and motor skill [4]. The performance of BD test can be declined in relation with many factors. The score can be declined in old age [5, 6], low education [7]. BD test performance also influence on gender-related differences. Non-significant [8] and significant [9, 10] male advantages were documented in the performance of the BD test. Still there is no study on handedness during performance of BD test.

Hemispheric lateralization was explained earlier, where specific functions were mentioned for each hemisphere [11]. These hemispheric functions are related directly with the hand dominance tasks. Left hand dominant persons may suffer from dementia of Alzheimer disease comparing with the right handed persons [12]. And right handed person have larger premotor area on the left hemisphere and vice versa [13]. As two hemispheres are working differently, therefore the hand dominance is the important issue in case of getting different scores during neuropsychology tests. Hand dominance effect on different neuropsychology tests has been documented [14]. But in BD test was not studied yet in case of hand dominance effect. Therefore in this study we investigated the hand dominance effect on block design test. The importance of this study is to determine treatment strategy among right and left handed persons as cognitive function is variable among these two groups.

2. METHODOLOGY

We received human ethical permission before starting experiment from ethical committee of Universiti Sains Malaysia (USM). Total 20 normal healthy subjects were recruited as right and left handed groups (n=10 in each group). Both groups were age and

51 education matched (Table 1). Written informed consent was taken from all subjects before
52 experiment.

53 EXPERIMENTAL PROCEDURE:

54 Block design test was done by an expert neuropsychologist in HUSM. We used
55 WAIS-R block design test to evaluate visuospatial function of right and left handed groups.
56 Participants matched the colors with special design which was instructed by
57 neuropsychologist and was done within limited time. The matching colors and designs were
58 gradually complicated. The scores were calculated according to the correct matching of
59 colors and designs within time. No extra time was calculated.

60 DATA ANALYSIS: Non parametric Mann-Whitney test was done to see significance
61 level between two groups by using SPSS 22 software. $P \geq 0.05$

62 3. RESULTS

63 Mean scores of BD test were shown in Table 1 and Figure 1. There was no significant
64 difference ($p=0.124$) of mean BD scores between these two groups. We observed only a
65 tendency of enhancement of the mean scores in the right handed group comparing with the
66 left handed group.

67 4. DISCUSSION

68 We aimed to determine the visuospatial function between right and left handed groups
69 with block design (BD) test which might be helpful for the better management for the right
70 and left handed patient groups. We found there was no significant difference of the mean BD
71 scores but tendency of slight enhancement of the mean BD scores were observed in the right
72 handed groups compared to the left handed group.

73 Different neuropsychology tests were done among right and left handed individuals.
74 Left hander person was more attentive with getting better memory and most of them had
75 visual learning style [14]. It was documented that left handed person has 11% larger main

76 connecting fibers of corpus callosum comparing with the right handed person [15, 16].
 77 Besides this, huge development of anatomical connectivity of the anterior temporal and
 78 inferior temporal lobe was documented [17, 18]. Researcher believed that these are the main
 79 reason for the left handed person to be better attentive and memory. In this study we found no
 80 significant difference between right and left handed groups but only a tendency of increase of
 81 mean scores of BD test in the right handed group. In our study, our left handed group did not
 82 show any significantly better performance which was opposite with the other studies [14].
 83 Based on these results, the conclusion about the visuospatial memory will be difficult in
 84 different handed groups as our sample size was small.

85 5. CONCLUSION

86 We concluded that there is no difference of visuospecial memory among right and left handed
 87 persons, but seem better in right handed group comparing with the left handed group.

88 6. LIMITATION

89 The main limitation of our study was small sample size. Larger sample size can give reliable
 90 results which might be different from small sample size.

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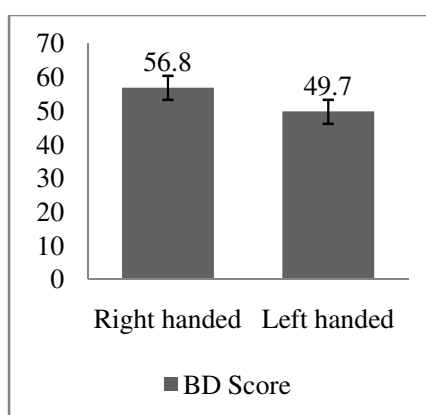
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129 37-48.

130 Table 1: Table 1 shows the demographic data of right and left handed groups with
131 their Block Design (BD) scores.

Groups	Age (years)	Education (years)	Score of Block Design (mean±SD)
Right handed	29.83±7.61	13.4±2.32	56.8±5.56
Left handed	29.93±7.94	14.0±2.79	49.7±17.35

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135 Figure 1: Bar graph shows the differences of mean BD scores between right and left handed
136 groups.