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COMPARISON BETWEEN EFFECT OF VERTICAL AND HORIZONTAL PLANES ON VISUAL MOTOR INTEGRATION

[1]Ms Nanaki Singh, [2]Ms Shubha Arora
[1]M.O.T. from GGSIPU Delhi, B.O.T. from Jamia Hamdard Delhi
[2]Assistant Professor, Department of Occupational Therapy, Jamia Hamdard,
Formerly Head of Department, Occupational Therapy, DIRD
Occupational Therapy Department
Place of Study: Jamia Hamdard, Delhi, India

Abstract: Comparison between effect of vertical and horizontal planes on visual motor integration was done by formulating three age groups of 20-39 years, 40-59 years and 60-79 years. Bender Gestalt Test was assessed for all three groups. It was performed twice by each participant. The designs were shown to the subjects, once in horizontal plane and once in vertical plane, and both attempts were scored. Upon analysis data showed that vertical plane had more effect on Visual Motor Integration than horizontal plane.

Index Terms – Bender Gestalt Test, Horizontal, Vertical, Visual Motor Integration

I. INTRODUCTION:

Visual motor integration is defined as a smooth integration between the visual-perceptual and motor skills, which requires the ability to translate the visual perception of motor function, or the ability to coordinate hand and eye. The learning of writing skills depends on visual perception, as it is used to construct internal representations of visual information that provides characteristics such as shape, size, position in space and distance of letters. [1]

Visual–motor integration (VMI) is the ability of the eyes and hand to work together in smooth, efficient patterns. VMI consists of coordinating visual perceptual skills together with gross-motor movement and fine-motor movement. It is the ability to integrate visual input with motor output. This is how individuals plan, execute, and monitor motor tasks, such as threading a needle, tying shoelaces, and catching or hitting a ball. It is also essential in academic performance. [2]

Although considerable effort has been devoted to the design of tabletop interfaces, the tasks and situations for which they are preferable to vertical displays are less certain. Marshall et al. argue that there is a need for more studies investigating how interfaces encourage or inhibit group participation. One aspect worthy of consideration is orientation: horizontal versus vertical. While vertical displays are known to be effective for presentations, some researchers have argued that horizontal displays might support more seamless interactions among small groups for collaborative tasks. Consequently, substantial effort has been placed on designing effective interfaces and applications for tabletop displays. [3]

It is evident from literature that Visual Motor Integration is essential for performing any work related, leisure or daily-life activities. Based on the above literature, this study will aim to compare the effect of vertical and horizontal planes on VMI. The result of this comparison can further be used to design an intervention protocol in the future, for improving VMI.

II. METHODOLOGY:

2.1 Research design:
Comparative study

2.2 Sampling:
Convenient sampling

2.3 Sample Size:
30 adults of ages 20-79 years. There were 17 females and 13 males who participated.

They were then divided into 3 groups:
Group A: consisted of 10 adults of 20-39 years of age
Group B: consisted of 10 adults of 40-59 years of age
Group C: consisted of 10 adults of 60-79 years of age

2.4 Collection of data:
Community

2.5 Outcome measures:
Bender Visual Motor Gestalt Test (BVMGT) : Test was purchased on 22/03/2018 (invoice no #ISC/234/2017-2018). This test consists of nine simple figures characterized by their Gestalt. It is not a test of visual memory or imagery, rather is one of perception and visual motor functioning. It measures the visual acuity and motor functioning. The test can be administered on children or adults. After seating comfortably, the therapist should ask the patient to copy the card design on the paper and make it as like the drawing on the card as possible.. It is a quantitative procedure. The protocol is searched for 15 signs. Each sign is scored only once. Each sign is given a numerical weight. Each sign is scored on the basis of 'All or None'. No sign is partially present. Numerical weight for a sign remains the same whether that particular sign is observed only in one design or in all the nine designs.

2.6 Inclusion criteria:
1) Adults from 20-79 years old who could communicate, understand the purpose of the research and give their consent for the participation in the study
2) No history of psychological problem

2.7 Exclusion criteria:
1) Conditions such as amnesia, CVA etc.
2) Subjects below 20 years or above 79 years of age
3) Subjects who could communicate in the English language

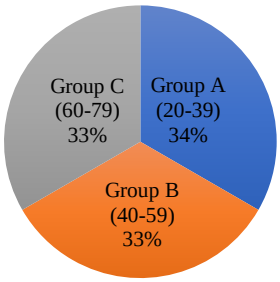
2.8 Procedure:
1) Convenient sampling was done, and 30 subjects of 20-79 years were selected to participate in the study.
2) The participants gave their informed written consent. They were informed that they could withdraw themselves at any time during the study.
3) The participants were made to perform the BVMGT twice. The designs were shown to the participants, once in horizontal plane and once in vertical plane.
4) Both attempts were scored, and the scores were then analyzed.

III. RESULTS:

3.1 Basic characteristics:

30 subjects were divided into 3 groups{A(20-39), B(40-59)and C(60-79)}10 in each group as reflected in Graph1:

GRAPH 1



3.2 Comparison between effect of vertical and horizontal planes on visual motor integration:

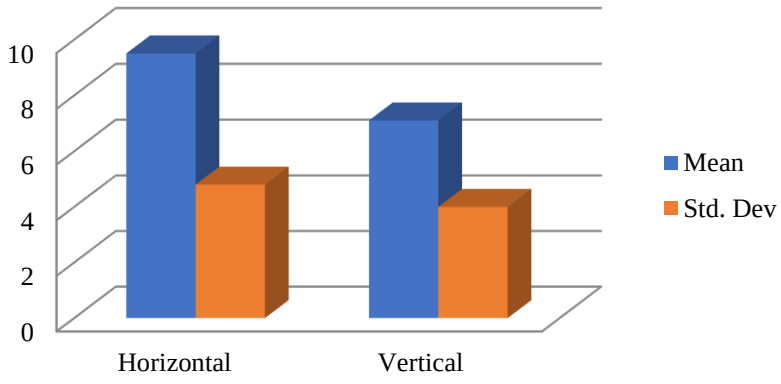
'T-test' has been applied for comparing the effect of horizontal and vertical planes on visual motor integration.

a) The mean values for horizontal plain and vertical plain were 9.5 and 7.1 respectively.
b) Thus, Horizontal plane mean was greater than Vertical Plane mean. This can be seen from Graph 2.
c) This means that participants made less errors while performing the BGVMT in Vertical Plane than in the Horizontal Plane.
d) The t-value was found to be -3.90, and the P-value (2-tailed) was found to be 0.0005 (P<0.5) which shows that the result is highly significant.

	Horizontal	Vertical
Mean	9.5	7.1
Std. Dev	4.8	4
N	30	30

t-value = - 3.9047
P-value (2-tailed) = 0.0005

GRAPH 2



IV. DISCUSSION:

This study aimed to examine the effect of horizontal and vertical plane on visual motor integration. A sample of 30 subjects was taken. They were divided into three groups of 10, according to age. Group A consisted of subjects of age group 20-39 years. Group B consisted of subjects of age group 40-59 years. Group C consisted of subjects of age group 60-79 years.

The BGVMT was performed twice. The designs were shown to the subjects, once in horizontal plane and once in vertical plane, and both attempts were scored. T-test was performed for carrying out comparison. Vertical plane (7.1) had a lower mean than horizontal plane (9.5), thus proving that vertical plane had more effect on VMI than horizontal plane ($P < 0.05$).

A study conducted by Brianna Potvin et al (2012) [3] compared the horizontal and vertical surfaces for a collaborative design task and concluded that vertical displays better supported face-to-face contact than horizontal displays, while standing. The results demonstrated that it was better to choose vertical display for this reason. But some researchers also argued that horizontal displays might support more seamless interactions among small groups for collaborative tasks

V. CONCLUSION:

On comparison, the effect of vertical plane was found to be significantly better on VMI than the horizontal plane. The participants made less errors while performing the BGVMT in Vertical Plane as compared the Horizontal Plane. This result can be taken into consideration while planning to use VMI as an intervention. Horizontal planes are commonly used for VMI testing and intervention. However, by using Vertical plane, VMI can be better integrated and more effective in improving skills like face-to-face contact activities and also handwriting legibility.

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