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EXPERIMENTAL STUDY ON THE CONSTANT PERCEPTION BASED ON THE COORDINATES OF CENTER OF GRAVITY

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Abstract:
The paper presents an experimental method used for estimating the constant perception of motion. The experiment is based on performing the vertical jumping on both legs, on right or left leg in different situations: normal conditions (opened eyes), blind folded or visualizing the image on the mirror. The results revealed the fact that the participant in the test was able to reconstruct the environment while jumping on both legs and on the left leg.
Keywords: space perception, motion, vertical jumping

1. Introduction

The motricity has a fundamental biological role, but also a psychological role in relation to human interaction with the environment regarding the autonomy of its actions. There is a functional and structural correlation between sensitivity and movement which is self-adjustable within the command and control system frame. When the body is moving it is possible that the stimuli reception is differentiated, thus providing adaptations to the biological needs and hence conserving the balance.

A variety of explanatory models that have evolved over time have been proposed in order to facilitate the understanding of psychological perception. Perception refers to the means by which information received from the environment through the sense organs is transformed into the experience of objects, events, sounds, tastes" (Roth, 1986)

The sensory-tonic model is taking into account numerous elements involved in perception. Wapner, Werner and Chandler (1951) have developed this model that first they called sensory-tonic. According to this model the sensory and tonic have common dynamic properties which are contributing to achieving a total dynamic process in an equivalent manner.

Perception is not exclusively sensorial, but also visceral. To perceive an object in front of us is not enough to consider only the position of the object in the visual field, but we need to know also the posture, the head position, etc. This model has great significance for understanding complex forms of perceptions, including also the perception of space.

The transaction model of Ames (1955) and Ittelson (1960) deals with the perception of the exchanges between organism and environment. According to this model, the perception involves issuing an assumption, not necessarily being aware of it. People tend to choose assumptions based on their prior experience and the significance is related to personal experience. This experience involves the anticipation of future.

Another model was developed by Gibson (1979), named the ecological model considering that perception is the plug with the environment. The information is organized in stimuli and the perception is resonating with this organized information, rendering the characteristic features of the object.

2. The constant of perception

This feature allows the perception to develop appropriate images on shape and size of objects when the distance or angle of view is moving. This motion combined with the eye movement (tracking, fixing the object) render the process of implementation of perceptual constant more complex. However, people manage to perceive a stable environment and to distinguish what is static from what is mobile.

The constant is associated with the position, meaning that when we perform eye movements and head movements, the visual scene remains fixed despite these movements. The answer to this question has to explain the mechanism of constancy position. The theory of mutual cancellation was developed by Shebilske in 1977.

Gregory (1966) suggests the existence of two receptor systems of movement: a picture-retinal, which is related to retinal movements, and a corporal eye-head for the movements of eye and head. Thus, the messages are confronted with retinal movements.

3. The experiment

In order to study how the visual perception is influenced an experiment was conducted. Two devices were used during this experiment: the Kinect sensor and test the sample MGM (Hillerin, 2009).

The Kinect sensor can study the biomechanics of the human without fluorescent markers [Ganea D., 2013]. Xia L, Chen CC and JK Aggarwal (2011) have developed a method of detecting human body through the information retrieved from the Xbox 360 Kinect sensor. The authors proposed a method that involves detecting the 2D contour of the human's head in the first instance followed by a 3D reconstruction.

To determine the effectiveness of the Kinect sensor in postural analysis, Dutta T., (2012), has developed a parallel system consists of a compact Kinect camera system and a system of 7 Vicon cams. The postural analysis results provided with the Kinect sensor were very accurate, compared to results obtained with fluorescent markers.

This time when in addition to test MGM providing energy and control parameters on vertical jumping on both legs, on right and left foot a parallel system that recorded the coordinates of the centre of gravity during the execution of vertical jumps was used.

The participants were asked to perform the vertical jumping in normal conditions described in the MGM protocol [MGM protocol], blind folded and visualising their image on a mirror. The coordinates of the canter of gravity were recorded and the data were analysed. Each participant performed vertical jumping on both legs, on the right leg and on the left leg.

4. Experimental data

For each participant in the test we were able to estimate the influence of visualisation on the position of center of gravity. The program developed for collecting the coordinates of the most important joints provides also the coordinates of the centre of gravity, for all cases. For each participant we have recorded 319 instances of the coordinates of centre of gravity. The analysis is performed for one of the participants. For other participants, the same analysis can be developed.

The recorded data are presented in table 1, 2 and 3.

Table 1 Vertical jumping sample on both legs

Vertical jumping sample: on both legs								
Blind folded			Normal conditions			Mirror visualization		
X	Y	Z	X	Y	Z	X	Y	Z

0.27	-0.21	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.27	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.3	3.18	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.3	3.18	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.29	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14
0.26	-0.21	3.16	0.26	-0.18	3.23	0.23	-0.18	3.14
0.26	-0.18	3.16	0.26	-0.18	3.23	0.23	-0.18	3.15
…	…	…	…	…	…	…	…	…
0.14	0.11	3.29	0.31	-0.2	3.16	0.21	-0.22	3.06
0.15	0.13	3.29	0.32	-0.12	3.18	0.22	-0.27	3.06
0.15	0.15	3.3	0.32	-0.04	3.2	0.22	-0.26	3.06
0.15	0.17	3.3	0.33	0.02	3.22	0.22	-0.18	3.06
0.14	0.17	3.31	0.34	0.08	3.22	0.22	-0.1	3.06
0.15	0.17	3.31	0.34	0.1	3.23	0.22	-0.03	3.05
0.14	0.15	3.31	0.34	0.14	3.25	0.23	0.04	3.03
0.14	0.12	3.32	0.34	0.15	3.26	0.23	0.1	3.02

Table 2 Vertical jumping sample on right leg

Vertical jumping sample: on right legs								
Blind folded			**Normal conditions**			**Mirror visualization**		
X	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.22	-0.17	2.96
0.31	-0.19	3.14	0.29	-0.18	2.99	0.21	-0.17	2.96
…	…	…	…	…	…	…	…	…
0.3	0	3.13	0.18	-0.14	2.87	0.36	-0.28	3.12
0.31	0	3.14	0.18	-0.14	2.87	0.36	-0.23	3.1
0.32	-0.01	3.14	0.19	-0.14	2.86	0.35	-0.17	3.09
0.33	-0.03	3.15	0.19	-0.15	2.86	0.35	-0.11	3.08
0.35	-0.08	3.15	0.2	-0.15	2.86	0.35	-0.04	3.07
0.36	-0.12	3.15	0.2	-0.15	2.86	0.35	0.01	3.07
0.37	-0.19	3.16	0.21	-0.15	2.84	0.35	0.01	3.07
0.38	-0.23	3.17	0.2	-0.15	2.84	0.36	0.06	3.07

Table 3 Vertical jumping sample on left leg

Vertical jumping sample: on left legs								
Blind folded			**Normal conditions**			**Mirror visualization**		
X	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**
0.27	-0.21	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14

0.27	-0.27	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.3	3.18	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.3	3.18	0.26	-0.18	3.22	0.23	-0.18	3.14
0.27	-0.29	3.17	0.26	-0.18	3.22	0.23	-0.18	3.14
0.26	-0.21	3.16	0.26	-0.18	3.23	0.23	-0.18	3.14
0.26	-0.18	3.16	0.26	-0.18	3.23	0.23	-0.18	3.15
…	…	…	…	…	…	…	…	…
0.08	-0.12	2.47	0.23	0.04	2.89	0.13	-0.25	3.1
0.09	-0.12	2.49	0.23	0.04	2.89	0.13	-0.21	3.12
0.1	-0.13	2.5	0.24	0.02	2.9	0.14	-0.14	3.13
0.1	-0.13	2.52	0.25	-0.02	2.9	0.15	-0.08	3.14
0.11	-0.13	2.54	0.24	-0.06	2.9	0.14	0	3.15
0.12	-0.14	2.57	0.25	-0.11	2.9	0.13	0.06	3.15
0.12	-0.15	2.6	0.25	-0.18	2.9	0.12	0.08	3.14
0.13	-0.16	2.63	0.24	-0.24	2.89	0.11	0.1	3.14
0.08	-0.12	2.47	0.23	0.04	2.89	0.13	-0.25	3.1

5. Results and discussions

For each type of vertical jumping the coordinates of the centre of gravity are recorded when the samples are performed respecting the normal protocol of MGM test, blind folded or when the image was visualized on the mirror. The variation of the projections on x, y and z are shown in figures 1, 2 and 3.

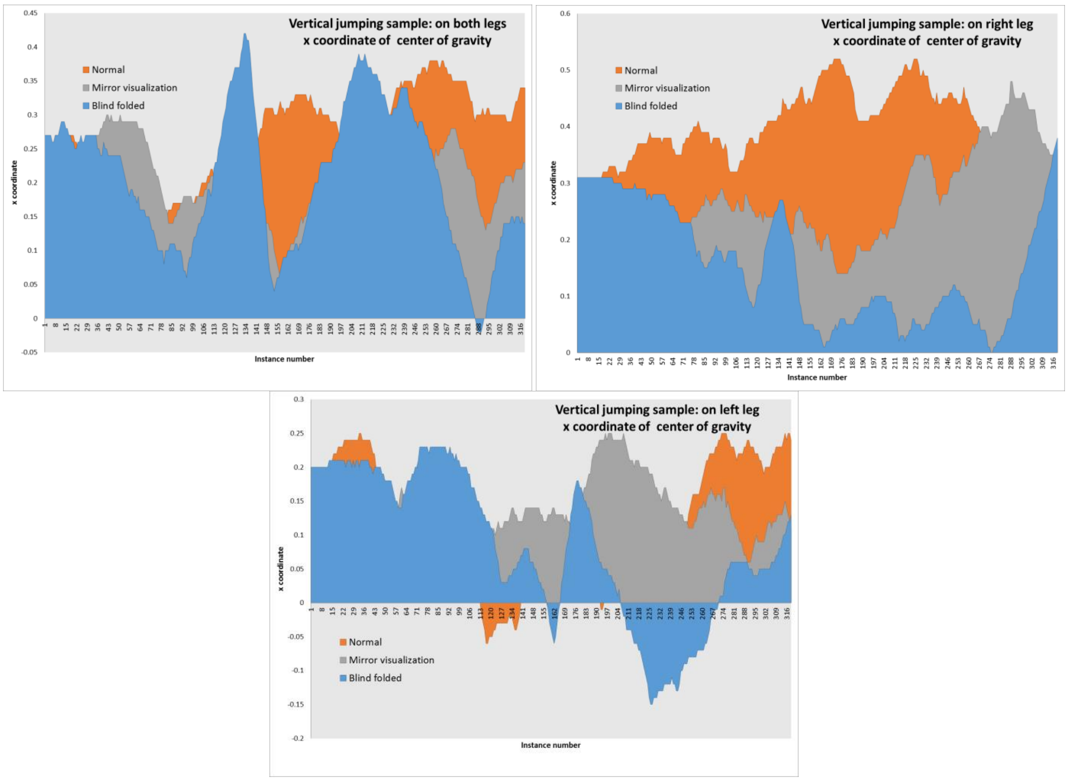

Fig.1. Vertical jumping– projection of centre of gravity on x axis

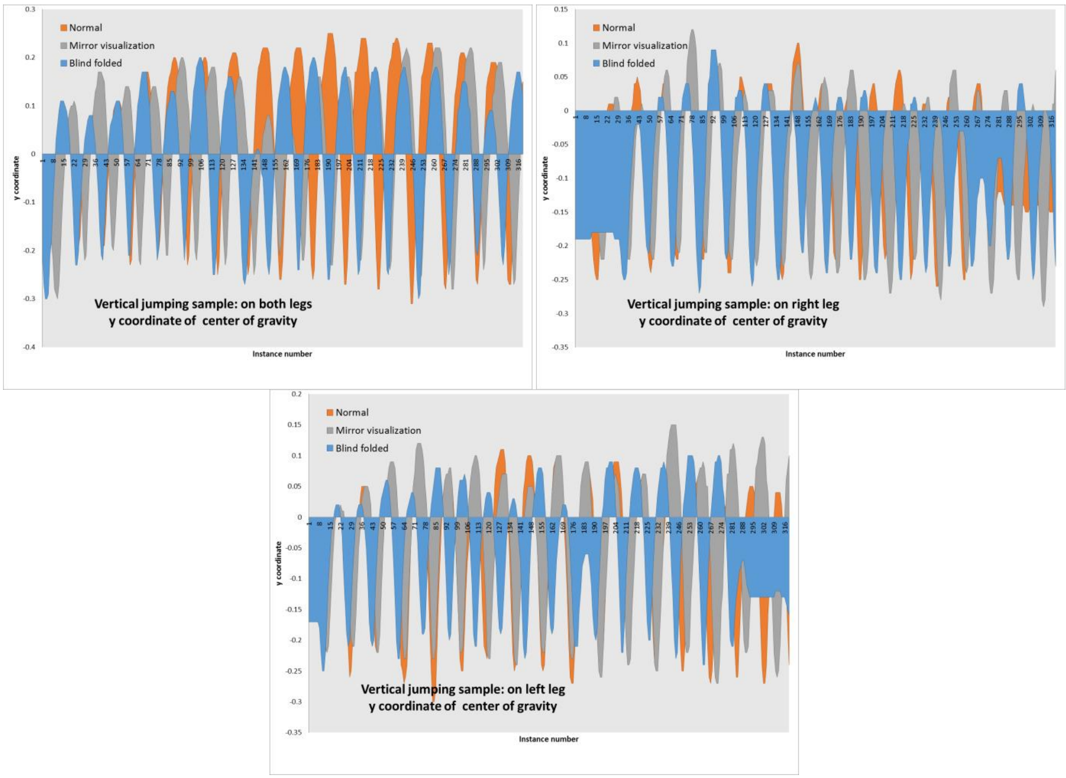

Fig.2. Vertical jumping – projection of centre of gravity on y axis

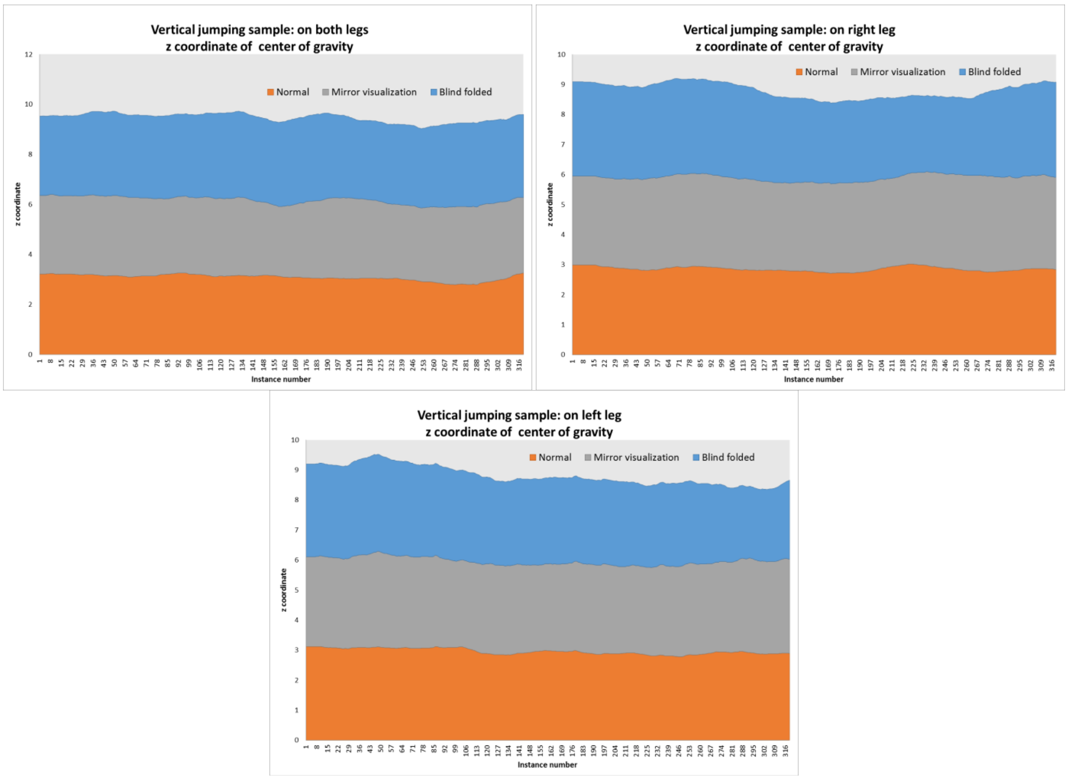

Fig.3. Vertical jumping – projection of center of gravity on z axis

The average values of the projections of centre of gravity on x, y and z axis are shown in table 4.

Table 4 The average values of the x, y, z coordinates of center of gravity

Center of gravity coordinates (average)	Vertical jumping on both legs			Vertical jumping on right leg			Vertical jumping on left leg		
	x	y	z	x	y	z	x	y	z
Blind folded	0.2074	0.122	3.292	0.155	-0.1	2.906	0.082	-0.06	2.856
Normal	0.269	0.142	3.073	0.382	-0.08	2.857	0.125	-0.07	2.959
Mirror visualization	0.203	0.125	3.074	0.264	-0.09	3.039	0.136	-0.05	2.998

Considering the vertical jumping according to MGM protocol (eyes opened) as the one performed in normal conditions, it is possible to analyse the average values of the x, y and z coordinates, while the vertical jumping is performed in abnormal conditions (blind folded or mirror visualizing).

Thus, while jumping on both legs, better results are recorded while visualizing the image on the mirror for x, y and z coordinates of the centre of gravity.

The situation is different when the participant performs vertical jumping on right leg. Better results were recorded for x and z coordinates when the participant was blind folded. While jumping on the left leg, the recorded data revealed the same situation as for the vertical jumping on both legs.

6. Conclusions

The experiment was intended to establish a method for estimation of the constant perception. The recorded data taken into account were the coordinates of the centre of gravity. Their evolution with respect to time was analysed for vertical jumping on both leg, on the right and on the left leg. Three situations were considered for each vertical jumping: in compliance with the MGM testing protocol (eyes wide opened), blind folded and visualizing the image on the mirror.

The constant perception is analysed using the coordinates of centre of gravity. The experiment reveal the fact that the participant in the test can develop images on his own body while jumping blind folded, being able to perceive a stable position of his centre of gravity and a fixed visual scene where he perform the jumping, even if he was blind folded. When visualizing his position the participant has the possibility to reconstruct the environment and to maintain approximately the same position while jumping.

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THE SOCIOMETRIC ANALYSIS OF THE IIND YEAR STUDENTS' VIEWS – F.E.F.S. GALAŢI- REGARDING THE SUBJECT "DIDACTICS OF THE SPECIALTY PHYSICAL EDUCATION AND SPORTS"

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Abstract:*The course "Didactics of the Specialty Physical Education and Sports" is included in the module of the subjects studied by students at the Department of the teaching staff training from the University Dunarea de Jos of Galati. These core subjects ensure psycho-pedagogical training for graduates in order to form the teachingskills for pre-university and university education, and it also includes: educational psychology, curriculum theory, the theory of assessment, teaching practices and classroom management.*
Questionnaire design has met all scientific provisions offered by the specialty literature. The questions included here cover the whole problem of subject: the importance and role of the subject in professional training, the thematic content covered, their difficulty or accessibility, the number of hours allotted to seminar and course activities, the bibliography consulted, the real time for individual study, the utility of the used teaching technique, the quality and objectivity of the assessment, reported deficiencies and development proposals of educational activities for future generations. The graphical representation of collected and processed data was made using the graphical editor Microsoft Office Word 2010. The study was conducted to optimize the transmission process of specialty information and to find ways to ensure a better teacher / student relationship, aspects that facilitate the efficiency of the teaching process.

Keywords:*questionnaire,school curriculum, didactic design, opinions,general and specific skills, assessment techniques.*

Introduction: The course*Didactics of the Specialty* presents students the main concepts related to the curricula and syllabi, planning documents, curricular and extracurricular activities, school evaluation, forms of practice, the characteristics,the objectives and development of motor skills by age. These contents and their distribution on the number of hours allocated are presented in detail in *Table 1*.This course has a total of 28 hours of classes - 2 hours / week and also 28 hours of seminars - 2 hours / week for students in one working