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Motor and mental representation of preschool aged children

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Abstract

Aim of the present research was the detection of motor disturbances, the detection of the vividness degree of the mental representation as well as the study of the relationship between the different levels of motor coordination and the vividness degree of the mental representation among 412 children of preschool age from 4 to 6 years old, who were selected by accidental sampling from Epirus and Corfu regions. The motor test "Motor Assessment Battery for children (M-ABC, Henderson & Sugden, 1992). The evaluation of vividness degree of the formation of mental pictures has been made according to "The measurement of imagery ability" (Hall, Pongrac and Buckolz, 1985). There were used tables of frequency distribution and their relative percentages regarding the rates of the two variables as well as the factors of correlation Pearson and Spearman. Comparing the results we conclude that a 4.9 percentage of the sample has serious difficulties in motor. It has been observed a statistically negative connection (Spearman $r = -.461$ & Pearson $r = -.710$ $df = 410, p < 0.001$) between vividness degree of the mental representation and the different levels of motor coordination. The children who have demonstrated good rates of motor coordination without difficulties have also shown a high vividness degree of mental representation while the difficulties on children's motor coordination are related to the low rates of the vividness degree of mental representation. The importance of the present survey is double-based. Through the appointment of this relationship between the two variables of the motor coordination (body-motor level) and the vividness grade of mental representation (perceptive-cognitive) level, useful conclusions are being extracted not only on pedagogic science but on sports, too. The motor behavior and the motor learning are promoted through such processes of motor coordination growth and the processes of perceptive-cognitive development shaping in that way an all-out child's personality which is the aim of General Education. Additionally, ways of early detection of children with motor and perceptive-cognitive particularities are being demonstrated.

Key words: *mental imagery, kindergarten, motor clumsiness, M-ABC test.*

Introduction

Various theories are in favour of the viewpoint of the promotion of movement, kinetic learning and behaviour through the process of intellectual representation (psychoneuromuscular theory of Jacobson/1932 and Paivio, 1991). According to this theory, vividly imaginary incidents or ways of behaviour must produce neuromuscular reactions similar to those of real experience (Zaharis, 1995). During the process of mental representation, the performance is formed, which is a produced picture or a series of produced pictures from objects or events of perception. Therefore, the representations result in absence of irritations (Nickel, 1981). The clarity of these representations depends on the relevant clarity of perceptions from which they came. At infantile and preschool age, the sensory experiences are limited and that is the reason for the difficulty in the

recording of the pictures with clarity, objectivity during the produced pictures (Zaharis, 1995).

The bibliography for the promotion of motor skills, motor learning and motor behaviour concerns, in its majority, athletes and students far older than the children of preschool age. In the present research, children of preschool age, between 4 and 6 years old, have been examined. A characteristic of mental pictures – that is the result of the mental representation is the vividness, liveliness of the pictures. The vivid mental pictures are presented in all senses (kinaesthetic, acoustic, visual, tangible, olfactory) and they have a character of perception.

The psychokinetic growth focuses, is being characterised and limited by the motor coordination. The determination and combination of steps (cognitive, body-kinetic) that leads to desired result without any time and energy loss and avoiding the confusions, is called motor coordination (Riek, Woolley, 2005, Salter, Wishart, Lee, Simon, 2004, Haverkamp, Behring, 1995). The lack of determination and coordination of actions so as for the desirable motor result to be achieved defines the motor clumsiness (Smith, Zelaznik, 2004, Hadders - Algra, 2003, Henderson, Henderson, 2003, Rodger, Ziviani et al., 2003, Desha, Ziviani, and Rodger, 2003, Schneiberg, Sveistrup, et al., 2002, Pless, Carlsoon, Sundelin, Persson, 2002, Pless, Carlsoon, Sundelin, Persson, 2001).

Aim of the present research was the investigation, localisation and evaluation of probable disturbances in the motor coordination, evaluation of vividness degree of intellectual representation, as well as the relation of these two variables in children of preschool age.

Method

Participants

Four hundred and twelve children (412) of preschool age, in three age-related teams of 4, 5 and 6 years ($M=5$ and $SD=.08$) were selected by accidental sampling from Epirus and Corfu regions.

Procedure

The motor test “Motor Assessment Battery for Children” (M-ABC, Henderson and Sugden, 1992) was used for the assessment of children’s motor coordination.

The evaluation of vividness degree of the mental pictures' formation has been made through the "the measurement of imagery ability" (Hall, Pongrac and Buckolz, 1985). Tables of Frequency distribution and their relative percentages regarding the rates of the two variables as well as the factors of correlation Pearson and Spearman were used.

Results

According to the practical instructions of (M-ABC), we present the brief table 1.

Table 1. *Brief presentation of the frequencies and relevant percentages of M-ABC test for aged teams of the sample.*

| Score zones ABC test | <i>Age (years)</i> | | | | | |
|--|--------------------|-------|-----|-------|-------|-------|
| | 4 | | 5 | | 6 | |
| | N | % | N | % | N | % |
| 0 - 10,50 without motor difficulties | 111 | 82,84 | 127 | 92,70 | | |
| 0 - 10 without motor difficulties | | | | | 132 | 93,60 |
| 10,50 - 17 motor difficulties | 18 | 13,43 | 4 | 2,90 | | |
| 10,50 - 13,50 motor difficulties | | | | | ----- | ----- |
| 17 - 40 Clumsy | 5 | 3,73 | 6 | 4,40 | | |
| 13,50 - 40 Clumsy | | | | | 9 | 6,40 |

Table 2. *Descriptive characteristics of the two variables of the research.*

| | Mean | St. Dv. | N |
|----------|-------|---------|-----|
| M-ABC | 6,721 | 5,6507 | 412 |
| B.Z.N.A. | 7,573 | 2,0150 | 412 |

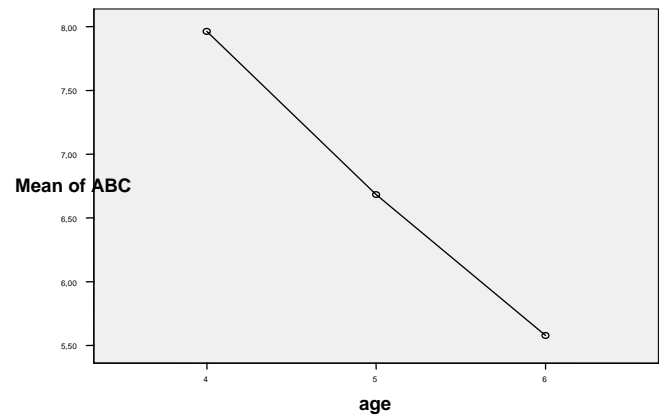
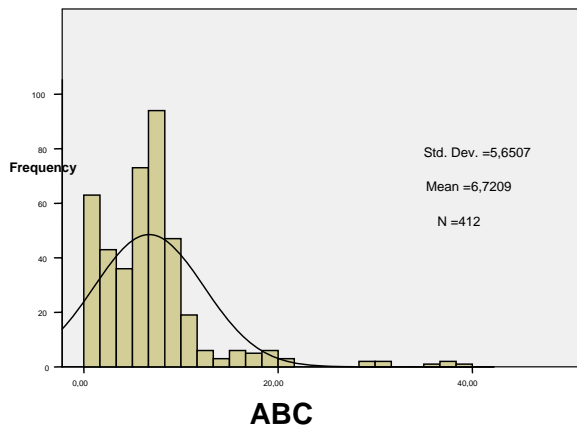


Figure 1. Graphic representation of distribution of sample prices for the (M - ABC).

Figure 2. Graphic representation of ABC means of the three age groups of the sample.

Observing graphic representation 1, it is obvious that there is a big accumulation of rates for the (M-ABC) between rates 0 to 10. The rates appearing in this area 0 - 10 are considered very good levels for motor coordination and are not characterised by motor clumsiness; these rates are placed on the left of the regular distribution for the (M-ABC).

Table 3. Brief presentation of frequencies and corresponding percentages of vividness degree of the intellectual representation of sample.

| RATES | N | % | RATES | N | % |
|-------|----|-----|-------|-----|------|
| 1,0 | 3 | ,7 | 6,0 | 19 | 4,6 |
| 2,0 | 14 | 3,4 | 7,0 | 47 | 11,4 |
| 3,0 | 15 | 3,6 | 8,0 | 128 | 31,1 |
| 4,0 | 18 | 4,4 | 9,0 | 135 | 32,8 |
| 5,0 | 8 | 1,9 | 10,0 | 25 | 6,1 |

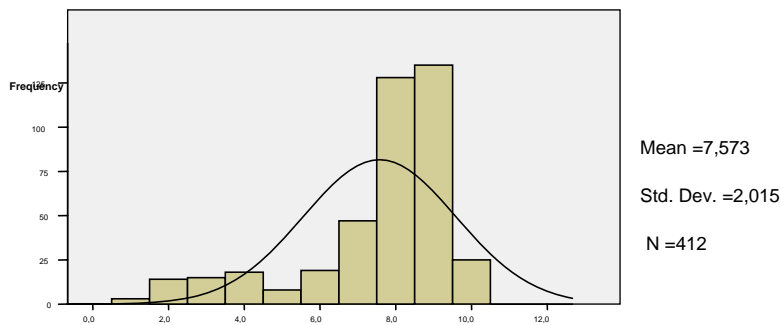


Figure 3. Brief presentation of frequencies of vividness degree of the intellectual representation of sample.

Observing table three as well as graphic representation three, there seems to be a great accumulation of mean rates for the vividness degree of the mental representation between six (6) and ten (10). The mean rates presented in this area 6 – 10 are characterised as very good rates, for the Vividness Degree Mental Representation (VDMR) and they're placed on the right of the regular distribution. Pearson and Spearman correlations were used for the investigation of the relation between the two variables. The Pearson correlation ($r = -.71$) demonstrates potentially negative correlation of the variables, which is displayed in table 4 and in graphic presentation 4. It seems that, when the rates of the vividness degree of mental representation is big (6 until 10), then the corresponding rates of the sample for the M-ABC receive very low prices from zero (0) to ten (10), a fact that shows that, when the sample presents good rates in one variable, the same happens in the other variable, too. The correlation factor Spearman $r = -.46$ shows a negative correlation of the two variables, which is demonstrated in table four.

Table 4. Brief presentation of cross-correlations factors.

| | | M-ABC | V.D.M.R |
|-----------------|----------------------------|-----------|-----------|
| M-ABC | Pearson Correlation | 1 | -,710(**) |
| | Sig. (2-tailed) | | ,000 |
| | N | 412 | 412 |
| V.D.M.R. | Spearman's rho | -,461(**) | 1 |
| | Sig. (2-tailed) | ,000 | |
| | N | 412 | 412 |

The correlation is in level of importance 0,01 for two -tail.

Discussion- Conclusions

The results of the present research on the serious disturbances of motor coordination present a percentage of 4,9% that is consistent to other corresponding international researches for preschool age (Missiuna, Gaines, Soucie and McLean 2006: Richardson and Montgomery, 2005: Rosenbaum, Missiuna and Johnson, 2005: Gilberg and Kadesjo, 2003: Ruiz, Graupera, Gutierrez and Miyahara, 2003: Dewey, Kaplan and Crawford, 2002: Geuze and van Dellen, 1990: Richman, 1988), as well as to the percentage of 5% of American Psychiatric Company (1994). The contemporary tendencies of preschool education are reported in the promotion of movement apart from the creative representation (Doliopoulou, 2000). The ability for the mental representation as it had been mentioned before constitutes a cognitive activity. The mental picture constitutes today a fundamental and essential mean for our cultural survival. The ability for the mental representation presupposes the birth and production of pictures, the maintenance of pictures, the vividness of them, the movement and rotation of pictures (Kosslyn, 1994). The present research turns to the relation between the independent variable of vividness degree of mental representation and motor coordination.

The relation between the two variables is being demonstrated and shows that motor behaviour is related to cognitive activities, such as the production and the vividness of mental kinaesthetic visual pictures. The child's personality is directly related directly to the promotion of motor development and motor behaviour (motor coordination), that are related to the child's ability for mental representation. An advanced motor behaviour provides the psychological characteristics of the developing person's personality with positive elements. The wholesome configuration of a child's personality is the main target of Physical Education, Pedagogic Science and Education generally. The relation of the two variables is of major importance. The relation of the two variables according to which children with high V.D.M.R., also present very good levels of motor coordination is shown from the results of our research. Then, through such processes of mental representations and motor coordination, we could evaluate children who chronologically show positive elements from an early age in their motor behaviour and development, as well as in their cognitive growth. These two variables can determine the achievement of "movement"

talented children from early stages of chronological development. By identifying this relationship, beneficial conclusions are drawn not only on pedagogic science but on sports too. Through activities enhancing motor and cognitive development during mental representation, the motor behaviour and motor learning are promoted, shaping in that way all-out child's personality, which is the aim of General Education. Ways of early detection of children with motor and cognitive talent who in future can make a big athletic career are being demonstrated. Ways of early detection of children with disturbances of kinetic coordination are also being shown.

References

- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders. Fourth edition.* 1994. Washington dc: APA, p. 53.
- Atkinson J., Nardini M., Anker S., Braddick O, Hughes C., & Rae D. (2005) Refractive errors in infancy predict reduced performance on the movement assessment battery for children at 3¹/₂ and 5¹/₂ years. *Developmental medicine & child neurology*, 47: 243 – 251.
- Bryden, MP., George, J., & Inch, R. (1990). Sex differences and the role of figural complexity in determining the rate of mental rotation. *Percept motor skills*. 70(2):467-77.
- Campos, A., & Gonzalez, MA. (1993). Vividness of imagery and creativity. *Percept mot skills*. apr;78(2):479-87.
- De haven, D.T., & Roberts – Gray, C. (1978). Age, familiarity, and visual processing schemes. *Percept mot skills*. 47(2):591-5.
- Dewey D., Kaplan B.J., Crawford S.G., Wilson B.N. (2002). Developmental disorder: associated problems in attention, learning, and psychosocial adjustment. *Hum. Mov Sci*, 21:905 – 918.
- Gallahue D., & Ozmun J. (1998). Understanding motor development. Infants, children, adolescents, adults. W.C.: Brown Communications.
- Geuze R.H., Van Dellen T. (1990). Auditory precue processing during a movement sequence in clumsy children. *J Human Mov Stud*, 19:11 – 24.
- Geuze R.H, Van Dellen T. (1990). Auditory precue processing during a movement sequence in clumsy children. *J Human Mov Stud*, 19:11 – 24.
- Gillberg C., Kadesjo B. (2003). Why bother about clumsiness? The implications of having developmental disorder (dcd). *Neural Plast*, 10:59 – 68.
- Hadders – Algra M, Grasmbergen A. (2003). Discussion: significance and treatment of clumsiness in children. *Neural Plast.*, 10(1-2):165-78.
- Haverkamp F., Behring B. (1995). Hereditary motor and sensory neuropathy type iii. Case report and review of the literature. *Klin Padiatr.*, 207(1):24-7.
- Henderson S.E., & Sugden D.A.. (1992). Movement assessment battery for children: manual. London: Psychological Corporation.
- Iversen S., Knivsberg A..B., Nødland M., & Ellertsen, B. (2006). Motor difficulties in 6-year-old children with severe behavioural and emotional problems. *Emotional and behavioural difficulties*. Vol. 11, no. 3, 2006, pp.165-181.
- Jacobson E. (1932). Electrophysiology of mental activities. *American Journal of Physiology*, , 44, 677 – 694.
- Johnson, P. (1982). The functional equivalence of imagery and movement. *J Exp Psychology*; 34 (pt 3:349 - 65).
- Krombholz H.. (2006). Physical performance in relation to age, sex, birth order, social class, and sports activities of preschool children. *Percept mot skills*, 102(2):477-84.
- Krombholz, H. (1997): Physical performance in relation to age, sex, social class and sports activities in kindergarten and elementary school. *Perceptual and Motor Skills*, 84, 1168-1170.
- Lafleur, M.F., Jackson, P.L., Malouin, F., Richards C.L., & Evans A.C.. (2002). Motor learning produces parallel dynamic functional changes during the execution and imagination of sequential foot movements. *Neuroimage*, 16(1):142 – 57.

- Marks D.F. (1989). Bibliography of research utilizing the vividness of visual imagery questionnaire. *Percept motor skills*, 69 (3 pt 1): 707 – 18.
- Marks D.F. (1989).. Construct validity of the vividness of visual imagery questionnaire. *Percept motor skills*, 69 (2): 459 – 65.
- Naito E. (1994). Controllability of motor imagery and transformation of visual imagery. *Percept mot skills*, 77(3 pt 1):923-8.
- Nickel H. (1981). *Entwicklungspsychologie des Kindes – und Jugendalters*. Bern Stuttgart, Wien: Huber.
- Remplein H. (1971). *Die seelische Entwicklung des Menschen im Kindes – und Jugendalter*. Munchen/Basel: Reinhardt Verlag.
- Rosser, R.A., Stevens, S., Glider, P. Mazzeo, J., & Lane, S. (1989). Children's solution strategies and mental rotation: evidence for a developmental shift. *Genet soc gen psychol monogr*, 115(2):183 – 204.
- Ruizj M., Graupera J., Gutiérrez, M., & Miyahara, M. (2003). The assessment of motor in children with the movement ABC test: a comparative study among Japan, Usa and Spain. *International journal of applied sport sciences*, vol 15, 1, 22-35.
- Schoemaker M.M., Smits-Engelsman B.C., & Jongmans M.J. (2003). Psychometric properties of the movement assessment battery for children-checklist as a screening instrument for children with a developmental coordination disorder. *Br Jou Educ Psychol*, 73(pt 3):425-41.
- Smits-Engelsman B.C., Henderson S.E. & Michels C.G.J. (1998). The assessment of children with developmental disorders in Netherlands: the relationship between the movement assessment battery for children and the Koerperkoordinations Test for Kinder. *Human movement science* , 17, pp.699 – 709.
- Switras, J.E. (1978). An alternate-form instrument to assess vividness and controllability of mental imagery in seven modalities. *Percept mot skills.*, 46(2): 379-84.
- Tedford, W.H., & Penk, M.L. (1977). Intelligence and imagery in personality. *Journal Pers Aaess*, 41(4):405 13.
- Traxel, W. (1962). Kritische Untersuchungen zur Eidetik. *Archiv Ges. Psychology*, 114, 260-336.
- Van strien , J.W., & Bouma, A. (1990). Mental rotation of laterally presented random shapes in males and females. *Brain Cognition* 12(2):297 – 303.
- Wall S., McClements J., Bouffard M., Finlay H., & Taylor M. (1986). A knowledge-based approach to motor development: implications for the physically awkward. *Adapted Physical Activity Quarterly*, 2, 21 – 42.

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