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THE IMPORTANCE OF PSYCHOMOTRICITY IN THE APPARITION AND DEVELOPMENT OF LANGUAGE IN CHILDREN

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Abstract

An important role in the development of personality is held by the development of language and the psychomotor structures. This constitutes a fundamental requirement in the children education process, which aims at developing the psychomotor abilities and structures, in forming and developing both the oral and the written language. Our research aims at identifying some characteristic aspects of the relationship between the psychomotor development and the language disorders (dyslalia and dysgraphia) in children.

Research. The research sample consisted of 120 subjects (60 preschool age children and 60 young children); 60 children were selected for every language disorder (dyslalia and dysgraphia): 30 children with speech disorders for the experimental group and 30 subjects without speech disorders, for the control group. From a methodological point of view, we applied three psychological tests: the "Oseretzki" development motor scale, the Bender-Lauretta Test and the Raven coloured progressive matrices. For the interpretation of the data obtained and for the verification of the hypotheses, we used the *Student Test* (t) – for independent samples and the *linear correlation coefficient* – Pearson. We also used the data statistical processing program SPSS 10.0. The hypotheses advanced in this research were confirmed for the language disorders analysed (dyslalia and dysgraphia), by the differences between the level of visual-motor maturity, the motor age, as well as the connection between the intelligence coefficient and the motor age in the dyslalic and dysgraphic subjects, compared to the subjects with a normally developed language.

Conclusions. The conclusions of the study highlight the interdependence between language development and the psychomotor development, an important aspect in the early education of the children, in preventing the apparition of language and psychomotor disorders. By the results obtained, this research fundaments the necessity of the psychomotor recovery therapy within speech therapy.

Keywords: psychomotricity, dyslalia, dysgraphia, therapy, child

Introduction

The psychomotor conducts evolve depending on the degree of psychophysical development and the educational influences exerted throughout childhood. Psychomotricity determines the control of the human behaviour and includes the participation of the various processes and psychic functions ensuring the adequate reception and execution of the response acts (E. Aubert, J.M. Albaret, 2001). Through its basic components, psychomoricity realises the pragmatic adjustment (acquisition of the professional, manual, intellectual techniques), social adaptation (methods of interpersonal communication), aesthetic adaptation (body expression techniques) and educational adaptation. C. Păunescu and I. Muşu (1990) consider that psychomotricity constitutes a complex direction in personal development, resulting from the interaction and interconnection of the neuropsychological devices (especially at cortical and peripheral level) ensuring the elaboration and execution of the movement, among the mental and affective processes, coordinated by consciousness. The more developed is the hand kinaesthesia, the more precise are the coordinations in executing the graphemes, the drawing, the manual activities and, generally, the fatigue phenomenon is not installed so quickly.

It is considered that by educating motricity, the child learns gestures, and becomes is prepared for professional tasks, while the physical and mental equilibrium and the harmonious relationships within community are improved (C. Albu, A. Albu, T.L. Vlad, I. Iacob, 2006). Speech acquisition means the acquisition of the capacity to articulate and coordinate the speech flow, differentiating between the phonemes and understanding their significance. In language learning, it is necessary to communicate, to integrate the coordinating function of the spoken material, to realise the laringo-faringo-velar function and the breathing movements. In addition, in written language realisation, an important place is played by the delicate movements of the hand and fingers. Therefore, the delicate motor development evolves during childhood, between the ages 3 to 7, recording special progress, especially at the level of the hands and feet. More advanced motricity is accompanied by a varied verbal plan, and, generally, by an evolution of the action and verbal conduct allowing for a better relationning and integration in the community. It is considered that at the age of 6, the child is sufficiently developed from a biological and intellectual point of view, so as to acquire writing and reading. Intellect and general motricity development, the development of hand kinaesthesia, especially vocabulary and verbal conduct, as well as the motivational nucleus for the future school activity, all these constitute the guarantee for forming the reading-writing skills, activity specific to the school period. If we add here the evolution of the physiologic process of small bones ossification (hand phalange), the increase in the muscular precision and strength ensuring the speed of the movement, it can be considered as a real basis constituted for the complex action for forming the writing skills. The more developed the hand kinaesthesia is, the more precise will be the coordination in executing the graphemes, the drawing, and the manual activity, and the fatigue is not installed so quickly.

As far as the pronunciation disorders are concerned, they are relatively frequent in children, consisting in deforming, substituting, omitting, inversing some sounds in spontaneous or reproduced speech, this disorder being called *dyslalia*. Generally, dyslalia is the inability to utter certain phonemes, permanently manifested, in any circumstances, both in spontaneous and repeated speech, in words, syllables or in trying to utter the isolated phoneme. In correcting dyslalia, in all therapeutic stages, various gymnastic and myogymnastic exercises are used for the body and the organs participating in the realisation of pronunciation (I. Tobolcea, 2002). These exercises aim at relaxing or straining the organism and the muscles of the uttering apparatus during sound pronunciation. The more frequent the speech disorder is, the more it determines negative effects in forming the graphic-lexical act. If such a disorder was installed during the writing-reading acquisition, the formation of the correct skills is carried out much harder since there is a tendency for the speech disorders to be transposed in the writing/reading. In order to prevent the written language disorders, the preparatory stage is necessary (6 years), when the family and the kindergarten are in charge of the child's education, in the adequate acquisition of the written language. Progress in the motor development influences the correct formation of the writing abilities, by developing the delicate movement of the fingers and hand, by involving some muscle groups and ligaments in the correct and prompt realisation of movements. Therefore, the development of psychomotricity is related to the evolution of the nervous system and it reflects the general mental maturity involved in the entire system of the oral and written speech.

Therefore, the treatment of dysgraphia includes a series of interventions including:

- psychomotor re-education focused on motricity, body scheme and laterality, temporal-spatial organisation, movement – aspects involved in the realisation of the graphical act;
- graphic-motor training comprises the development of general motricity, the dominant hand training, the sensorial-motor integration;
- the visual-motor training involves the formation of visual-motor, auditory abilities, structures, as important elements determining the various dysgraphic disorders. Therefore, the movements of the hand must be practised until the elimination of synkinesies, that burden both the execution and reproduction but also the possibility to copy a model. Writing also presupposes a certain affective maturity, self-confidence and motivation to overcome the difficulties, aspects realised by the children during speech therapy.

Experimental design

Starting from the premise that between the children with speech disorders (dyslalia, dysgraphia) and the children with a normally developed language there are differences in the psychomotor sphere, we tried during our research to highlight the relationship between some aspects of psychomotricity and speech disorders (dyslalia, dysgraphia).

Aim of the research: IThe identification of some characteristic aspects of the connection between psychomotricity and speech disorders in children.

Research hypotheses:

a. *General hypotheses:*

Pre-school age children present retardation in the psychomotor development compared to pre-school age children with a normally developed language.

Deficient psychomotor development influences the apparition and manifestation of language disorders.

b. Specific hypotheses:

1. The level of visual-motor maturity is lower in the pre-school dyslalic children compared to the normally developed children.

2. Motor age is smaller in the pre-school dyslalic children compared to the normally developed pre-school age children.

3. There is a connection between the intelligence coefficient (QI) and the motor age, respectively the level of visual-motor maturity.

4. The psychomotor development is deficient in the dysgraphic pupils, compared to the normally developed ones.

Research methodology and the instruments used. We used as instruments for data collection the psychological tests: Bender-Lauretta test, the Oseretzki motor development scale, the Raven coloured progressive matrices, and for the verification of the hypotheses, the Student (t) test – for independent samples, and the linear correlation coefficient-Pearson. We also used the statistical data processing program SPSS 10.0, statistical program designed for research in the field of social sciences.

The research subjects. The research was carried out in educational institutions in the city of Iasi, and it included pre-school age children and young school-age children.

The research group consisted of 120 subjects (60 pre-school children, and 60 children in the early school years; for each language disorder: dyslalia and disgraphia, 60 children were selected: 30 subjects with speech disorders for the experimental group and 30 subjects without speech disorders, for the control group.

The group was formed according to the following factors:

Speech disorder

–the children in the experimental group present language disorders (dyslalia, dysgraphia)

–the children in the control group present a normally developed language

c) The age – the selected children were 6 years old (60 pre-school children: 30 dyslalic and 30 with a normal speech) and 9 years old (60 pupils in the 2nd grade: 30 dyslalic and 30 with normal speech).

Results and discussions

Hypothesis 1. The visual-motor maturity level is not lower in the pre-school dyslalic children compared to the normally developed pre-school children. In order to verify this hypothesis, we used the Bender-Lauretta test, applied to the two groups of subjects (pre-school children with a normally developed speech and dyslalic pre-school children). The results obtained were introduced in the database, processed with the help of the SPSS 10.0 program. The t test was computed for the independent samples (Independent Samples T Test) in order to establish the difference between the visual-motor maturity level in the children with normally developed speech and the visual-motor maturity level in the dyslalic children.

Table 1: The mean of the visual-motor maturity in the experimental and the control groups

	Mean of each group
Normally developed children (without dyslalia)	4,27
Dyslalic children	1,00

Table 2 : T Test (Independent Samples Test) for the level of visual-motor maturity

Level of the visual-	T	Degree of freedom	Significance threshold
motor maturity	12,891	58	0,0001

The statistical analysis identified significant differences between the visual-motor maturity level in the normal and dyslalic children; thus, the visual-motor maturity level influences the language development. The t test for independent samples *t (58) = 12.891* for p<0.01 confirms the hypothesis, that is the level of language development differs according to the level of visual-motor maturity. Moreover, the positive value t shows that the mean of the results obtained by the normally developed pupils (4.27) is higher than the mean of the results obtained by the dyslalic children (1.00). Therefore, the visual-motor maturity level in the dyslalic 6 years old pre-school children is significantly lower compared to the visual-motor maturity level in the 6 years old pre-school children with a normally developed language.

These differences are given in figure 1:

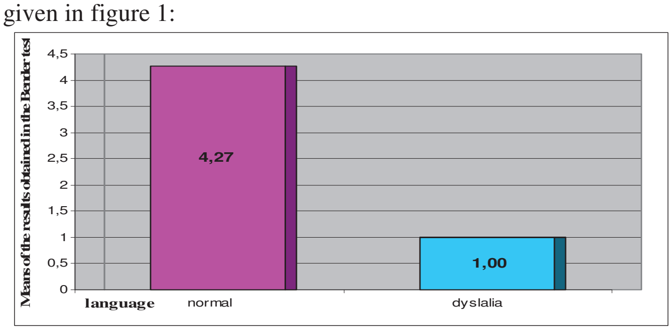

Figure 1: Difference of the means of the two groups (Bender-Lauretta test)

The differences between the advanced level of the visual-motor maturity in the two groups of children is justified by the retardation in the motricity development in dyslalic children compared to the normally developed children, these retardations also involving visual-motor aspects. Thus, the higher the progress in motor development, the faster the verbal and graphic abilities are acquired, a very important role belonging to the development of the phono-articulatory apparatus motricity, as well as the delicate movements of the fingers and hands.. In the drawings made by dyslalic children, we notice big distortions, integration failures or overlaps, disproportions, lacking angles, distortions of the squares and circles, etc. In these circumstances, we notice that the dyslalic children present a low level of visual-motor maturity, which also determines retardations in the development of speech, implicitly in the pronunciation and correct articulation of the Romanian phonemes. E. Verza (2009) notices that verbal evolution is correlated with the development of motricity, the children with an advanced motor development presenting normally developed verbal possibilities, since the development of psycho-motricity is related to the evolution of the nervous system and it reflects the general psychic maturity involved in the entire verbal and written language. In the speech therapy of dyslalia, in order to improve the general motricity and the phono-articulatory movements, exercises are used not only for language development, but also for the well-being of the organism. We distinguish two important categories of exercises, namely: exercises aiming to relax the organism and the muscles of the emission apparatus, useful exercises in the pronunciation of the majority of the Romanian sounds, and other strained ones, used especially during the pronunciation of the deaf sounds. Therefore, for the development of phono-articulatory organs, a series of exercises are recommended, referring to the development of the movements of the facial, lingual, mandibular, labial expressivity, etc (I. Mititiuc, T. Purle, 2005).

Hypothesis 2. The motor age is smaller in the dyslalic preschool children with a normally developed language. In order to verify this hypothesis, we used the Oseretzki motor development scale, applied to the two groups of pre-school subjects. The t test was estimated for independent samples (Independent Samples T Test) in order to distinguish between the motor age of the children with a normally developed language and the motor age of the dyslalic children.

Table 3 : The mean of the motor age for the experimental group and the control group

	Mean of each group
Normally developed children (without dyslalia)	6,23
Dyslalic children	4,40

Table 4 *:* T Test (Independent Samples Test) for establishing the motor age

	T	Degree of freedom	Significance threshold
Motor age	7,320	58	0,0001

The statistical analysis allowed for the identification of some significant differences between the motor age of the normal children and the motor age of the dyslalic children, by evidencing the differences between language and motor age; the t test for independent samples *t (58) = 7.32,* $p<0.01$ confirms the hypothesis; that is, language development differs according to motor age. The positive t value also shows that the mean of the results obtained by the dyslalic children (4.40) in the test is lower than the mean of the results obtained by the normal children (6.23). We can thus say that the motor age in the 6 years old pre-school dyslalic children is significantly lower than the motor age of the 6 years old pre-school normal children. Differences are also noticeable at the level of general, dynamic and static motricity, dyslalic children presenting developmental retardations compared to the children with a normally developed language.

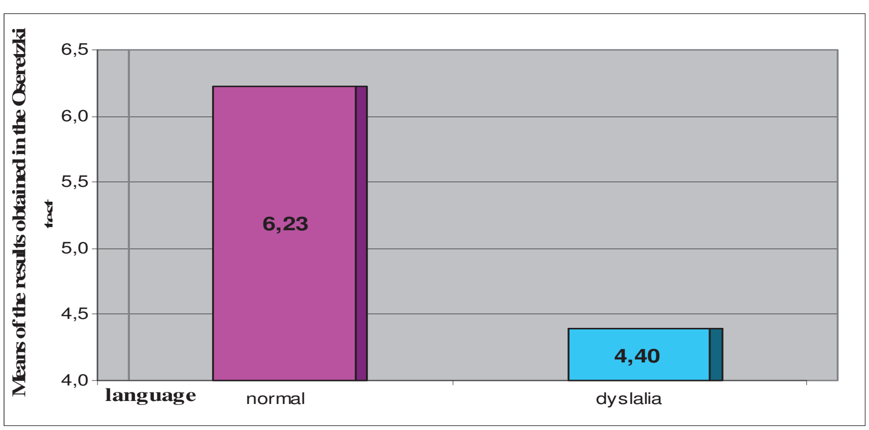

Figure 2. Difference of the means of the two groups (Oseretzki test)

Hypothesis 3. There is a connection between the intelligence coefficient (QI) and the motor age, respectively the level of visual-motor maturity, in the absence of other disorders influencing motricity, that is, the smaller the intelligence coefficient is, the lower the motor age and the visual-motor maturity level are.

In order to verify this hypothesis, we applied the Raven Coloured Progressive Matrices, in order to establish the intellectual level of the children in the two groups. In order to verify the validity of the hypothesis, we computed the Pearson linear correlation for two variables: in a first analysis, we considered the intelligence coefficient as a first variable, and the motor age a second variable; in the second statistical analysis, we considered the intelligence coefficient the first variable and the level of visual-motor maturity, a second variable. Having thus the two variables, we computed the Pearson linear correlation coefficients for each group.

Table 5*:* Pearson correlations (r) between the intellectual level and the motor age of normally developed children

		Intelligence coefficient	Motor age
Intelligence coefficient	Pearson correlation	1.000	0,543
	Significance threshold	,	0,002
	N	30	30
Motor age	Pearson correlation	0,543	1.000
	Significance threshold	0,002	,
	N	30	30

At the intersection between the variables we obtained: the correlation coefficient r=0.543,, the significance threshold p= 0.002 for the number of subjects N=30. The significance threshold below 0.05 (p<0.05), indicates a relationship between the two variables, that is, there is a connection between the intelligence coefficient of the children with a normally developed language and their motor age, specifying that this connection exists in the absence of other disorders negatively influencing motricity.

The positive correlation (r>0.50) indicates an inversely proportional connection between the normal intelligence coefficient and the motor age corresponding to the chronological age in the children with a normally developed language. The relationship between the intelligence coefficient and the level of visual-motor maturity is given in the following table:

Table 6*:* Correlations between the intellectual level and the level of the visual-motor maturity in children with a normally developed language

		Intelligence coefficient	Level of visual-motor maturity
Intelligence coefficient	Pearson correlation	1.000	0,609
	Significance threshold	,	0,0001
	N	30	30
Level of visual-motor maturity	Pearson correlation	0,609	1.000
	Significance threshold	0,0001	,
	N	30	30

At the intersection between the variables, we obtained: the correlation coefficient r=0.609, the significance threshold p= 0.000, and the number of subjects N=30. The significance threshold lower than 0.05 (p<0.05) indicates the relationship between the two variables, that is the connection between the intelligence coefficient of the children with a normally developed language and the level of their visual-motor maturity. The positive correlation signifies (r >0.50), a direct proportional connection between the normal intelligence coefficient and the level of visual-motor maturity corresponding to the chronological age.

Table 7: Correlations between the intellectual level and the motor age of dyslalic children

		Intelligence coefficient	Motor age
Intelligence coefficient	Pearson correlation	1.000	0,540
	Significance threshold	,	0,002
	N	30	30
Motor age	Pearson correlation	0,540	1.000
	Significance threshold	0,002	,
	N	30	30

Table 8 : Correlations between the intellectual level and the level of visual-motor maturity in dyslalic children

		Intelligence coefficient	Level of visual-motor maturity
Intelligence coefficient	Pearson correlation	1.000	0,446
	Significance threshold	,	0,013
	N	30	30
Level of visual-motor maturity	Pearson correlation	0,446	1.000
	Significance threshold	0,013	,
	N	30	30

We notice the strong, direct proportional connection (r=0.540) between the intellectual level and the motor age, the 6 years old pre-school dyslalic children presenting a lower intellectual level in accordance with their motor age. Thus, one of the factors that determine a low general motricity is also the intellectual level, but in the absence of other disorders that can influence motricity. There are also other factors determining low motricity, for example affectivity disorders, cerebral traumatisms, etc, this factor being of particular interest for our study (J. Maillet, 1997).

Pearson linear correlation coefficient (r=0.446) resulting after the correlation between the intelligence coefficient of dyslalic children and the level of visual-motor maturity, shows an average direct proportional connection. As R.J. Sternberg (2000) states in his research, one of the factors determining the low level of visual-motor correlation is the intellectual level, with the mention that there are also other factors influencing the low level of visual-motor maturity.

Hypothesis 4. Psychomotor development is deficient in the dysgraphic pupils, compared to the pupils with a normally developed language.

Table 9: Mean, Mean of the standard differences and Mean of the standard errors for the group of dysgraphic children and the group of normally developed children

			Mean Difference (I-J)	Std. Error	Sig.	95 % Confidence Interval	
Dependent Variable						Lower Bound	Upper Bound
Bender	Without language disorders	Dysgraphia	-8,7556	1,5514	0,000	-12,9989	-4,5122
Oseretzki	Without language disorders	Dysgraphia	2,8311	0,5144	0,000	1,4242	4,238

By analysing the results obtained in the Bender test, we can say that there are significant differences as far as the number of errors made by the normally developed children compared to the dyslexic-dysgraphic children is concerned. The significance threshold is p=0.000(p<0.05), and the errors made by the dysgraphic children are more numerous compared to the errors made by the subjects without speech disorders. In addition, the level of visual-motor development is higher in the pupils with a normally developed language compared to the dysgraphic children. Therefore, the significant differences obtained between the normally developped subjects and the dysgraphic subjects confirm the hypothesis that the visual-motor development in dysgraphic children is deficient compared to the children with a normally developed language. In his research, J. Konczak (2003), states that any perturbation in the visual-motor development determines the apparition of the dysgraphic syndrome.

The acquisition of graphic skills is based on perceptive, audio, visual and kinaesthetic mechanisms, and therefore, the visual-motor disorders affect the acquisition of the graphic skills (V. Bâlbâe, 2002). The high results obtained in the children without speech disorders reveal the fact that they realise normally the perception of the shape, size, and colour, compared to the dysgraphic pupils. The speech therapy of dysgraphia uses exercises with a great importance for the formation of the delicate movement of the fingers and hand, which contributes to a better usage of the writing tool, avoiding fatigue and facilitating writing, having thus as a result, the increase in the speed of action and the adoption of a correct writing (J. Richard, L. Rubio, 1995).. All the exercises have to contribute to the synchronisation of the groups of muscles involved in writing, which leads to the realisation of the adequate movements for writing. Moreover, the general physical exercises are important for the general fortification of the organism, but also for the realisation of the spatial-temporal organisation and for the development of the delicate and synchronised movements.

Conclusions

The conclusions of the research highlight the relationship between language development and psychomotor development, an important aspect in the early education of children, in preventing the apparition of speech and psychomotor disorders. By the results obtained, this research fundaments the necessity of the psychomotor recovery therapy within speech therapy.

There is interdependence between the existence of speech disorders and the psychomotor development, especially for the disorders affecting the language verbal-motor apparatus, the somatic-psychological and kinaesthetic development in all its forms.

In the case of children with pronunciation disorders, the psychomotor development is definitive, phenomenon explained by the affectation of the verbal-motor side of dyslalic children by the difficulties in the analysis and synthesis of the perception of shape, colour, size, etc.

It is difficult for dysgraphic children to achieve psychomotor maturity, the formation of the graphic dexterity being determined by the development of the perceptive-motor, audio, and kinaesthetic functions.

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