

Dominant manual skills in right and Left-handed children

Habilidade manual dominante em crianças destros e canhotas

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RESUMO

De acordo com a predileção manual, os indivíduos são classificados como destros ou canhotos. Os aspectos religiosos e culturais passaram a contribuir para o grande número de adultos destros, já que os canhotos eram considerados inferiormente capazes. Esta pesquisa teve como finalidade fazer uma avaliação comparativa da habilidade manual dominante de crianças destros e canhotos utilizando o Purdue Pegboard Test. Participaram do estudo 15 crianças destros e 15 canhotos, todas matriculadas numa escola pública de Campina Grande – PB, com idade variando de 6 a 9 anos. A destreza manual do membro superior dominante foi avaliada através do Purdue Pegboard Test. Os dados foram analisados por meio da estatística descritiva e inferencial. Os resultados deste estudo não indicaram diferenças entre o desempenho manual da criança destra em relação à canhota.

Palavras-chave: habilidade manual, destro, canhoto.

ABSTRACT

Individuals are classified as left or right-handers according to their hand preference. Ancient religious and cultural aspects contributed to a large number of right-handed adults, since left-handers were considered inferior or less capable. The main purpose of this research is to do a comparative assessment of the dominant hand skills of right and left-handed children. Thirty children took part in the study —15 right-handers and 15 left-handers —, all enrolled in a public school in Campina Grande, PB, Brazil, with ages between 6 and 9 years-old. The dexterity of the dominant upper limb was evaluated by Purdue Pegboard Test. The data was analyzed both through descriptive and inferential statistics. The results showed no differences in the hand performance among left and right-handed children.

Keywords: hand skill, right-hander, left-hander.

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INTRODUCTION

Laterality is the human ability of using more one side of the body than the other, and it affects both hands and feet as well as the sight and the hearing. Upper and lower limbs are used asymmetrically, and the same can be said about the sensory organs¹. Besides starting and executing bodily actions, dominance of one side represents more muscular power, accuracy and quickness, leaving to the non-dominant side only a supporting role².

There are two theories to determine laterality at the present moment. One is genetic and was initially defended by Annett³ (1972), who argues that there is a innate and inheritable conformation of the nervous system, and this suggests that functional asymmetry is established from birth in every person and emerges at a given age and stays the same for the rest of his/her life. Another one is behavioral and explains that handedness is determined by social imitation and by influence of the environment in which the subject lives¹.

Handedness seems to be determined genetically at first, but later this asymmetry escalates consistently, affected by environmental influences. This suggests that laterality has many causes and develops under various mechanisms^{4,5,6}.

The time when the dominant hand is actually established can differ from person to person, though most children reveal their handedness around 15-months-old⁷. Nevertheless, this preference is only considered stable when they reach the age of 5 or 6 years-old⁸.

Most people are right-handed because in 9 out of 10 individuals the hand-controlling motor areas are dominated by the left side of the brain⁹. Besides, religious aspects, cultural and schooling pressures, and past social influences contribute to the large number of right-handed adult individuals, since left-handed people were considered less capable⁶. However, according to Brandão¹⁰ (1984), the real left-handed person is as able as a right-handed one. There are not many studies comparing

the hand skills of left and right-handed people though.

The purpose of this study is to compare the hand skills of the dominant limb in left and right-handed children. In order to accomplish that, we used the Purdue Pegboard Test, an instrument that evaluates hand coordination and dexterity.

METHODOLOGICAL PROCEEDINGS

The field research was both exploratory and transverse. Thirty children participated in the study, all enrolled in a public school at Campina Grande, PB. Among children hanging from 6 to 9 years-old, we intentionally selected 15 left-handers and 15 right-handers.

The chosen children were the ones with good and stable health; expected scores in the Mini-Exam of Mental State directed to schooling; and had hand laterality well-defined, that is, only left-handed subjects who presented *Edinburgh* < -40, and right-handed subjects who presented *Edinburgh* > +40, which were analyzed by calculating the Lateral Asymmetry Index through the use of the Edinburgh Handedness Inventory. We excluded from the study children who had restrictions in upper limb movements; who ingested medicines that could reduce motor skills; who had exercised their upper limbs right before the experiment; and who presented non-corrected short-sightedness.

The dexterity of the dominant upper limb was assessed by the Purdue Pegboard Test (model 32020), developed in 1948 by psychologist Joseph Tiffin of the Purdue University. This instrument has been used in neuropsychological evaluations in order to provide information regarding the location of brain damages, but also to measure hand dexterity^{11,12}. It measures two kinds of dexterity: gross motor movements of arms, hands and fingers; and particularly, fine motor skills of the fingers¹³.

The device is a board that has four cups disposed horizontally (side by side) at the top of it. There are also two parallel rows of 25 small holes (0.2 millimeters, or 0.08 inches, of diameter)

located vertically at the center of the board. The far right and far left cups have 25 pins each. The center cups have different contents: the left one has 45 washers, and the right one has 25 collars¹⁴. The activity consists in picking up a pin and placing it at a hole of the row, with or without the respective washers and collars. The test application has five different options: 1) using only the right hand; 2) using only the left hand; 3) using both hands; 4) the sum of scores (right hand + left hand + both hands); 5) simultaneous and alternate assembly work of both hands using a pin, a washer, a collar, and a washer again, respectively. The assembly test (5) should be done in 60 seconds, the other tests should be performed in 30 seconds, all timed with a stopwatch^{14,15}.

In this study, each child had three attempts of 30 seconds to quickly place the greatest number of pins possible in the vertical row of the same side

as the evaluated limb. The gap between each attempt was the time needed to return the pins to the outer cup of the same side as the evaluated upper limb. The final test result is an average of the three attempts. To determine if there was any difference between the average values, we made use of Student's T-Test with $p < 0,05$.

RESULTS

Table 1 shows the global average of placed pins in the right-handed children group (12,51), as well as the left-handed children group average (13,18) ($p = 0,31$).

It is possible to observe the minimum and maximum average of pins placed by the right-handed children (minimum = 9,33; maximum = 15,00) and also by the left-handed ones (minimum = 10,67; maximum = 16,67).

Table 1: Purdue Pegboard Test – RHG X LHG

Group	\bar{x}	\pm SD	Av (min-max)	p^*
R	12,51	1,70	12,67 (9,33-15,00)	0,31
L	13,18	1,80	13,33 (10,67-16,67)	

*Student's T-Test

R: Right-handed Children Group

L: Left-handed Children Group

DISCUSSION

A comparative evaluation of the dominant hand skills between left and right-handed children with the Purdue Pegboard Test demonstrated that there is no difference in the dominant hand motor performance of these individuals, showing the same profile of response when we used the same proceedings for left and right-handed children.

There are few studies in the literature that examined the differences in motor performance of left and right-handers. Culturally speaking, especially in the past, left-handed people were considered less capable from a certain point of view and because of that a great many of them were forced to become right-handers. Nevertheless, according to Serafin et al¹⁶ (2000), spontaneity should be allowed because, based on the

experiences of their body, children define their dominant side without any kind of external pressure.

Furthermore, according to Brandão¹⁰ (1984), non-affirmation of laterality leads to reduction of hand skills, and this allows us to conclude that forcing left-handed children to use the opposite hand out of prejudice can be harmful, since—besides reduction of their hand skills—they could present other problems mentioned by the same author, such as impairment of intellectual functions and emotional/affective disorders, which could even cause the delay of language acquisition and affect writing skills.

In 2008, however, Araújo et al¹⁷ investigated the influence of motor learning through left-hand exercises done by right-handed individuals and noticed that the performance of the exercised limb and of the opposite one became alike, suggesting a successful motor learning and similar hand skills in both hands. To Le Boulch¹⁸ (2000) and Esteves et al¹⁹ (2005), the hand skills develops accordingly to the individual needs and can be, therefore, modified, insofar as the social environment pressure affects the inherited factor.

Judge and Stirling²⁰ carried out a study similar to ours in 2003, also using the Purdue Pegboard Test, and concluded that the motor skill of left-handed individuals is significantly better than right-handed ones, but the selected task demanded the coordination of both hands, not only of the dominant one. Our study, however, compared the dominant hand skills of left and right-handed children, and the results point out that there is no significant difference between them. The small sample was a relevant restraint though.

Therefore, we came to the conclusion that, since the results of this study showed no difference between the hand skills of left and right-handed children, further studies with larger samples will be needed to confirm, to expand or even to correct such results.

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