

## الملخص

الذاكرة الحركية قصيرة المدى لدى الاطفال المعاقين  
بصريا وعقليا والاطفال غير المعاقين

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هدفت هذه الدراسة الي التعرف علي طبيعة الأداء من خلال  
الذاكرة الحركية القصيرة المدى وكذلك مقارنة الاداء الحركي  
للذاكرة قصيرة المدى لدي ثلاث مجموعات من الاطفال غير  
المعاقين والاطفال المعاقين عقليا والاطفال المعاقين بصريا ٣٦٠  
طفلا تم اختيارهم كعينة للمشاركة في هذه الدراسة وتم  
تقسيمهم الي ثلاث مجموعات متباينة . تم استخدام جهاز  
اعادة انتاج الحركة علي عدة مسافات من خلال محاولة تذكر  
المسافة المحددة واعادة انتاج نفس مكان الحركة السابق .

أظهرت نتائج الدراسة وجود فروق في اداء الذاكرة  
الحركية قصيرة المدى بين كل من مجموعة الاطفال غير المعاقين  
والاطفال المعاقين بصريا من وجهة وبين الاطفال المعاقين عقليا  
من جهة أخرى .

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### **Abstracts**

#### **Short term motor memory in handicapped and normal children**

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The purpose of the present study was to examine and compare the nature of short term motor memory in normal children, mentally handicapped children, and visually handicapped children. A total 36 children were selected to participate in this study, they were divided into three groups according to their disability / ability. Apparatus used in the study was the visual motor task for reproduction of several locations in a sliding handle that would move along two alloy rods. The results of the study revealed different ability in short term motor memory between visually handicapped and normal children against ability of the mentally handicapped in reproduction of movement which represented the short term motor memory task.

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Another point which should be pointed concerning the interpretation of this particular result that visually handicapped perform most movements in daily life activity around the midline of their body which may develop more opportunities for visually handicapped to refine their coding of kinesthetic input and therefore , and efficient use of short term motor memory. On the other hand, normal children usually experienced a far wider range of movement activities around the body and on the environment using visual experience which enhances the performance of short term motor memory.

Short term memory studies broke the short term memory process in mentally handicapped into three parts: aquisition, retention and retrieval. Hermelin , et al (6:1975:295-301) found that there were no differences in retention between normal children and mentally handicapped children, this finding confronted the finding of the present study, and it could be due to the differences in the motor task used in both studies.

Since the performance of a short term motor memory presented in a form of reproduction of movement location which considered a nonlocomotor movement manily a manipulative movement, it resonalbe to find such results in the present study, Because Buell (1982:3:36-49) states that an increase in tension when performing selected locomotor activities without feedback has been noticed in visually handicapped. For the mentally handicapped children, the lack of ability to concentrate and the short span of attention effected their performance in this study.

### **Coniusion:**

The present study aimed at investigating the short term motor memory in handicapped and normal children . The use of a visual motor task confirms the absence of rehearsal ability in mentally handicapped children and presented a greater reheasal ability in visually handicapped and normal children by reproduction several movement location.

Future research in the area of motor control and learning should adress different motoric information that would enhance our understanding about the motor performance of handicapped and normal children and the process they control movement.

### **Discussion:**

The present study was designed to examine the nature of short term motor memory by reproduction of various locations movements by mentally handicapped ,visually handicapped , and normal children. The results showed in general that both groups the visually handicapped and the normal group produced locations with better accuracy and they were more consistant than the mentally handicapped, it seems that among other interpretation of these results is in term of the important contribution of visual experience to the memory representation that normal children have. However, for the visually handicapped group despite the lack of vision for many years of life it seems that visually handicapped individuals develop forms of kinesthetic coding (remembering the location ) because blind individuals locate objects in the environment such as doors and windows handles by coding previous experience that then coded in the memory.

For the mentally handicapped group results showd that they were less accurate than visually handicapped and the normal group. It seems that this results concerning mentally handicapped children confirms the inability of the mentally handicapped to employ kinesthetic coding that could help them in the representation of movements performed and coded in the short term memory. Sugden (14:1978:330-339) referes the inability to employ kinesthetics in mentally handicapped because of the great lack of an efficient rehearsal strategy that would help in the reproduction of movement and expresses the nature of short term motor memory in means relatively similar to normal children .

A strikind aspect of the results that the performance of visually handicapped and normal children did not differ and in some cases as they perform on 40cm, and 70cm locations the perform more accurate and with less variabillity than normal children and mentally handicapped children. it is abvious that vision primarily important during growth in providing feedback for the development of an accurate representation of movement and body spaces, and limbs movement, this representation serve as a reference for movement related input from kinesthetic sources.

**Table (6)**  
**Means and standard deviation of reproduction**  
**variable error for visually handicapped children**

Location	Absolute error (AE)		
	Mean	SD	t - value
Location (20cm)	2.12	1.71	(1.14)
Loction (25 cm)	1.82	1.41	
Loction (40 cm)	2.11	1.90	
Loction (70 cm)	1.73	1.46	

**Table (7)**  
**Means and standard deviation of reproduction**  
**variable error for normal children**

Location	Absolute error (AE)		
	Mean	SD	t - value
Location (20cm)	2.18	1.78	(1.29)
Loction (25 cm)	2.14	1.73	
Loction (40 cm)	2.24	1.55	
Loction (70 cm)	2.29	1.98	

The means and standard deviation of reproduction movement across locations showed that performance of the three groups differs between the three groups: normal children group and the mentally handicapped children group. also between the visually handicapped children group and the mentally handicapped children group. In applying the t- test between mean scores for the reproduction it indicated no significant differences between reproduction of movement for normal children and reproduction movement for visually handicapped But a significant differences was found between the performance of mentally handicapped children and both the visually handicapped children and the normal children group.

**Table (3)****Means and standard deviation of reproduction  
absolute errors for visually handicapped children**

Location	Absolute error (AE)		
	Mean	SD	t - value
Location (20cm)	3.22	1.92	(1.35)
Loction (25 cm)	3.46	1.98	
Loction (40 cm)	3.12	1.88	
Loction (70 cm)	4.70	2.72	

**Table (4)****Means and standard deviation of reproduction  
absolute errors for normal children**

Location	Mean Absolute error (AE)		
		SD	t - value
Location (20cm)	2.88	1.94	(1.22)
Loction (25 cm)	3.10	2.09	
Loction (40 cm)	3.48	1.99	
Loction (70 cm)	3.96	1.55	

**Table (5)****Means and standard deviation of reproduction  
variable error for mentally handicapped children**

Location	Absolute error (VE)		
	Mean	SD	t - value
Location (20cm)	2.15	1.70	(2.69)*
Loction (25 cm)	2.44	1.77	
Loction (40 cm)	2.85	2.13	
Loction (70 cm)	2.55	1.99	

### Data collection:

Four lengths for the criterion movements were selected: 20 cm, 25 cm, 40 cm, 70 cm. which were randomised for each subject during performing the four testing trials.

A score of cm was recorded. Using a correct or target score, two types of error scores were reported:

- 1- Absolute error (AE) which represented the average difference the subjects response and the correct response.
- 2- Variable error (VE) which reflects the extent to which the subject tends to repeat his responses.

### Results:

Analysis of error scores was designed to analyze the performance of the three groups using absolute error, which represents the average difference between the subjects response and the correct response as shown in tables (2,3,4,5,6, and 7).

Table (2)

#### Means and standard deviation of reproduction absolute errors for mentally handicapped children

Location	Absolute error (AE)		
	Mean	SD	t - value
Location (20cm)	4.25	2.21	(3.55)*
Location (25 cm)	4.09	2.32	
Location (40 cm)	4.54	2.78	
Location (70 cm)	5.88	2.89	

(11:1972:271-282) (10:1973:168-177).

Handicapped children exhibit developmental and environmental differences in the generation or use of appropriate learning strategies in motor memory tasks. According to Kessso et al. (9:1978:145-161) short term memory may be a function of mental age, because he found that older educable mentally handicapped performed better than younger educable mentally handicapped. Also visually handicapped were found to be accurate in producing some movements related to short term memory in the same time they were more variable in other short term memory tasks.

Therefore, this study is an attempt to describe the ability of short term motor memory by visually handicapped, mentally handicapped and normal children by using a reproduction of preselected arm movements. The movement reproduction paradigm in short term motor memory studies utilizes a series of criterion movements which subjects are asked to replicate.

### Subjects:

A total of 36 boys were selected to participate in this study. 12 of the boys were nonhandicapped children, a second group was 12 educably mentally handicapped children, and the third group was 12 visually handicapped children. The average ages of the subjects in the three groups are shown in (table 1).

Table (1)

### Average age of subjects

Group	Range	Mean
Nonhandicapped (n=12)	11.6-12.6	12
Educably Mentally handicapped (n=12)	12.10-12.8	12.9
Visually handicapped (n=12)	11.10-12.11	12.3
Total (n=36)		

### **Instrument:**

The instrument used in this study was linear positioning apparatus in which a slide, mounted on ball bearings, could be moved along two metal bars with a minimum of friction. A marker attached to the slide moved along a scale which allowed the experimenter to determine movement extent to a given location, The performance objective of this task was the accurate recall of a previously executed criterion movement where accuracy represented by the linear deviation of a reproduced movement from a criterion element.

### **Procedure:**

The subject was seated in front of the apparatus which was placed on a table at waist height and his hands guided around the apparatus while it was described and general information about the nature of the task provided. The subject was then given instructions relating to the aspect of movement (either end location or distance). Practice trials using different movement amplitudes from the experiment.

For each experimental trial the subject's arm was moved passively from the right end to the left end of the slide and for different criterion locations for practice trials. practice trials were given in order to make sure that subjects fully understood the task.

Nonhandicapped subjects and mentally handicapped subjects performed the task while they were blindfolded.

After this explanation each boy was tested four times on each of the four locations. the actual instructions were:

- 1- Take hold of the handle.
- 2- Move the handle until it stopped by the marker.
- 3- Hold it there for 5 seconds.
- 4- Now move the handle to the same point it was before.
- 5- Now stay here, and hold the handle for 5 seconds.

capped and visually handicapped children perform well below the average of intellectually sighted normal children on components of motor performance at the same and sex (12:1985:183-191) (5:1970:314-331).

concerning the mentally handicapped short term memory deficits have been outlined as one of the possible causes for the inferior motor learning and motor performance. Several studies explored the role of central processing capacity in the retention of information arising from visual and kinaesthetic source, concluding that very young children and mentally handicapped failed to spontaneously rehearse information the same manner adults rehearse on short term memory motor and verbal tasks. However, mentally handicapped children do not show such deficits when using long term memory. (2:1975:412-432) (5:1970:314-331).

In contrast, visually handicapped who had been functioning without vision and had no memory of vision using Just Kinaesthetic or motor memory. Jones (7:1984:3743) (4:1976:559) has argued that the central monitoring of efferent commands to the muscle the sole determiner of retention of blind motor task. Also, Keele 1972(8:127-134) has expressed the view that movement of the body and the limbs are accompanied by a copy of the normally achieved visual results. The visual information resulting from movement is fed back, and compared with visual schema which was expected on the basis of previous movements. Hermlin and O,connor 1975(6:295-301) compared the performance of congenitally visually handicapped and sighted individuals on short term memory using reproduction of end and distance of vertical constrained movements, Results revealed that visually handicapped group displayed a greater tendency to undershoot the target, in common with other investigators he suggested that visual information makes an important contribution to short term motor memory as to the production of movement

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in sports skills, individuals required to learn complex movement patterns and sequences. This learning requires memory that is an important component in processing of information in order to produce the desired response .Studies in motor behavior have emphasized the role of memory in acquisition and retention process while performing motor skills (1:1971:111-150)(13:1975:225-260).

The notion short term motor memory has emerged as area of study. Investigations have been performed to evaluate the motor performance of handicapped children as well normal children. And it is well documented that both mentally handi-

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