

Lab 6: FITT'S LAW & MOTOR PROGRAM

NAME: _____ Date: _____

Introduction: The purpose of part one of this lab is to Assess how movement time is affected by tasks that differ in difficulty. Fitts defined task difficulty in terms of target size (W, which is the width of the target) and the distance to move (D, which is the distance between targets). He quantified task difficulty (which he called “index of difficulty,” or simply ID) by using the following formula:

$$ID = \text{Log}_2(2D/W)$$

Purpose: To examine the relation between the time to make rapid arm movements and the difficulty of the task. This relationship is expressed formally as Fitts' Law, in which task difficulty is expressed in terms of the distance to move and the accuracy demands at the movement endpoints.

Procedure: For this lab, eight combinations of task difficulty will be used. The easiest task has D= 2 cm and W= 2 cm. Solving the equation for ID, that would be the log (base2) of (2 X 2)/2. This works out to be the log₂ of 2, which is 1. The most difficult task has D=16 cm and W =1cm. This works out be the log₂ of (2 X 16)/1, which is 5. The ID for the other task variations is listed on the lab report where the results of each trial are recorded.

(A copy of the 8 combinations will be provided by the instructor)

Three trials will be performed on each task variation. The tasks should be performed in random order. The objective is to put as many pencil dots into each of the targets as possible by moving back and forth between two targets. It is important to tap as fast as possible while maintaining accurate performance at all times. However, it is also important to try to stay inside of the targets at all times. Although misses will occur, in order to adequately test Fitts' law there should no more errors made in the most difficult task than there are in the easiest tasks. If the number of errors exceeds more that 5% of the pencil dots, the trial should be done again. A single trial will last 10 seconds.

The student can be organized in pairs. One student can serve as the subject for a set of three trials while the partner times each trial, and counts and records the taps (the number of dots in each target). This partner should verbally tell the subject to start and stop on each 10-second trial. The rest interval between trials should be the amount of time needed to count and record taps.

Results:

1. The data record should record your number of taps for each trial for each index of difficulty on the individual data sheet on the page following the questions sections of this lab.

Individual Data Sheet

ID	D/W	1 Trial	2 Trial	3 Trial
1	2/2			
2a	2/1			
2b	4/2			
3a	4/1			
3b	8/2			
4a	8/1			
4b	16/2			
5	16/1			

2. Select the trial for each ID that represents the mean number of taps for that ID and record the number of taps for that trial in the summary below.
3. For each ID, calculate the average movement time in msec for a single movement of the tapping task. Do this by dividing each number of taps by 10, which will give you the number of taps per sec in the 10-second trial. Take the inverse of this number, which is $1/x$ (where x is the median number of taps). Then multiply this number by 1000 to obtain the movement time in msec. Record the movement time in the following table.

Individual Data Summary Table

ID	Median Taps	Number of Taps/sec (Median/10)	<u>Movement time</u> (MSEC)
1			
2a			
2b			
3a			
3b			
4a			
4b			
5			

