B.A. (Hons) Part–III

Psychology Paper-VIII

Aesthesiometric Index

Lesson Structure

1.0 Objective

The objective of this lesson is to explain what is aesthesiometric index and how it can be determined. In this context the readers will also know about the types of questions that can be asked in their viva-voce examination. In the end of each lesson some questions are mentioned and also the books are suggested which can provide you the answers to these questions. The readers will know how experiments are conducted to measure aesthesiometric index experimentally.

1.1 Introduction

Aesthesiometric index is also called as absolute threshold or two-point threshold. When two points on the skin surface are touched simultaneously, one gets the sensation of two points only when the two points are separated by a minimal distance. When it is smaller than this distance, subject gets the perception of one point only, though physically two points are being stimulated at the same time. This minimal distance at which subject gets sensation of two points in 50% of the trials and of one point in the other 50% of trials, has been called the two-point threshold. This two-point threshold is also called as aesthesiometric index since it provides a measure of the sensitivity of the skin surface.

The aesthesiometric index varies from person to person. It also varies from region to region in the same person. This happens due to the difference in sensitivity of different organs of the body. Now the important question arises as to why the sensitivity is more in some organs and less in other organs. The physiologists and psychologist have analysed this in such a way— there are four spots in the skin— pressure spot, pain spot, warm spot and cold spot. There are pressure receptors in the pressure spot and when this gets stimulated we have the sensation of touch. This pressure spot is not distributed equally in the whole body and that is why sensitivity differs from region to region. The region which has more pressure spots is more sensitive and which has less pressure spots is less sensitive.

Generally the psychophysical methods are used to study two-point threshold. It can be conducted by the method of limit. This method has got two limits— lower limit and upper limit. It has two series— ascending series and descending series. Each trial consists of series. The data obtained provides the RL. There is possibility of two types of error in this method— error of habituation and error of expectancy. When the subject does not change his response when required but repeats the old one (due to the fact of developed habit) then it is called as error of habituation. But when he changes the response before he has reached the value on which he had to change then it is called as error of expectancy.

This lesson aims to determine the two-point threshold of subject. For this an experimental study is going to be related in section 1. 2.

An experiment on aesthesiometric index by the method of limit :

1.2 Problem

To demonstrate experimentally the two-point threshold of subjects right plan by the method of unit.

1.3 Introduction to Experiment

When the skin surface is touched by two points simultaneously then individual gets the perception of two points, only when the two points are separated by a minimal distance. When the separation is smaller than this distance the individual gets the perception of one point only, though

physically two points are being stimulated at the same time. This minimal distance at which the individual gets the sensation of two points in 50% of the trials has been called the two-point threshold or spatial threshold. It is also called as aesthesiometric index since the apparatus used to measure the aesthesiometric is called as aesthesiometer. This index varies in the various regions of the body and also from person to person.

The psychophysical method used to study two-point threshold is the method of limit. The procedure for determining the RL or DL by this method involves the presentation of the stimulus in a serial order, that is, by gradually increasing or decreasing its amount.

1.4 Hypothesis

In a normal condition a normal person's two-point threshold of right paln varies from 2 to 20 mm.

1.5 Subject

Name – Prerna,
Sex – Female,
Age – 19 years,
Health – Normal,
Education – B. A. Student

1.6 Material

(i) Aesthesiometer
(ii) Screen
(iii) Paper and Pen

1.7 Method of Experiment

1.7.1 Design :

It is given in Table No – 1.

Table No. – 1

Design

Order or Presentation of Stimulus	No. of Trials	Rest for 10 minutes	No. of trials	Minimal units of change in sti. value
A and D series	5 trials A/D, A/D, A/D A/D, A/D		5 trials A/D, A/D A/D, A/D A/D	2 mm

1.7.2 Planning :

The experimenter planned to find out the aesthesiometric index of subject by the method of limit for which she decided to use the apparatus aesthesiometer. It was planned to take 10 trials with a rest pause of 10 minutes after 5 trials. As the method of limit was used so each trial consisted of ascending and descending series. So one trial of ascending series and one trial of descending series constituted one trial. Thus, altogether 20 trials were taken-10 of A series and 10 of D series. The minimal distance or change in stimulus value was decided to be kept 2 mm.

1.7.3 Arrangement of Apparatus and Other Materials :

The subject and the experimenter sat at right angles and close rapport was established with the subject. Before the experiment began a line of 3 mm was drawn on the surface of the subject's right palm. The experimenter took a few trials to find out the range. After few trials to find out the range. After few trials it was found that lower limit of S's right palm was 2 mm and upper limit was 20 mm. So whole experiment was conducted by starting from 2 mm in ascending series and 20 mm in the descending series. After this the subject's right forearm was extended under a screen. Then following instructions were given to the S by the E—

1.7.4 Instructions :

"See this apparatus. It is called as aesthesiometer. It has two points which can be adjusted. I will set it at different lengths and you have to tell whether two or one point is touching your palm. You will be given few trials after which a rest pause of 10 minutes will be given. After that again 5 trials will be taken. Be attentive and answer whether you are feeling the prick of one point or two points."

1.7.5 Conducting Actual Experiment :

The first trial was started in which ascending series (index values are increased) first taken. The two point of aesthesiometer which was kept at a distance of 2 mm was placed on the right palm and if the subject felt the touch of one point '1' was written in the first trial (A-series) of raw data. Then the descending series was taken in which two points of aesthesiometer was adjusted at the length of 20 mm and was pricked on S's palm. If the subject said two then '2' was written in the respective space of the raw data table. Thus trial no. I was over. In the second, third and other trials of ascending series the two point distance was increased by 2 mm, i.e. 4 mm, 6 mm, 10 mm, 12mm and so on and it was done so till the S declared the sensation of two points. After this declaration one more trial was taken to avoid the chance factor. All the responses of the S was recorded in the raw data table. In the descending series (index values are discussed) the distance was decreased by 2 mm, i.e. 20 mm, 18 mm, 16 mm and so on. This was done until the subject declared the sensation of one point. In this series also one more trial was taken after the subject declared the feeling of one point in order to avoid chance factor. After five trials was over a rest pause for 10 mts. was given and then again five trials were taken. After that introspective report was taken.

1.8 Collection of Data

The data collection was done in two ways— (1) Objective data which is presented in Table No. – 2 as raw data and (2) Subjective data which is presented in the form of introspective report.

Table No . – 2

Raw Data

No. of trials→	1		2		3		4		5			1		2		3		4		5	
Stimulus value in mm ↓	A	D	A	D	A	D	A	D	A	D		A	D	A	D	A	D	A	D	A	D
20		2		2		2		2		2			2		2		2		2		2
18		2		2		2		2		2			2		2		2		2		2
16		2		2		2		2		2			2		2	2	2	2	2		2
14	2	2	2	2		2		2		2		2	2		2	2	2	2	2		2
12	2	2	2	1	2	1	2	2	2	2		2	2	2	2	1	2	1	2	2	2
10	1	1	1	1	2	1	2	1	2	1		1	1	2	1	1	1	1	1	2	1
8	1		1		1		1	1	1	1		1	1	1	1	1	1	1	1	1	1
6	1		1		1		1		1			1		1		1		1		1	
4	1		1		1		1		1			1		1		1		1		1	
2	1		1		1		1		1			1		1		1		1		1	
Threshold	11	11	11	13	9	13	9	11	9	11		11	11	9	11	13	11	13	11	9	11

Rest for ten minutes

Introspective Report : "I concentrated on my task and when I was given ready signal I got alert and reported the sensation of one or 2 point on my palm. It was an interesting experiment but sometimes I found difficult to determine whether experimenter touched the palm with one point or two points".

1.9 Treatment of Data

Result :

(1) Mean and SD of all trials

Note : This will tell about the RL of S'S right palm

(2) Mean of ascending and descending series separately and their difference.

Note : This will help in the assessment of the error of habituation and error of expectancy.

(3) Mean and SD of first five trials (first half) and last five trials (second half) and their difference.

Note : This will help in finding out the effect of practice and/or fatigue.

All these calculations were summed up in Table No. 3 which is the result table.

Table No. 3

Result

Series	Total	A Series	D Series	1st half	2nd half
Mean	10.9	10.4	11.4	10.8	11
SD	1.34	1.56	0.8	1.4	1.26
Diffirence	–1.0				–0.2

1.10 Discussion and Conclusion or Interpretation of Data

From the result table it is clear that the subjects two-point threshold or aesthesiometric under right palm is 10.9 mm. This means that the minimum distance between the two points of the aesthesiometer should be 10.9 mm, then only the subject will have the sensation of one point in 50% of the trials and two points in another 50% of the trials. Thus our hypothesis is proved that in a normal condition aesthesiometric index tries between 2 to 20 mm. The SD of all 20 trials is 1.34 mm which is quite less than mean. It declares that there is less variability in the subjects response and thus the obtained RL is more reliable and consistent.

The mean of the ascending series is 10.4 which is less than the mean of descending series (11.4mm). It means that there is error of expectancy in judgement given by the subject. The subject changed her response before she was required to change it. But this difference is only of 1mm so it is almost negligible. So the result of the experiment is not influenced much by the expectancy error. In this way the R.L. of S's right palm which is 10.9 is quite reliable.

The mean of the first 5 trials (first half) is 10.8 mm and the mean of last 5 trials (second half) is 11mm, Thus the mean of last 5 trials is 0.2 mm more than the mean of first 5 trials. This can be said as effect of fatigue but as the value is so small so we can say that effect of fatigue is almost negligible.

The SD of first half and second half is 1.4 and 1.26 respectively which clears that subject has not shown great variability in her responses. Hence the result is much reliable.

Conclusion : Thus it can be concluded that the aesthesiometric index of the subjects right palm (10.9 mm) is similar to any normal subjects aesthesiometric index and it is reliable as it is not affected much by error of expectation, neither effect of fatigue or practice has influenced the subject's judgement.

1.11 Questions for Exercise

(A) Questions for Oral Examinations :

1. What is two-point threshold ?
2. What is spatial threshold ?
3. What is aesthesiometric index ?
4. Is there individual difference found in aesthesiometric index ? Why ?
5. How do aesthesiometric index differ from region to region ? Can you give some example of this ?
6. How many sensitivity spots are there in the skin ? The stimulation of which spot results in touch sensation ?
7. Explain the following terms :–
   1. Ascending series
   2. Descending series
   3. Error of habituation
   4. Error of expectancy
8. What is aesthesiometric Index ? Explain its function. What does it determine ?
9. How does fatigue affects the aesthesiometric index ? Can you explain this by making a design for the conduction of experiment on the same ?
10. What do you understand by upper limit and lower limit ?
11. What is the method of limit ? Describe it ?

(B) Questions for Conducting Experiments :

1. Conduct an experiment to find out the RL or two-point threshold of the subject's left forearm with the help of the method of constant stimuli.

2. Make a design to conduct an experiment to verify the statement that RL or spatial threshold of different organs of the body is different.
3. Conduct an experiment to make a comparative study of the two-point threshold of any two organs of the subject's body.
4. Demonstrate experimentally the effect of fatigue on the two point threshold of the subject.
5. Demonstrate experimentally the effect of practice on the two-point threshold of the subjects right palm or forearm.

Verification of Weber's Law

Lesson Structure

2.0 Objective

The objective of this lesson is to discuss Weber's law. This is related to the psychophysical experiments. So it will be convenient to discuss it after going through the topic of psychophysics. This lesson aims to explain what is psychophysics, what are the psychophysical methods and after

knowing all these it will finally switch over to the experiment on Weber's law. As this is very important topic for viva-questions so at the end of lesson some questions are given which will enable the student to answer questions asked during their viva-voice examination.

2.1 Introduction and Meaning of Psychophysics

A group of scientists got interested in the study of relationship between the properties of the physical stimulus and the characteristics of mental events. The science that makes the study of this relationship (its description and interpretation) is called as psychophysics. The scientists who are trained in the methods of the physical sciences and seek to develop similar methods for the study of the psychophysicists.

The close relationship between the physical and psychological phenomena led the psychophysicists think that it may be possible to measure the characteristics of the psychological events just as it is possible to measure the properties of the physical objects. They called themselves psychophysicists because of their interest in the study of the relationship between the physical and psychological. According to them physical and psychological dimensions are closely related. For example, the sensation of colour (psychological) is related to the length of the light wave, that of brightness to the strength of the light stimulus (physical) etc. Such type of relationship between the physical properties of the stimulus and the attributes of sensation are noticeable in respect of all kinds of sensation. The psychophysicists thought that a systematic study of the relationship could enable them to discover some laws governing the relationship.

We use scale for measuring length, weight etc. of physical objects. This scale uses a unit of measurement just as we measure length in units of inch or meter, which remains constant for all lengths. The scale begins with a zero value, which implies absence of measured characteristic. The psycho-physicists thought that for measuring psychological characteristics too one should develop a similar scale. The zero value of such a scale would be at the point where the mental process first occurs. They came to the conclusion that in spite of close relationship between the physical and psychological dimensions the zero value of the psychological scale is not the same as the origin of the physical value. That is to say, there is no mental response to the very low values of the physical stimulus. The physical value of the stimulus should reach a particular level beyond zero before it can elicit a mental response.

The psychophysicists called that value of the stimulus above zero at which a sensation takes place and below which one experiences no sensation, the least noticeable value of the stimulus. This minimal value was technically called "Limen" (in German) and in English it means 'threshold'. So least noticeable value of a stimulus was called the 'stimulus threshold', and in German it is called as 'Reis Limen' (Reis is the German word of stimulus). RL is the abbreviation of Reis Limen. This value of a stimulus is not identical in all observations. Therefore, RL was defined as that value of a stimulus which was noticeable in 50 percent of observations and not noticeable in the remaining 50 percent. The individuals differ in respect of the value of RL, some can notice a stimulus at a much lower value when compared to other persons. The RL provided the zero for the psychological scale. The concept of DL or Differential Limen also needs to be explained.

The psychophysicists noticed that like its zero value, the unit of measurement in the psychological scale is not identical with that of the physical scale. For every unit of increase or decrease in the value of a stimulus, there is not the same unit of increase or decrease in the intensity of sensation. Further, they also pointed out that while the unit remains the same throughout the physical scale, the unit increases with the progress of the psychological scale. For example, the physical difference between 5 gms and 6 gms is the same as that between 60 gms and 61 gms. But the psychological difference (which one can notice by lifting weight) is not the same. While 5 gms and 6 gms may be noticeably different, 60 gms and 61 gms will be noticeably same, that is, one may not differentiate between them. Therefore it is clear that unit of noticeable difference increases with the increase in the value of the stimulus. They called the first noticeable difference to any value of a stimulus the differential threshold or Differential Limen. The abbreviation of this is DL, it is also called as just noticeable difference (JND). Here again like RL, the DL was not identically same for all trials taken by the same subject for the same value of a stimulus. Thus DL can be defined as the minimum difference between any two values of a stimulus that is noticed 50 percent of the times and unnoticed in the remaining 50 percent of the times.

Weber discovered that though the unit of the psychological scale is not absolutely constant, it is relatively constant. The DL of a stimulus bears a constant ratio to the stimulus irrespective of the value of stimulus. Though DL increases with increase in size of the stimulus the increase is alwas proportional to the size of the stimulus. For example, if an addition of 1 gram brings appreciable difference to a weight of 20 gms., an addtion of 5 gms will make an appreciable difference to a weight of 100 gms. So the DL increases in the same proportion as the stimulus. Weber claimed that each kind of sensation has a fixed ratio that is constant. The ratio is called as Weber's ratio. The just noticeable difference to a stimulus bears a constant ratio to the stimulus came to be known as Weber's law. This law is stated in the formula like this.

$$K = \frac{\Delta R}{R}, \text{ Where } K = \text{constant}, \Delta R = DL, R = \text{Stimulus Value}$$

Psychophysical methods are three in number which study the relationship between the physical and psychological dimensions.

1. Method of average error
2. Method of limit
3. Method of constant stimuli

Method of Average Error : This is used to determine the average magnitude of errors in ones perception of the value of a stimulus. In this method, the experimenter repeatedly presents to the subject a stimulus of a constant value (standard stimulus) together with a variable stimulus (comparison stimulus whose value can be changed). The subject is required to adjust the variable stimulus to equality to the standard stimulus. The difference between the value of the standard stimulus and variable stimulus gives an estimate of the magnitude of errors makes in perceiving the standard stimulus.

Method of Limit : This method has been used to determine the RL and DL. It involves the presentation of the variable stimulus in a successive or serial order by gradually increasing or decreasing its amount.

Method of Constant Stimuli : This is also used for the determination of RL and DL. It is very similar to the methods of limits. In this also different values of a stimulus are presented and to determine RL, S has to report whether he notices the stimulus or fails to notice it. To determine DL, S has to report whether a particular value of the stimulus is the same or different from a standard stimulus which is kept constant. As the same value of a stimulus are presented throughout the entire sets of observation, so it is called as method of constant stimuli.

In the other section an application of the method of limit will be done to verify Weber's law.

2.2 Problem

To verify experimentally Weber's law in respect of Differential Limen for different weights by using the method of limits.

2.3 Introduction to the Experiment

A stimulus may increase in size or intensity without one's being able to appreciate the change. Only when the amount of increment or decrement reaches a certain limit one can notice the difference. The limit of noticeable difference has been called the differential threshold or DL. The DL however, does not remain the same for all values of a stimulus, it increases or decreases with the size or intensity of the stimulus. Weber discovered that the DL remains relatively the same for different values of a stimulus. He stated his finding in the form of law. Weber's law states that the noticeable difference to the value of a stimulus bears a constant ratio to the stimulus. For example, if the value of the stimulus increases by 1/4, the DL also increases by the same ratio. Weber said that this law is applicable to all sense modalities. In this experiment an attempt is made to examine the correctness of Weber's law for the sensation produced by lifting a weight.

2.4 Hypothesis

The DL found for each one of two or more different weights will be the same fraction of the respective weights or the ratio of DL for any two similar nature of stimuli is always constant.

2.5 Preliminaries

Name of Subject	–	Prerna,
Age	–	19 years.
Sex	–	Female,
Qualification	–	B. A. Student,

Health – Normal,

Time of Experiment – 11 A. M.

2.6 Apparatus and Other Materials

1. Two sets of lifted weights

Set A – Standard weight 75 gms with variable weights - 60 gms, 65 gm, 70 gm, 75 gm, 80 gm, 85 gm, 90 gm.

Set B – Standard weight 80 gms, with variable weights - 50 gm, 60 gm, 70 gm, 80 gm, 90 gm, 100 gm, 110 gm.

2. Metronome
3. Stop Watch
4. Screen
5. Paper, Pen

2.7 Method of Experiment

2.7.1 Design :

Table No . 1

Design

No. of Conditions	Set of Stimulus and Std. wt.	Method	No. of trials
I	Set 'A' with std. wt. of 75 gms.	Method of limit	5
Rest for 10 minutes			
II	Set 'B' with Std. wt. of 80 gms.	Method of limit	5

2.7.2 Planning :

The experimenter planned to conduct the experiment in two conditions using two different sets of lifted weights. In one set std. weight was of 75 gms. and variable weights were seven differing by 5 gms. In the another set std. weight was of 80 gms. and seven variable weights each differing by

10 gms. The method of limit was used so trials were taken in both ascending and descending series. Total no. of trials to be taken was 10 trials, 5 in each condition. A rest pause was given in between the two conditions. After the conduction of experiment introspective.

2.7.3 Arrangement of Apparatus and Other Materials :

At first Metronome was connected and it was checked whether it gave tick sound regularly at the interval of 2 secs or not. Then two sets of variable weights were kept on the table in front of the subject and it was checked that one set consisted of such weights which had the difference of 5 gms, i.e. 60, 65, 70, 75, 80, 85 and 90 and the other set havings difference of 10 gms i.e. 50, 60, 70, 80, 90, 100 and 110 gms. As the Metronome was working so the stop watch was not used. A screen was placed between the subject and the experimenter so that subject may not see the weight. An arrangement was made in such a way that subject extended her hand through the hole of the screen. At one tick S lifted std. weight and at the another tick she kept that weight. On the third tick she lifted one variable weight and on next tick she put down that weight. Thus, everytime she first lifted the std. weight and then one of the variable weight. The E prepared raw data sheet to note down the data were given to the subject.

2.7.4 Instructions :

I will give you a weight to hold after the first tick of Metronome and when you hear the next tick, put the weight back on the table. Then I will give you another weight to hold on third tick and after the tick again comes you put the weight back. Your task is to tell whether the second weight was heavy, light or equal compared to the first weight. This you will have to do several times."

2.7.5 Conducting Actual Experiment :

After giving the instructions to the subject the experimenter started the actual experiment. The materials were kept ready on the table. The subject and experimenter sat at right angles to each other and conduction of the experiment started according to the design. In the first condition, the first set of weight box was used where the standard weight was 75 gm. and variable weights were 60, 65, 70, 75, 80, 85 and 90 (all in gms.) The subject was given a ready signal together with std. weight of 75 gm with the tick sound of Metronome and then taken away on the subsequent tick. Then a weight of 60 gm was placed on the right palm of the subject and with the subsequent tick it was taken away. The S had to report whether she found the second weight lighter, heavier or equal to be first weight. If she reported the second weight to be lighter than the first one then a sign of minus (–) was placed against 60 gm in the ascending series of the data collection table. This process of subsequent presentation of standard weight and the variable weight in ascending series continued till a change in subjects response was noticed with the end of ascending series alongwith std. weight of 75 gm a variable weight of 90 gm was presented. If the subject reported second weight heavier a plus sign (+) was noted down in the descending series column of data collection table. The variable weight was then decreased from 90 gm to 80 gm and subjects response was noted down. This process continued in descending series till the subjects response changed. Then the next trial continued Similarly all five trials were performed with ascending and descending trials alternately. After condition I a rest pause

of ten minutes was given before starting the condition II. In the second condition, the second set of lifted weights were used where the standard weight was of 80 gms and the variable weights were 50, 60, 70, 80, 90, 100, 110 (all in gms). In this condition also 5 trials was taken in both ascending and descending series.

In the condition II std. weight 80 gm was given at one tick and then on another tick 50 gms weight was given. The subject was asked whether the second weight was lighter, heavier or equal to the first weight. When the subject reported lighter then a minus sign (-) was given in the respective place in the raw data table. This process of subsequent presentation of standard weight and the variable weights continued till the subjects response changed. Thus all the five trials were taken each having an ascending and a descending series. After the data collection was finished, introspective report of subject was taken.

2.8 Collection of Data :

The collection of data consists of both (a) Objective data and (b) subjective data. The objective data is given in table No. 2 in the form of raw data and subjective data is reported as the introspective report.

Table no. – II

Raw Data

Condition – I

No. of trials→	1		2		3		4		5	
Weight in gms ↓	A	D	A	D	A	D	A	D	A	D
90		+		+		+		+		+
85		+		+		+	+	+		+
80	+	+		=	+	=	=	+		+
Std. 75	=	+	+	–	=	–	–	=	+	+
70	–	=	=		–		–	–	=	=
65	–	–	–		–		–		–	–
60	–						–		–	
U.T.	77.5	72.5	72.5	82.5	77.5	82.5	82.5	77.5	72.5	72.5
L.T.	72.5	67.5	67.5	77.5	72.5	77.5	77.5	72.5	67.5	67.5
Mean of UT & LT	75	70	70	80	75	80	80	75	70	70

Condition – II

No. of trials→	1		2		3		4		5	
Weight in gms ↓	A	D	A	D	A	D	A	D	A	D
110		+		+				+		+
100		+		+		+	+	+		+
90		+	+	+		+	=	+	+	+
Std. 80	+	=	=	+	+	+	–	=	=	=
70	=	–	–	=	=	=	–	–	–	–
60	–		–	–	–	–	–		–	
50	–		–		–		–		–	
U.T.	75	85	85	75	75	75	95	85	85	85
L.T.	65	75	75	65	65	65	85	75	75	75
Mean of UT & LT	70	80	80	70	70	70	90	80	80	80

Introspective Report : The subject gave the following introspective report to the experimenter - "I enjoyed doing this experiment. In some situation it was very difficult for me to decide the correct weight."

2.9 Treatment of Data

The following statistical treatment of data was done:

1. Mean of UT and LT – $\frac{\Sigma fx}{N}$

2. Differential Limen – $\frac{\text{Mean of UL} - \text{Mean of LL}}{2}$

3. Weber's Ratio – $\frac{DL}{\text{Std. Stimulus}}$

4. Mean of A series and D series – $\frac{\text{Total AS}}{\text{10 trials}}$ and $\frac{\text{Total DS}}{\text{10 trials}}$

5. Point of subjective equality – $\frac{\text{Mean of UL} - \text{Mean of LL}}{2}$

6. Constant error – PSE – Standard Stimulus

All this statistical calculations were put in table No. - 3 which is called as result table.

Table No – 3

Result

Condi.	Mean of UT	Mean of LT	DL	Mean of AS	Mean of DS	Weber's Ratio	PSE	Constant Error
I	77	72	2.5	76.5	77.5	0.03	74.5	0.5
II	82	72	5	83	81	0.06	77	0.3

2.10 Interpretation of Data, Discussion and Conclusion

From the raw data table the upper limit and lower limit (UL + LL) of the subjects estimation in each trial was calculated and their means were found out separately. Mean of UT in condition I is 77 and that in condition II is 82, mean of LT in condition I is 72 and in condition II also it is 72. DL in condition I is 2.5 whereas in condition II it is 5 gm. It means that when std. weight is 75 gm then a minimum difference of 2.5 gm is needed, then only subject can feel a change in the perception of the stimulus. In the same way DL of 5 gm in condition II reveals that when std. weight is of 80 gms then in order to perceive difference between std. stimulus and variable stimulus weight a difference of 5 gms is must between the two. Thus this result verifies the Weber's law that increase or decrease in the size of the DL is proportional to the increase or decrease in the size of the stimulus. Weber's ratio in condition I is 0.03 and in condition II it is 0.06. Although the ratio in both condition is not similar yet as the difference is very less so it can be said that ratio of DL for any two similar nature of stimuli is always constant. In this experiment it is not constant which may be due to the error of habituation or any other factor.

The mean of ascending series in condition I is 76.5 and descending series in 77.5, thus with a difference of I which indicates the occurrence of error of expectancy. When the mean of descending series is greater than the mean of acending series then there is error of expectancy and when the mean of ascending series is greater than the mean of descending series then there is error of habituation. In the second condition error of habituation has occurred as the mean of AS (83) is

greater than the mean of DS (81). This means that subject is habituated to change her response at one point and in condition I she changes her response before it is required to bring a change, hence error of expectancy. Thus it can be said that Weber's ratio is not constant due to the occurrence of these two types of errors in the subjects response.

The PSE in condition I is 74.5 and in condition II it is 77 which proves that the subject has perceived the standard weight of 75 gm as 74.5 gm in condition I. There is difference of only 0.5gm hence it can be said that difference of 0.5 is almost negligible, so subject has estimated the std. weight more or less accurately. In condition II the subject has perceived 77 gm equal to 80 gms, i.e. error of 3 gms. It means that subject has underestimated the Std. weight or in other words overtimated the variable weight. So in condition II error of overestimation has also occurred which might have influenced the result and Weber's ratio was not found constant.

Conclusion – From the above result and discussion it can be concluded that the hypothesis has not been proved fully. The ratio of DL for two similar nature of stimuli is not constant.

2.11 Questions for Exercise

(A) Questions for Oral Examination :

1. What is psychophysics ? Who was the first scientist to study this problem ?
2. Explain the different types of psychophysical methods.
3. Explain the terms RL and DL.
4. How can you differentiate DL from JND ?
5. What is Weber's ratio? Explain Weber's law and give its formula.
6. Method of average error is called by different names as well. What are those names ? Explain why they are so called.
7. What do you mean by error of habituation and expectancy error ?
8. By which other nerves method of constant stimuli is called ?
9. What are the different names of method of limit ?
10. Explain the following terms :
    (a) Upper threshold (UT)
    (b) Lower threshold (LT)
    (c) Basal value (BV)
    (d) Apical value (AV)
    (e) Constant error (CE)

(f) Point of subjective equality (PSE)

(g) Movement error (ME)

(h) Space error (SE)

11. What are the possibilities of error in method of limit and method of average error ?

12. How is method of constant stimuli different from method of average error ?

13. What correction Doid Fechner brought in Weber's law or Weber's ratio ?

14. How dies method of limit different from method of average error ?

(B) Questions on Experimental Problems :

(1) Verify Weber's law through and experiment by any psychophysical method.

(2) Conduct an experiment by the method of constant stimuli to verify Weber's law. Also calculate the points of subjective equality.

(3) Experimentally determine the Weber's ratio of subject with reference to lifted weights.

(4) Conduct an experiment to verify Weber's law in relation to visual lengths.

(5) Conduct an experiment to determine the subject's DL for lifted weight.

(6) Conduct an experiment on the 'S' by the method of limit to find out the Weber's ration in the perception of a 'visual length' of lifted weights.

2.12 Suggested Readings

1. Mohsin, S.M. : **Experiments in Psychology**
2. Postman and Egan : **Experimental Psychology**
3. Sulaimam, M. : **Manovaigyanik Prayog aur Parikshan**
4. Sinha and Mishra : **Monovigyan Main Prayog, Parikshan Evam Sankhyiki.**

Reaction Time

Lesson Structure

3.0 Objective

The main objective of this lesson is to make the concept of Reaction Time clear to the readers. In this context, RT., foreperiod, different types of RT etc. will be discussed. Then experimental studies will be given on three different problems. To make the students aware about the types of questions asked during viva-voce examination, a number of questions are given in the end. One can collect its answer from the suggested books. So the whole objective of lesson is to make the student fully acquainted with reaction time.

3.1 Introduction and Meaning of RT

Reaction Time is a measure of time between the onset of a stimulus and the occurrence of a response. This is used in experiments as an important variable for measuring the dependent variable. We measure the time taken to complete a performance, we measure the frequency of a particular kind of response within a given time etc. So, time is measured in various ways. In RT stimulus used is generally a simple one, like colour, sound, touch, taste etc. The response most often used in RT experiments involves pressing of a telegraphic key.

The measuring device used for RT is called Chronoscope. One of the most easily accessible Chronoscope is called as Vernier Chronoscope. It has got two pendulums hanging from the two ends of a metal bar. There are two keys, one for the E and the other for the S. Both pendulums are held at an angle so that when released they start swinging to and fro. When the S presses his key then it releases the short pendulum and when E presses his key then it releases the long pendulum. The S's pendulum is set a little higher than that of E, so that when S's pendulum oscillates at the rate of 77 times per minute it takes 0.78 seconds for one oscillation. The E's pendulum oscillates at the rate of 75 per minute or 0.80 sec. per oscillation. Thus, there is a difference of 0.02 seconds per oscillation between the pendulums. E's key forms an electric circuit with the stimulus, i.e. light or sound, so that the moment E presses his key, the stimulus is presented automatically and the long pendulum starts oscillating. Before hand the S is instructed to press his key the moment he observes the stimulus (light or sound). When the S press his key, his pendulum too, starts oscillating (the short one). The faster oscillation of S's pendulum let it catch up after a certain number of oscillation with E's pendulum. Thus the string by which each pendulum is hanging becomes parallel. E counts the number of oscillation of S's pendulum after which it catches up with E's pendulum. This number multiplied by 0.02 sec. gives the reaction time of the subject. Since the resulting value is the fraction of a second, it is converted into milliseconds (ms), which is one-thousandth of a second. For example the number of oscillation in a trial to catch up with E's pendulum is 8, then RT will be 160 ms. (For eg. 8 x .02 x 1000). The students will remember one thing that this constant multiplier (.02) is called Vernier constant. It was determined by a mathematician named Vernier. Since the Chronoscope uses the Vernier system for calculating time, it is called as Vernier Chronoscope.

3.1.1 Types of Reaction Time :

Reaction Time is of three kinds :

Simple, Complex and Associative type.

1. **Simple RT :** In this one stimulus is presented and the subject has to respond on it. That is, the same stimulus is presented every time and the subject has to make the same response every time. The mean RT in a certain set of trials provides an estimate of S's RT. The S is first given a ready signal and then after a pause of 2 seconds he is presented the stimulus. This ready signal puts

the subject in a state of readiness to respond. Sometimes he may respond without actually observing the stimulus and as a result his RT will be shorter than what it could be had he responded after observing the stimulus. That is why, S is specially instructed to respond only when he has noticed the stimulus. The first one may be categorised as muscular RT and the second one as sensorial RT.

Here one point needs to be mentioned that length of RT is also influenced by the length of fore period. Fore period means the time that lapses between the ready signal and the presentation of the stimulus. An optimal fore period is ascertained that ranges from 1 to 2 seconds. The interval between the ready signal and the presentation of the stimulus should, therefore, be about 2 seconds.

2. Complex RT : In this the subject is presented with more than one stimulus to which he has to give more than one response. This can be explained more clearly by giving two types of complex RT :–

(a) Choice RT : this involves choosing one key when stimulus is given and another key when other stimulus is given. This is also called as 'b' type of RT. For example in Vernier Chronoscope, suppose there is a red and a blue light, the S may be instructed to press the right key when the red light glows and to press the left key when blue light glows.

(b) Discriminative RT : In this many stimulus are presented to the S but he has to respond only on one stimulus. For example the S is instructed to press the key when red light is on but the experimenter not only gives red light but also blue, yellow, green as stimulus light. The S has to discriminate that he has to react only to red light. This is also called as 'C' type RT. It has been found that choice RT is longer than discriminative RT.

Complex RT was originally introduced in order to measure the time taken in the mental processes of discrimination and choice. Since complex RT is always longer than simple RT, it was presumed that the difference was due to the time taken in these complex process. But since there are other intervening variables, it is now believed that the difference does not give precisely the time taken in the mental operations of discrimination and choice.

From practical point of view, it can be said that it is more useful to know ones complex RT than the simple RT. The measure of complex RT is valuable because in actual life situations we are confronted with a complexity of stimuli and are called upon to choose among a variety of responses the one that is appropriate to each stimulus. So practically, to measure complex RT more useful.

3. Associative RT : It is a measure of the speed of verbal response to a verbal stimulus. The S has to say the word that first comes in his mind in response to the stimulus word. That is to say, E utters a word (called SW or the Stimulus Word) and the S has to utter another word (called RW the Response Word). The time that lapses between the SW and RW gives the associative RT. It is so called because S responds on the basis of his associations to the SW. For example to the world 'Book' he has several associations like 'page', 'paper', 'print', 'school', 'teacher', 'story' and many more'. At a particular moment anyone of these associations may be the first to be revived by the SW book. The device used to measure associative RT is called the word association test (WAT).

There are many factors that influence RT. For example, preparatory set length of foreperiod etc. Many experimental studies are done on RT with these factors. Now we will see three experimental reports on RT. Two problems will be related to simple RT and one with the complex RT. In the next section of this lesson the students will know how to conduct the experiments and also the procedure of writing the report of experiments.

3.2 Problem

In this section the readers will find that problems on simple RT and complex RT will be discussed. The problems on which experiments will be demonstrated are as follows :—

a. Reaction time as a function of length of foreperiod.

b. A comparative study of sensorial and muscular reaction time.

c. A comparative study of single Vs complex reaction time.

3.2 (a) Problem

To demonstrate through an experiment the effect of variation in length of foreperiod upon the reaction time of a subject.

3.3 Introduction to Experiment

Reaction time is a measure of time between the onset of the stimulus and occurrance of the response. The time that lapses in between the presentation of stimulus and ready signal is called as the foreperiod. The foreperiod plays important role in the determination of reaction time. It gives a shorter RT when foreperiod is of 1 or 2 seconds but if foreperiod is longer than RT also increases. It is so because when a short foreperiod is given the subject does not fully prepare himself to react and a long foreperiod lets the state of preparedness fade out.

In this experiment the purpose is to see the effect of varying lengths of foreperiod on RT of the subject.

3.4 Hypothesis

Foreperiod of 2 seconds is the optimal foreperiod.

Or

RT will increase if foreperiod is less or more than 2 seconds.

3.5 Preliminaries

Name of subject – Prerna,

Age – 19yrs,

Sex	–	Female,
Qualification	–	B.A. Student,
Health	–	Normal,
Time of Conduction of Experiment	–	10 A. M.

3.6 Apparatus and other Materials

1. Vernier Chromescope
2. Screen
3. Stop Watch
4. Paper and pen

3.7 Method of Experiment

3.7.1 Design :

The design is shown in table form in table No. –1

Table No. – 1

Design

Conditions	A	B	C	D	D	C	B	A
Foreperiod	1 Sec	2 Sec	4 Sec	8 Sec	8 Sec	4 Sec	2 Sec	1 Sec
No. of trial	5	5	5	5	5	5	5	5
Stimulus	Green Light	Green Light	Green Light	Green Light	Green Light	Green Light	Green Light	Green Light

3.7.2 Planning :

It was planned to conduct the experiment in four conditions, each condition having separate length of foreperiod. The conditions were A (1sec), b (2sec), c (4 sec) and D (8 sec) with different foreperiods. In order to rule out the effect of practice or fatigue it was decided to use counterbalancing design, ICA BCD DCBA each consisting of 5 trials. The stimulus used was green light. After ready signal in condition A when 1 sec. passed then experimenter passed his key which made the green bulb on and seeing the green light subject had to press her key as a response. In similar way in condition B,C,D a foreperiod of 2 sec., 4 Sec. and 8 sec. were to be given. The apparatus to be used was Vernier Chronoscope. An introspective report will be taken after the completion of trials.

3.7.3 Arrangement of apparatus and other materials :

The Vernier's Chronoscope was kept on the table. The experimenter first checked whether the green bulbs was functioning or not. When he got assured then he checked the no. of oscillations of the small and big pendulum. The small pendulum is supposed to oscillate 77 times in one minute and big pendulum 75 times in one minute. After this he placed a screen so that the subject may not see the no. of oscillations per trial counted and noted down by the experimenter. A stop watch was kept ready to see the foreperiods. A blank sheet with raw data table was put in front of the E to note down the raw data and introspective report of the subject.

3.7.4 Instruction :

The following instructions were given to the S by the E— "Keep your finger on one of the keys and when you see the green bulb glowing then press the key with your right hand finger. I will give you a 'ready' signal and after sometime the green light will glow. As soon as you see the green light glowing you press your key. Remember that you must not press your key on hearing the signal of 'ready'. This signal is given to make you a best for giving the response. You have to respond only on seeing the light."

3.7.5 Actual Experiment :

The subject was comfortable to the left side of the experimenter. A screen was placed, so that S could not see the materials and other proceedings of the experiment. The experimenter counted the oscillations of the subjects pendulum to be 77 per minute and 75 oscillations of the experimenter's pendulum in one minute. After this he instructed the S and gave few practice trials. The bulbs were checked and the S was given a ready signal after which the experimenter pressed his button and the green light was on. On seeing the green light glowing the S pressed her key with index finger of right hand. Both the pendulums started swinging to and fro. The number of oscillations of S's pendulum were counted till both the pendulums became parallel. In condition A five trials were taken with a foreperiod of 1 second. After this condition B, C and D all having five trials were taken with a foreperiod of 2 secs, 4 secs, and 8 secs, respectively. The whole experiment was planned in counterbalancing design, i.e. ABCDDCBA, thus, each condition (ABCD) consisted of 10 trials. The number of oscillations were noted down in data collection table and in the end an introspective report was taken from the subject.

3.8 Collection of Data

Two types of data were collected :—

1. Objective data – as given in table no. 2 in the form of raw data.
2. Subjective data – as given in the form of introspective report.

Table No. – 2

Raw Data

A		B		C		D		D		C		B		A	
Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill.	Trials	No.of Qscill
1	23	1	5	1	29	1	20	1	20	1	20	1	28	1	30
2	35	2	20	2	40	2	20	2	10	2	40	2	20	2	35
3	35	3	4	3	35	3	10	3	40	3	30	3	35	3	20
4	40	4	7	4	35	4	30	4	38	4	30	4	10	4	30
5	30	5	25	5	40	5	28	5	40	5	34	5	30	5	0

Introspective Report : " I liked the nature of job. When I was asked to press the key on seeing the green light then I found it as an interesting task. In each trial ready signal was given which helped me in doing my work. In some trials green light was seen just after the ready signal whereas in some trials light was seen after few seconds of ready signal. Thus in some trials I pressed my key quickly after the appearance of green light whereas in some trials I was late."

3.9 Treatment of Data

The treatment of data consists of finding out the mean and SD of all four conditions. The following calculations were done—

1. Mean of A,B,C,D (A+A, B+B, C+C, D+D) which consisted of 10 trials in each condition.

   Formula — Mean $\frac{\Sigma x}{N}$ = No. of ascillations.

   R.T. in milliseconds = No. of oscillations x .02 x 1000

2. SD of A, B, C, D which consisted 10 trials in each condition (A + A, B+B, C + C, D + D)

   Formula : SD = $\frac{1}{N}\sqrt{N\Sigma x^2 - (\Sigma x)^2}$

   SD in milliseconds = SD x 0.02 x 1000

All these findings were noted in result table.

Table No. – 3

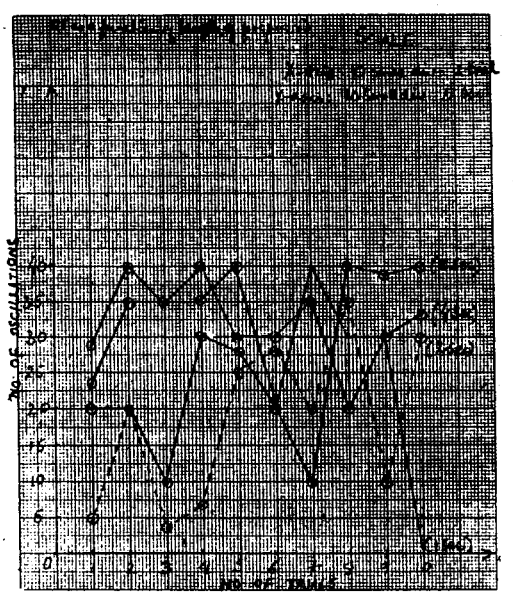
Result

Conditions	A	B	B	D
Mean in ms.	556	368	666	712
SD in ms.	216.84	260.6	262.8	396.6

3.10 Interpretation of Data, Discussion and Conclusion

It is clear from the result table that foreperiod of 2 seconds is the optimal foreperiod because RT is lowest or shortest when 2 secs. foreperiod is given. In condition A when the length of foreperiod. was 1 secs. mean in ms is 556 SD is 216.8. In condition B when foreperiod. was of 2 secs. its mean in ms in 368 and SD is 260.6 in condition C when foreperiod was 4 secs. mean and SD is 666 and 262.8 respectively and in condition D when foreperiod was 8 sec. its means was hightest i.e. 712 secs. and SD was 396.6. Hence we see that in all these four conditions reaction time is lowest when foreperiod is of 2 seconds. And as the foreperiod increased its mean of oscillation also increased (666 and 712 respectively). And when it decreased than 2 seconds (i.e. 1 sec. foreperiod) then also RT increased in comparison to foreperiod of 2 secs., i.e. 556 ms whereas in B condition it is only 368 ms. It so happens because when foreperiod is less than optimal foreperiod then subject was not prepared to react when she got the signal. So she took more time in reaction. And when it was more than 2 secs. Then the subject's preparedness to give response was distracted by factors like relaxedness, mental tension, scatterdness etc. hence the reaction time increased.

So it can be concluded that foreperiod of 2 secs. in the optimal foreperiod. The graph also is in accordance to the hypothesis.



3.2 (B) Sensorial and Muscular Reaction

Time – An experiment

Problem – To conduct an experiment for making a comparative study of sensorial and muscular reaction time of the subject.

3.3 Introduction to Experiment

Reaction time is the period between the onset of the stimulus and the beginning of the response. There are many factors which influence RT among which one is attitude. Division of RT into sensorial and muscular RT depends upon the attitude of the person. The attitude in a person is of two types- sensory attitude and motor attitude. RT based on sensory attitude is called sensorial RT and that based on motor attitude is called muscular RT.

The purpose of this experiment is two verify that sensorial RT is longer than muscular RT or muscular RT is shorter than sensorial RT because in muscular RT subject's focus is on doing response whereas in sensorial RT the focus is on the perception of stimulus and after that on response. Hence the reaction is delayed.

3.4 Hypothesis

Sensorial RT is longer than muscular RT.

Or

Muscular RT is shorter than sensorial RT.

3.5 Subject

An undergraduate female student of normal health acted as S in this experiment.

3.6 Apparatus and other Materials

1. Vernier's Chronoscope
2. Stop Watch
3. Screen
4. Paper, Pen

3.7 Method of Experiment

3.7.1 Design :

Given in the table No. – 1

Table No . – 1

Design

Conditions	A	B	B	A
Types of RT	Sensorial	Muscular	Muscular	Sensorial
Stimulus	Green Light	Green Light	Green Light	Green Light
No. of trials	10	10	10	10

3.7.2 Planning :

The plan was to conduct the experiment in two conditions–condition I of sensorial RT and condition II of muscular RT. The foreperiod to be given was decided as 2 secs. and 20 trials in each condition was to be given. The subject had to respond on seeing the green light. The counter balancing design was used in order to counteract the effect of fatigue and practice.

3.7.3 Arrangement of Apparatus and Other Materials :

The experimenter placed the apparatus called Vernier Chronoscope on the table. Then it was connected with electricity and E checked whether the green light was functioning or not as it was the stimulus light to be given after ready signal. Then he counted the no. of oscillations of being pendulum (75 oscillation per minute) and small pendulum (77 oscillations per minute). The stop watch was kept ready for giving the intervals of foreperiod. A raw data table consisting of no. of trials and no. of oscillations was kept ready for noting down the number of oscillations of subject's pendulum.

3.7.4 The following instructions were given separately for condition I and II :

Instructions for Condition I— "You have to keep your right index finger on the key. As soon as you see the green light on, you will have to press your key. Be very attentive to the appearance of green light and press the key only when you see the green light glowing. Keep your eyes focussed on the light and before pressing the key get assured that green light is only glowing because on seeing the green light you have to respond on your key."

Instructions for Condition II — "Here also you have to press your key on the presentation of the stimulus. But here you have to be very quick in pressing the key. As soon as you see the green light, react as quickly as you can. Always be ready to press the key on seeing the green light.

3.7.5 Conducting Actual Experiment :

The S was seated confortably and Verniers Chronoscope was kept on the table to conduct the experiment in ABBA conditions. Condition A consisted of sensorial RT and condition B of muscular RT.

The Veriner Chronoscope consists of two pendums hanging from the two ends of a mental bar, and there were two keys, one meant for E and the other for the S. The S's pendulum was set a little higher than that of the Experimenter pendulum. When the S's key was pressed then the pendulum started swinging to and fro, it oscillated at the rate of 77 per minute or 0.78 secs. per oscillation. The experimenter's pendulum oscillated (when S's key was passed) at the rate of 75 per minute or 0.80 secs. per oscillation. Thus, there was a difference of 0.02 secs. per oscillation between the two pendulums. In condition A the emphasis was given upon the perception of stimulus and in condition B emphasis was given upon the response. In each trial a ready signal was given and after 2 secs. the stimulus, which was green light, was presented. Seeing the stimulus, the S pressed the key on her side which released the pendulum and it started swinging to and fro. The E counted the number of oscillations of S's pendulum till it became parallel with that of E's pendulum. This number was multiplied by .02 seconds which gave RT in seconds. Again it was multiplied by 1000 in order to get the RT in milliseconds.

3.8 Collection of Data

The data collection was done in two ways— (1) Objective and (2) Subjective. The objective data is given in table No.- II and subjective data is given in the introspective report.

Table No. – 2

Raw Data

A (SRT)		B(MRT)		B(MRT)		A (SRT)	
Trials	Oscillation	Trials	Oscillation	Trials	Oscillation	Trials	Oscillation
1	12	1	10	1	9	1	12
2	12	2	8	2	8	2	9
3	10	3	8	3	7	3	10
4	6	4	7	4	7	4	7
5	15	5	8	5	9	5	5
6	15	6	10	6	9	6	7
7	10	7	2	7	4	7	8
8	15	8	7	8	6	8	5
9	12	9	5	9	6	9	2
10	15	10	10	10	8	10	5

Introspective Report : " I worked according to the instructions given to me. Once I was told to be sure that green light is on and then only react and the other time I was told to react as quickly as possible on seeing the green light on. In the second situation the task was much easiar as I was not to concentrate on light but on pressing the key. On the whole experiment was easy and interesting."

3.9 Treatment of Data

Table – 3

Result

Type of RT	Sensorial of RT (A)	Muscular RT (B)
Mean in ms	192	148
SD	76.2	40.2
T-Ratio Level of Signifance	2.23 Sig. at 0.01 level	

The experiment aimed to prove muscular RT shorter than sensorial RT. For this the mean of condition A must be greater than the mean of condition B. The mean was calculated by formula –

$$\text{Mean} = \frac{\Sigma fx}{N}$$

RT in millisceconds was calculated by the formula –

$$RT = \text{Mean} \times 0.02 \times 1000$$

SD was calculated by the formula –

$$SD = \frac{1}{N}\sqrt{N\Sigma X^2 - (\Sigma x)^2}$$

SD in milliseconds was calculated by the formula –

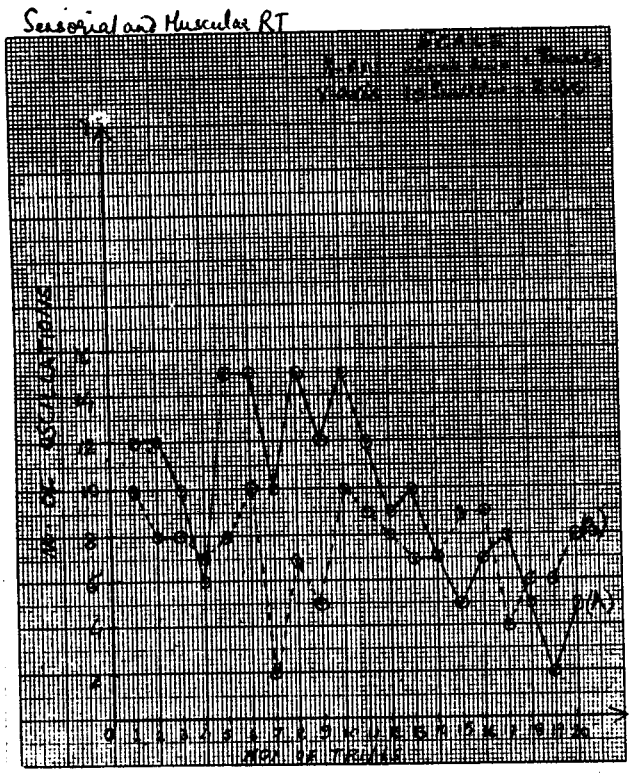
$$SD \times 0.02 \times 1000$$

The SD was calculated in order to find out the internal variability among the responses. In order to find out the significance of difference in mean of both conditions t-ratio was calculated, the formula for this is—

$$t = \frac{M_1 - M_2}{SED}$$

3.10 Interpretation of Data, Discussion of Conclusion

The result shows that mean of condition A i.e. sensorial RT is 192 ms and SD is 76.2 ms. The mean of condition B is 148 ms and SD is 40.2 ms. Thus difference between two mean is 44 ms which means that muscular RT is 44 ms less than sensorial RT. This confirms the hypothesis. The SD of two conditions is not very less than their mean which may be interpreted as there is variability in the response given by the subject. The t-ratio between the two conditions is 2.23 which is significant at 0.01 level. Thus it can be said that the main cause of increased mean in sensorial reaction time is that subject was more involved in attending to the stimulus and not on doing reaction. But in muscular reaction time she was more attentive towards the pressing of the key. So reacted quickly, hence RT. decreased. The graph also supports the hypothesis. Straight line is of SRT and dotted line is of MRT.



Thus on the basis of this experiment it can be concluded that difference between sensorial and muscular reaction time is real and has not occurred by chance and muscular RT is shorter than sensorial RT. Thus the hypothesis is proved fully.

3.2 (C) Simple Vs Complex Reaction Time

— An experiment

Problem — To conduct an experiment for making a comparative study of simple RT and complex RT of the subject.

3.3 Introduction to Experiment

Reaction time is the time between the onset of the stimulus and occurrence of response. When the subject is presented with the same stimulus and has to make the same response everything then the time taken by the subject to give such a response is called simple reaction time. For example. when the subject sees the green light she has to press her key and the time taken to give this response is simple reaction time. On the other hand when there are many stimulus and the subject has choosen and respond to a particular stimulus the time taken by the subject to give such a response is called discriminative RT. For example the two stimulus green and red light will be shown to the subject randomly and the subject has to press the key only when she sees the green light. Here the stimulus is complex, the subject has to discriminate between the two stimulus and then give the response due to which the response gets delayed. Therefore, discrimination RT is longer than the simple RT. Choice reaction time is that RT in which both the stimulus and the response are complex. In this there are two or more stimulus and two or more response as well. For example the subject has to press the right key with right index finger when she sees red light and she has to press the left key with left index finger. When she sees a green light. In this the subject has to discriminate between the stimulus on one hand and between the response on the other hand due to which the response gets delayed. As a result choice RT is longer than the discrimination RT.

The purpose of this experiment is to see simple RT is easiest and choice RT is most difficult and discrimination RT is harder than SRT but easier than complex RT.

Introduction : Write about complex RT and its type and describe the types in short. Don't exceed from 20-25 lines.

3.4 Hypothesis

Simple reaction time is the easiest, choice RT is the most difficult and discrimination RT falls in between these two.

3.5 Subject

An undergraduate female student volunteered as S for this experiment.

3.6 Apparatus and other Materials

1. Vernier Chronoscope with multiple lights.
2. Stop Watch
3. Screen
4. Paper, Pen