ii. Ten cards showing dots varying from three to twelve on each card.

iii. Record sheets.

iv. Graph paper.

v. Stationery.

Subject: Name:

Age:

Sex:

Educational Status:

Place:

Date:

Time:

Description of the apparatus: The name of the apparatus which will be used in the experiment is known as 'Tachistoscope'. The apparatus is mounted on a wooden frame. The front of the apparatus is covered by a metallic sheet which is painted in black. In the middle of the metallic front there is a rectangular wooden box that is fitted with a glass through which materials used in the experiment may be exposed. Cards of the size of the slit may be inserted in the box and may be kept tight behind the glass with the help of a wooden mechanism fitted with springs. On the back of the apparatus, there is a metallic door with a bigger slit. The door is used for exposing experimental materials through the slit in the apparatus. A releaser is there to release the falling door.

Description of Cards: The dots are prepared first and those dots are pasted on the chart-paper. The chart paper was cut according to the size of the board in the Tachistoscope. The number of dots vary from 3 to 12; that is, all together 10 cards were prepared. The dots are equally spaced. The dots should be placed in such a way that they should not form any symbol or design. After preparation of

the cards and making everything ready for the experiment the following procedure may be followed.

Procedure: During the experiment, the Tachistoscope was placed on the table of the laboratory room. The subject was invited to sit in the chair, where the apparatus was placed. The apparatus was placed in such a way so that the subject could see the card clearly. The experimenter then explained the nature of the experiment by giving the following instruction as:-

"You will be shown some cards with dots in them. Please give your full attention as each card will be shown to you for only half of the fraction of a second. After seeing the cards with the dots, you have to report the number of dots you have seen. Is it clear to you? Are you ready?"

After getting positive response from the subject, the experimenter started the experiment. The experimenter then put the card at the slit and then asked the subject to give full concentration. The experimenter then put the card one by one in the slit and released the falling door and accordingly the subject reported to the experimenter the number of dots seen. The experimenter exhibited the dotted cards in serial order and the experiment was stopped when all the cards had been exposed 50 times, that is each card has been shown for 5 times in a random order. All the responses made by the subject were recorded in the work sheet.

Worksheet No: XIV

Title: Span of Attention

CARD NUMBERS	ACTUAL NUMBER OF DOTS SHOWN	ACTUAl NUMBER OF DOTS RESPONDED IN 5 TRIALS					TOTAL NUMBER OF CORRECT DOTS RESPONDED	PERCENTAGE OF THE CORRECT SPAN OF ATTENTION
		1	2	3	4	5		
1	3	3	3	3	3	3	5	100%
2	4	4	4	4	4	4	5	100%
3	5	5	5	5	5	5	5	100%
4	6	6	6	6	6	6	5	100%
5	7	7	7	8	7	7	4	100%
6	8	7	8	8	8	9	3	60%
7	9	9	10	8	9	9	3	60%
8	10	11	11	11	10	10	2	40%
9	11	12	10	11	12	11	2	40%
10	12	11	12	11	11	10	1	20%

After completion of the experiment, the introspective report was taken and the subject was thanked for his co-operation and was allowed him to leave the laboratory room.

After that the percentage of span of attention for each card was found out. The percentage of span of attention was shown graphically. For this purpose two ordinates ‘X’ and ‘Y’ was drawn in the graph paper where X-axis represented the number of dots and Y-axis represented the percentage of the span of attention. Percentage was plotted on the graph paper and points were joined in a straight line.

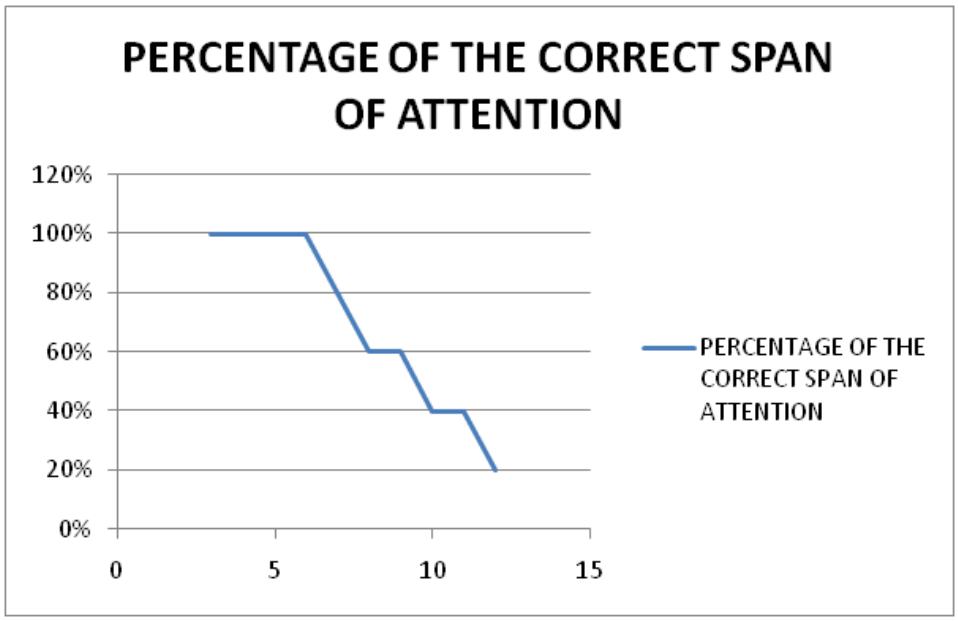


Fig: 1.10

Result: The results of the experiment are shown in worksheet number XIV It shows the percentage of correct apprehension and Fig-1.10 of the graphical representation shows the number of dots and the percentage of correct apprehension.

Introspective report: "When the dots were less it was easy to pay attention, but when the number of dots were gradually increasing it was very difficult for me to concentrate. But overall I found it very interesting."

Observation and discussion: From the experiment it can be observed that the span of visual apprehension gradually decreases with the increase of number of stimuli (dots). In 5 trials, the 10 set of card is where dots are presented varying from 3 to 12 on each card is shown to the subject. The subject's visual span of attention is 100% in case of 6 dots. It means from 3 to 6 number of dots, the subject is able to give 100% attention. But in case of more than 6 dots subject's attention gradually decreases and the percentage of correct span of attention is 80% in case of seven (7) dots. Similarly with 8 and 9 dots it reaches the level of 60% span of attention. While with 10 and 11 dots the total number of correct dots responded by

the subject is only 2 and correct span of attention is 40%. And in 12 number dot the subject is able to respond only 1 trial correctly. So the correct span of attention is only 20%. It makes us clear that the subject's span of visual apprehension gradually decreases with the increase of the number of stimuli. Hence, it is clear that as the number of dots are increased like 7, 8, 9 then the subject's level of visual apprehension gradually decreases. Therefore, the hypothesis can be soundly accepted.

ACTIVITY- 3.1



Conduct an experiment of your own to test the span of attention by preparing the cards with number of dots and with proper graphical representation.

4.5 CONCEPT OF SPAN OF APPREHENSION

Span of apprehension is the maximum number of stimuli or units of information that can be processed at one time after brief presentation. Span of apprehension directly determines short-term memory capacity. The term "span of apprehension" is sometimes used interchangeably with attention span, though technically span of apprehension refers to a more basic processing capacity that influences attention span.

The idea of span of apprehension aroused out of efforts in the field of cognitive psychology to demonstrate the processes by which information is transferred from sensory storage to short-term memory, and the constraints on the transfer.



CHECK YOUR PROGRESS

Q6: Fill in the blanks:

a) Span of apprehension directly determines……

b) Span of apprehension is the effort of …… psychology.

c) Through span of apprehension information is transferred from…….. to ……

4.5.1 EXPERIMENTAL FINDING THROUGH SPAN OF APPREHENSION

Title: Span of apprehension

Objective: To make a comparative study of the subjects span of apprehension for letters and digits by constant stimuli method.

Hypothesis: The span of apprehension for digits is larger than the span of apprehension for letters.

Apparatus and Materials: The apparatus and materials used for this experiment are-

1) Tachistoscope
2) One set of eight cards consisting of certain alphabets ranging from 3 to 10 (Set I)
3) One set of 8 cards consisting of digits ranging from 3 to 10 (Set II).
4) Graph paper.
5) Record sheet.
6) Stationery.

Subject: Name:

Age:

Sex:

Educational Status:

Date:

Time:

Place:

Description of the apparatus: In the experiment, the apparatus known as 'Tachistoscope' will be used. The apparatus is mounted on a wooden frame. The front of the apparatus is covered by a metallic sheet which is painted in black. In the middle of the metallic front there is a rectangular wooden box that is fitted with a glass through which materials used in the experiment may be exposed. Cards of the size of the slit may be inserted in the box and may be kept tight behind the glass with the help of a wooden mechanism fitted with springs. On the back of the apparatus, there is a metallic door with a bigger slit. The door is used for exposing experimental materials through the slit in the apparatus. A releaser is there to release the falling door.

Preparation of the cards: While preparing the cards the experimenter must see that the letters or digits of the cards should be so randomly placed on the cards that they do not form any designs or meaningful words. The letters or digits written in the cards should be equally spaced and should be written in block letters. The number of digits should be from 3 to 10. For performing the experiment, the experimenter prepared two sets of eight cards with letters in one set and digits in the other set. After that the experimenter put the apparatus before the subject and gave the following instructions-

"First of all you will be shown some cards with letters in them. You will be shown the cards for a fraction of second. Please pay attention as soon as the cards are shown to you. After seeing the cards you have to report the number of letters you have seen. Are you clear with my instruction?"

After giving the instruction the experimenter exposed the cards to the subject with a ready signal after placing the card on the card holder. As soon as the door exposed the card, the subject reported the number of letters seen. The experimenter presented the cards in a random order and stopped when the cards had been exposed forty times. (Each card had been shown for 5 times). To neutralize

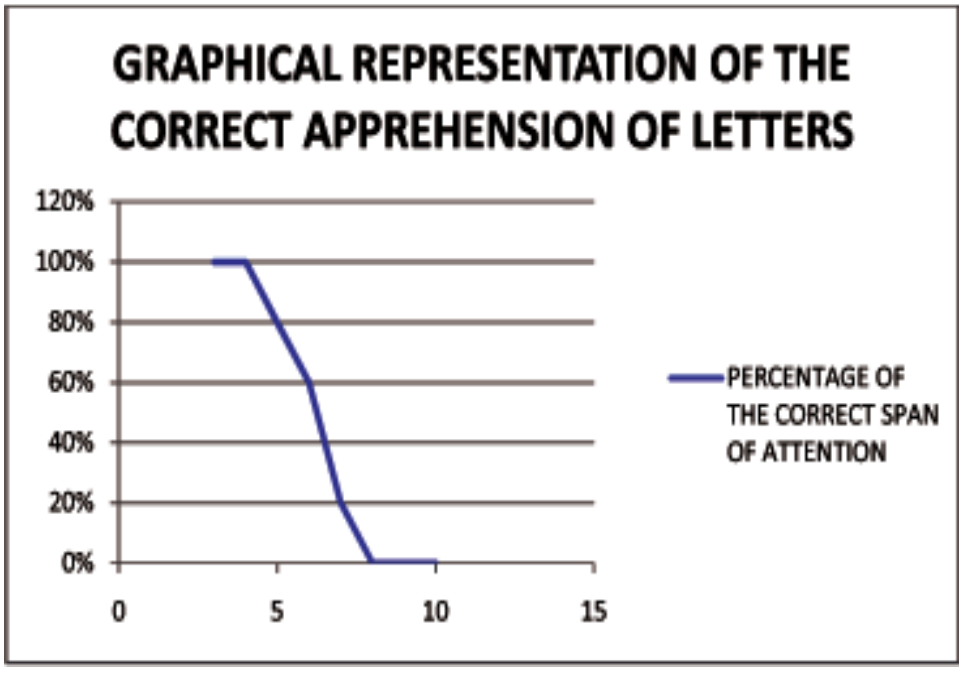
the effect of eye strain a rest interval of 10 minutes was given to separate the two phases of the experiment.

Worksheet- XV

Data showing right and wrong apprehension of letters of each card from trial to trial

Card Number	Actual number of digits	Number of trials					Correct responses	Percentage of correct apprehension
		1	2	3	4	5		
1	3	√	√	√	√	√	5	100%
2	4	√	√	√	√	√	5	100%
3	5	√	√	√	√	√	5	100%
4	6	√	×	×	√	×	2	40%
5	7	√	×	×	×	×	1	20%
6	8	×	×	√	√	×	2	40%
7	9	×	×	×	√	√	2	40%
8	10	×	×	×	√	×	1	20%

Fig: 1.11



In the second phase of the experiment, the experimenter in a similar way, presents the number of cards with digits one by one and in the

same way the subject reported the number of digits seen by him. The data showing the right and wrong number of apprehension of digits is shown in the worksheet below-

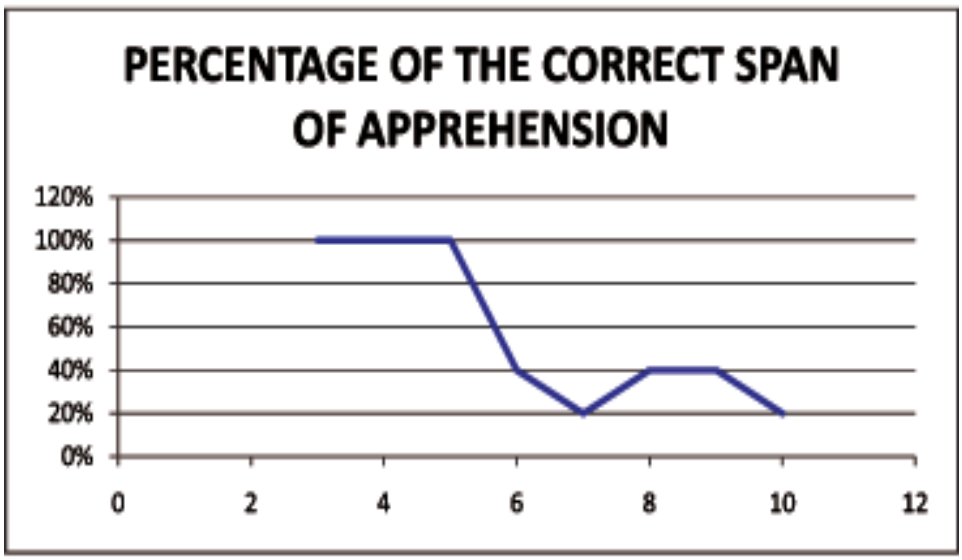
Data showing right and wrong apprehension of digits of each card from trial to trial

Worksheet- XVI

Data showing right and wrong apprehension of letters of each card from trial to trial

Card Number	Actual number of digits	Number of trials					Correct responses	Percentage of correct apprehension
		1	2	3	4	5		
1	3	√	√	√	√	√	5	100%
2	4	√	√	√	√	√	5	100%
3	5	√	√	√	√	×	5	100%
4	6	√	×	×	√	×	2	40%
5	7	√	×	×	×	×	1	20%
6	8	×	×	√	√	×	2	40%
7	9	×	×	×	√	√	2	40%
8	10	×	×	×	√	×	1	40%

Fig-1.12



When the experiment was over the subject was thanked for his co-operation and was allowed to give his introspective report and take leave from the laboratory room.

Introspective report: "It was difficult for me to give correct answer after seeing letters and digits but gradually I could respond. It was an interesting experiment for me."

Result: The results of the experiment are shown in Worksheet XV and XVI It has also been shown graphically. Two graphs were shown separately for letters and digits (Fig 1.11 and Fig 1.12). The percentage of correct apprehension was plotted on the graph paper and points were joined by the straight lines.

Observation and discussion: From the experiment it can be observed that the subject was found to be doing better in remembering digits. It was easier for the subject to remember the digits than letters. The percentage of correct apprehension of digits was more than letters. Hence, we can safely retain our hypothesis.



ACTIVITY-3.2

Conduct an experiment of your own to test the span of apprehension by preparing the cards with number of digits and with proper graphical representation.

3.6 CONCEPT OF DIVISION OF ATTENTION

Attention is said to be the concentration of conscious mind or focusing of consciousness at a particular object, idea or situation at a particular point of time. Accordingly attention cannot be given to more than one object at a time. It is indivisible. Although there are people who can do more than one thing at a time, that seems to divide attention to more than one object. An expert lady can talk while knitting wool with her hand. An experienced driver can talk and smoke while driving the car. In such cases it seems to be obvious that one can attend to two or three activities at a time out of the division of attention. This division of mind and attention seems to be an extra-ordinary ability of a person. Division of attention means a simultaneous focusing upon two separate activities. The activities should

be separated from each other; like both of the activities should be combined in a group or one of the two activities should not be automatic.

Psychologists have undertaken observation and experiment in this regard. They have given the testee to do two things at a limited period of time and observed the nature of reaction and behaviour of individual in such cases. They have found that the testee could not do well either of the two activities by dividing their attention in mind. They also needed more time to do so. It was also found about 40% of efficiency in each kind of activity has suffered. Out of the result of such experiment it may be maintained that division of attention cannot take place as a matter of fact. Concentration of mind cannot be divided into two or more activities at a particular point of time. It is an illusory concept of the common people. Here, it should be noted that one can do two things at a time out of habit. Habitual activity needs no attention or concentration of mind.

Many researchers have tried to study the effect of the division of attention on the work product. It has been found that the work products suffer less if both the tasks are simple and similar but in the case of difficult and dissimilar tasks, the division of attention surely results in deterioration of both quality and quantity of nearly all the tasks attended and performed simultaneously by an individual. It is very rare that division of attention produces no effect. It has happened only in exceptional cases of individuals like the famous figure of the late Hardayal and mathematics wizard Shakuntalaji or in case when except for one, the remaining tasks can be performed automatically requiring the least or no attention.



CHECK YOUR PROGRESS

Q7: What do you mean by division of attention?

.....

.....

3.6.1 EXPERIMENTAL FINDINGS THROUGH DIVISION OF ATTENTION

Title: Division of Attention.

Objective: To verify the hypothesis that efficiency of work or attention decreases when two tasks are performed at the same time.

Hypothesis: The output of the work is decreased in both tasks when they are performed simultaneously.

Materials used: a) Two physical task
b) Two mental task
c) One Physical and one mental task.
d) A stop Watch
e) Record Sheets
f) Stationery

Subject: Name:
Age:
Sex:
Educational Status:
Date:
Time:
Place:

Procedure: In this experiment the subject is provided with three conditions. In the first condition the subject is provided with a single task. In the second condition the subject is again provided with another task and in the third condition the subject is required to perform both the tasks equally at the same time. Let us now discuss in detail all the three conditions performed by the subject in the experiment.

In the first condition the subject is asked to write a letter of the alphabet say 'S' with right hand for 2 minutes and then the number of 'S' written by the subject is counted and recorded under 'S1' in Table-1. After that the subject is again asked to write the letter 'D' with left hand similarly for 2 minutes and then again it is counted

and recorded under 'S2' in Table-I. The subject is then asked to write the letter 'S' with right hand and letter 'D' with left hand at the same time for 2 minutes and the number of 'S' and 'D' are counted and written under D1 and D2 in table I respectively. The example of the first condition is presented below:

Subject Written alphabet 'S' with right hand	Subject Written alphabet 'D' with left hand
S S S S S S S S S S S S S S S S S S S S S S S S S S S.....Total= 100	D D D D D D D D D D..... Total= 20
Subject Written alphabet 'S' with right hand(both at same time)	Subject Written alphabet 'D' with left hand (both at same time)
S S S S S S S S S S S..... Total =15	D D D D D D D D..... Total = 7

For the second condition the experimenter asked the subject to go on writing every 4th number of the natural numbers starting from 1 and asking to stop after every 2 minutes. Then the experimenter counted and wrote the correct responses under S1 in table II. After that the subject is asked to tell every 3rd alphabet starting from 'A' and when the subject comes to 'Z' the subject is to continued back from 'A'. The subject was asked to stop after 2 minutes. The number of the correctly spoken alphabet were counted and written under S2 in table II. At the end of the second condition the subject was asked to write down every 4th number and speak out the third alphabet at the same time. The experimenter recorded the alphabets spoken by the subject and counted the correct number of alphabet and written numbers under D1 and D2 respectively in table II. The example of the second condition is given below:

Natural Numbers Written by the Subject	Alphabets Spoken by the Subject
4 8 12 16 20 24 28..... Total= 30	C F I L O R U X A D..... Total= 36
Natural number Written by the Subject	Alphabets Spoken by the Subject
4 8 12 16 20 24 28 32..... Total= 15	C F I L O R U X A D..... Total = 18

For the third condition the subject was asked to write the letter 'S' with right hand and to tell every 3rd letter of the alphabet at the same time for 2 minutes. The correctly written alphabets and correctly spoken alphabets were counted and recorded under D1 and D2 in table-II. The example of the third condition is presented below:

Letter 'S' written by the subject with right hand
S S S

OBSERVATION AND DISCUSSION

Division of attention means simultaneous focusing of attention upon two separate activities, whether they are physical or mental tasks given at the same time. The subject shifts attention back and forth from one task to the other. The subject losses efficiency in performing the task as found out in the results of the present experiment.

In the experiment it was observed that the subject had a shift of attention in performing double task as it is quite difficult to write the 4^{th} number of the natural numbers and to speak out every 3^{rd} letter of the alphabet. Similarly, it is also seen that in case of the double task, there is a decrease in scores in D1 and D2 in all the three tables (Table I, Table II, and Table III). It is also seen that writing and speaking at the same time is quite a difficult task as seen in the two mental tasks. From this experiment it is clear that the subject's efficiency was affected by the division of attention between the two mental tasks. Hence, it can be said that the double task of both mental and physical task appear to be very difficult and thus our hypothesis can be retained.



3.7 LET US SUM UP

- Attention is a mental effort or striving to control or regulate the conscious mind. Attention was originally considered as an inborn mental faculty and due importance was given on the cognitive or intellectual aspect of mind in attention.
- Attention as a process is carried out through cognitive abilities and helped by emotional and conational factors to select something out of the various stimuli present in one's environment and then bring it in the centre of one's consciousness in order to perceive it clearly for deriving the desired ends.

- There are generally two causes or determinants of attention- objective and subjective conditions. The objective conditions or determinants of attention are size, intensity, mobility, novelty, change, secrecy, situation, discipline, contrast, rareness, strangeness of any object or thing. Again subjective conditions of attention are interest, temperament, instinct, emotion, sentiments, desire, past-experiences and habit.
- Attention is of two types- Volitional or voluntary attention and Non-Volitional or involuntary attention. Again volitional attention is again sub-divided into two categories- implicit and explicit volitional attention and non-volitional attention is also classified into enforced and spontaneous non-volitional attention.
- Attention can be sustained through formation of habit, disciplinary rules, formation of ideal environment, making situation free from distraction, dynamic nature of teaching, learning by doing, formation of sentiment, creating motivation and development of will-force.
- Attention has certain limitations so far as the number of objects on immediate presentations is concerned. One cannot attend to too many things when presented at a time. Span or range of attention is the limit to which one can attend to a number of objects on immediate presentation.
- Psychologists have determined limits of attention by using an apparatus called “Tachistoscope”. It comes from the Greek word ***“Tachistos”*** which means ***“quick”*** and ***“scope”*** which means ***“to see”.***
- Span of apprehension is the maximum number of stimuli or units of information that can be processed at one time after brief presentation. Span of apprehension directly determines short-term memory capacity.
- Division of attention means a simultaneous focusing upon two separate activities. The activities should be separated from each other; like both of the activities should be combined in a group or one of the two activities should not be automatic.



3.8 FURTHER READING

1) S.K Mangal 2007: Essentials of Educational Psychology, Prentice Hall of India Private limited, New Delhi.

2) Dr. Lutfun Rasul Saikia 1997: Psychological and statistical Experiments in Education, Saraighat Printers, M.C. Road, Guwahati.

3) Chauhan S.S 2007: Advance Educational Psychology, Vikash Publishing House, New Delhi.



3.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Attention is a mental effort or striving to control or regulate the conscious mind. It involves the way we attend to or concentrate or focus on a task. It is the cognitive process of selectively concentrating on one aspect of the environment while ignoring other things.

Ans to Q No 2: The four characteristics of attention are:

- Attention is a striving activity of mind.
- Attention is essentially a process and not a product.
- It helps in our awareness or consciousness of our environment.
- At one time we can concentrate or focus our consciousness on a particular object only.

Ans to Q No 3: Determinants or causes of attention depend upon external and internal factors. The four important determinants of attention are size and novelty of the object which is external or objective by nature and interest and desire of a person which is subjective by nature.

Ans to Q No 4: Span of attention is the limit to which one can attend to a number of objects on immediate presentation. It is the amount of concentrated time on a task without becoming distracted. It may be