

BLOCK 5

GUIDELINES FOR PRACTICAL

**THE PEOPLE'S
UNIVERSITY**



1.0 INTRODUCTION

The BA Programme offered by the University will introduce you to the laboratory component in the courses offered by the Discipline of Psychology. To complete the course BPCC-131 Foundations of Psychology, you must complete one Tutor Marked Assignment, attend practicum sessions (sessions are mandatory), write the term end examination for theory and practical components separately.

Laboratory component is of 2 Credits. In this, you will learn how to administer tests and conduct experiments in a controlled condition, that is in a laboratory setup at your Study Centre. The test and experiments will be carried out on a human participant and you will be the experimenter or test administrator. At times, this situation may also be reversed as during the course you will carry out practical amongst your classmates. The tests and experiments are related to various topics that you have read or about to read in the theory component of BPCC 131. While doing lab work, you will be directly supervised by your academic counsellor. You will follow a standard procedure for administration/ conduction, scoring and interpretation of the result and findings. You will also learn about ethical issues as they apply in laboratory work.

As you must have learned that psychology is a science of human behaviour. It aims at understanding various phenomena of human mind and behaviour. The purpose of understanding is description, explanation, prediction and control of behaviour and the application of various techniques for the betterment of life. But how these goals are achieved? These goals are achieved through scientific research as a first step and then the research results are applied in real life settings. Psychologists have developed certain methods and procedures over the years to understand behaviour. These methods are studied in the branches of psychology especially devoted to the experiments, methods and research in psychology. The first such branch is *Psychometrics* which literally means measurement of psychological variables. It includes everything related to the measurement of psychological constructs. The more specific branches are Experimental Psychology and Psychological Testing. Experimental psychology, as the name suggests, is focused more on experimentation in psychology. Psychological testing is more focused on psychological tests developed to study various mental abilities, personality traits, and other related aspects of behaviours. Psychological tests are scientifically designed instruments for psychological measurement of constructs.

Experiments in psychology make use of different instruments/apparatus to study different cognitive, affective or behavioural aspects such as sensation, perception, attention, memory, learning and other such processes. They mainly focus on studying the cause and effect relationship between independent and dependent variable. The participant has to be active during the experiment as she/he not only performs on a task but is also vigilant in observing one's own mental activities while performing the task and reporting it to the experimenter. This is also known as 'introspective report'.

On the other hand, psychological tests can be classified into various types on the basis of administration, time limit, nature of items. This will be described in detail in later section. Psychological tests can be used in different settings like schools, hospitals, organisations and welfare organisations. They can also be used for research purpose. They are not only used to diagnose mental disorders, but may also be used to select individuals for different jobs, to determine career choice and grades, etc. Tests are also used to assess personality and adjustment pattern. Tests are administered in a standardized manner and includes assessment of some mental process, trait or characteristic. The main characteristics of a good test are that it should be reliable,

valid, possess good norms and should be appropriate for the persons's age, cultural, linguistic and social background. A good psychological test is always a standardized test, which means that the test follows a uniform and systematic procedure of administration and scoring. It also has a manual in which the reliability, validity and the norms are provided.

As part of this course, you will learn the administration of tests related to personality and also experiments based on cognitive processes, like perception and learning. As an experimenter/test administrator, you will make use of different apparatus and test materials (test booklet, manual, and scoring keys) to study different aspects of human behaviour.

2.0 PRACTICAL IN BPCC-131 (2 CREDITS)

The following practicals are to be conducted:

TEST:

- 1) Eysenck Personality Inventory

Or

- 2) 16 PF

EXPERIMENT:

- 1) Muller-Lyre Illusion Experiment

Or

- 2) Experiment on bilateral transfer

Two practicals are to be conducted in psychology laboratory. From the above four, one test will be administered and one experiment will be conducted and written in proper format (as mentioned in the guidelines) in the Practical Notebook. The Practical Notebook should include a title page (format given in Appendix I) and a certificate (Appendix II). This notebook is to be assessed by the concerned academic counselor. Actual conduction of practical and reporting it in practical note book (internal assessment) carries 70% weightage and the Term End Examination of Practical including viva-voce (external assessment) carries 30% weightage.

3.0 PROCEDURE TO BE FOLLOWED BY THE ACADEMIC COUNSELLOR

For Experiments in Psychology

- 1) You may refer to some of the books given as follows:
 - Experimental Psychology by L. Postman & J. P. Egan
 - Experiments in Psychology by S. M. Mohsin
 - Experimental Psychology with Advanced Experiments (2Vols.) by M. Rajamanickam
- 2) Explain the experiment in detail to the learners.
- 3) Introduce the experiment in terms of:

- Historical background
 - Hypothesis/es
 - Independent and dependent variables
 - Control and experimental conditions
 - Administration
 - Scoring
- 4) After the introduction of the experiment, demonstrate to the learners how to conduct the experiment.
 - 5) The demonstration will include the following:
 - Preparation for the experiment, for instance, keeping the material (instrument/ apparatus, stimulus words/ list, stopwatch) ready.
 - Establishing rapport with the participant, making him/her feel comfortable
 - Explaining the experiment (procedure, time limit, precautions)
 - Taking informed consent for undergoing the experiment and informing the participant that the experiment findings will remain confidential.
 - Taking permission to record the session, wherever applicable.
 - Explaining the instructions to the learners.
 - Clearing all doubts in the mind of the participant about the experiment.
 - The experiment is conducted on the participant.
 - 6) Explain the scoring procedure to the learners.
 - 7) Explain how to discuss the data.
 - 8) Ask learners to conduct the experiment on each other in pairs and monitor the same.
 - 9) The learners will now conduct the experiment and do the scoring.
 - 10) The learners will have to write a report of the experiment in the practicum notebook which will be evaluated by the academic counsellors.

For Psychological Tests

- 1) Go through the manual of the test thoroughly.
- 2) Explain the test in detail to the learners in the class.
- 3) Introduce the test in terms of:
 - History of the Test
 - Author
 - Development of the test
 - Features of the test (e.g. no. of items, dimensions, reliability, validity)

- Administration
 - Scoring
 - Interpretation
- 4) After the introduction of the test, demonstrate to the learners how to administer the test.
 - 5) The demonstration of administration will include the following:
 - a) Preparation for the test, for instance, keeping the test material (test booklet, answer sheet, stopwatch) ready.
 - b) Establishing rapport with the participant, making him/her feel comfortable
 - c) Explaining the test (procedure, time limit, precautions)
 - d) Taking informed consent for undergoing the test and informing the participant that the test findings will remain confidential.
 - e) Taking permission to record the session, wherever applicable.
 - f) Reading the instructions for test administration from the manual and showing it to learners as to from where they have to read the instructions.
 - g) Clearing all doubts in the mind of the subject about the test administration.
 - h) The participant takes the test.
 - i) Taking the answer sheet from the participant after completion of the test. .
 - 6) Explain the scoring procedure (as given in the manual) to the learners.
 - 7) Explain how to interpret the data.
 - 8) Ask learners to administer the test on each other in pairs and monitor the same.
 - 9) The learners will then administer, score and the results.
 - 10) The learners will have to write a report of the experiment in the practicum notebook which will be evaluated by the academic counsellors.

4.0 IMPORTANT INFORMATION FOR THE LEARNER

- 1) **Practical Counselling Sessions:** You are advised to contact your Study Centre with regard to schedule of counseling sessions for the Practical. You may also visit the website of your Regional Centre, where the schedule of sessions is displayed. Unlike counseling sessions of other courses in the programme, the sessions organized for lab work are mandatory. Thus, you should attend all the sessions and, in these sessions, your academic counselor will teach you how to conduct and administer experiments and tests. You will clarify all your doubts arising from your academic counselor. There is weightage given to attendance in evaluation also (refer to evaluation scheme, under 'Evaluation'). The number of counselling sessions allocated for practicum course are 02 sessions (01 session is of 03 Hours duration).
- 2) **Writing of Practical Notebook:** As mentioned above, you will be conducting and administering experiment and test. You will thus, record the procedure of experiment/test in the practical notebook. The notebook should be handwritten,

in the format mentioned at point No.3, and checked by the academic counselor under whose guidance you have conducted practical.

3) **Format for Writing Practical Notebook**

The academic counsellor will introduce the following format which you have to follow while preparing the practicum notebook.

- **Title:** This heading will mention the 'title' or 'name' of the practical e.g: 16 PF / Muller-Lyre Illusion.
- **Aims/ Objectives:** This section will consist of the main objectives or purpose of the practical. For example, if you are administering '16 PF' test, then the basic objective of the test will be: 'To assess the personality of the participant using 16 PF'.
- **Hypothesis/es (written in case of experiments only):** A tentative statement about the cause and effect relationship between the independent and dependent variables, is to be mentioned.
- **Introduction:** Here, the historical background of the test/ experiment is mentioned. The concept is defined and discussed. For example, in case of 16 PF, the historical background of 16 PF is described. The concept of personality is defined and the theories related to it are discussed, with a special focus on Cattell's personality theory.
- **Description of the Test/ Experiment:** Under this, the details with regard to the test is mentioned, like author of the test, basic purpose of the test, number of items, dimensions/ factors included in the test, time limit, reliability, validity, and scoring. For experiment, a brief information with regard to experiment is mentioned.
- **Material Required:** The material required for the administration of the test (or experiment) is mentioned. For example, in case of 16 PF, the test booklet, answer sheet, scoring key, pencil, eraser are required.
- **Participant's Profile:** This will consist of all the detailed information about the participant, like, name of the participant (optional), age, gender, educational qualification and occupation.
- **Procedure and Administration:** The following sub headings are included here;

Preparation: The material required for conduction of the test/ experiment, like, test booklet, apparatus or instrument, answer sheet, stopwatch, instruments, are kept ready.

Rapport: You have to mention that rapport was created with the participant and that she/he was well informed about the details of the test/ experiment.

Instructions: Instruction as given in the test manual/ experiment are included here.

Precautions: Precautions, if any, to be considered while administration of the test/ experiment are mentioned under this sub-heading.

Introspective Report: After completion of the test/ experiment by the participant, an introspective report is to be taken, that is, the participant's feeling and constraints faced by him/her while undergoing the test/ experiment is mentioned under this sub-heading in first person.

Scoring and Interpretation: After the participant completes the test, the answer sheet is to be scored with the help of the scoring key and the data is to be interpreted with the help of the norms given in the manual. The scores can then be mentioned and interpreted under this heading. For experiments, the findings are to be analysed and mentioned here.

Discussion: You have to discuss the obtained results based on the interpretation. It may be further analysed in the light of the introspective report. In case of experiments, the results may be supported by existing studies conducted in the field.

Conclusion: Under this heading, you have to conclude the findings of the test or the experiment.

References

The books, websites and the manual referred to by the learner are mentioned in American Psychological Association (APA) format.

References (APA Style)

References have to be written in APA format. These should be alphabetically listed.

Books

Anastasi, A. (1968). *Psychological Testing*. London: MacMillan Company.

Journal Article

Dennison, B. (1984). Bringing corporate culture to the bottomline. *Organizational Dynamics*, 13,22-24.

Book Chapter

Khan, A. W. (2005). Distance Education for Development. In: Garg, S. et.al. (Eds.) *Open and Distance Education in Global Environment: Opportunities for collaboration*. New Delhi: Viva Books.

Websites

<http://www.mcb.co.uk/apmfirum> (accessed on 2.3.2011)

- 4) You will keep the photocopy of the practical notebook before submitting it at the study centre. Acknowledgement (Appendix 3) may also be taken while submitting the notebook.

5.0 EVALUATION

- 1) **Term End Examination (TEE) Form and Exam Fee:** You will have to deposit separate exam fee for the TEE of Practical. The exam fee is Rs.150. Kindly check the latest fee amount applicable from www.ignou.ac.in.
- 2) **TEE:** Total marks for Practicum Examination will be 100 marks (Internal assessment is 70 marks and External assessment is 30 Marks). Internal assessment refers to actual conduction of Practical and reporting them in the practical notebook in the prescribed format. External Assessment refers to conduction/ administration of Practical on exam day and appearing in Viva- Voce. TEE for the practical will be organized at the Study Centre.
- 3) **Conduction of TEE:** You will conduct the practical and submit practical notebook

to the academic counsellor and get it corrected before the Practical Term End Examination. You will bring notebook at the time of examination. The examination will be conducted at the respective study centres. The duration of the examination will be of 3 hours. During the examination, you will conduct the practical and submit the answer sheet. The practical will be allotted to you by the way of lottery system. You will then collect the test material and start conducting the practical. You need to bring one participant on the day of exam, on whom the test/ experiment will be conducted. Once you finish conducting the practical, write the findings in the answer sheet. This will be followed by viva-voce. The participants may leave after the conduction of practical is over.

The practical answer sheets will be evaluated by the external examiner and the viva-voce will also be conducted by the external examiner.

Dates for Term End Examination of Practicum

Admission Cycle	Date Range for TEE of BPCC 131
July	1 July to 14 August
January	1 January to 15 February

The date for Practical TEE of BPCC131 will not appear in the datesheet provided by SED, IGNOU. For this, please contact your respective study centres.

- 4) **Passing Marks for Practicum:** Minimum passing marks in the course is 35. There is no re-evaluation in TEE of Practical.
- 5) **Scheme of Evaluation:** The following evaluation methodology will be followed for TEE:

INTERNAL	Marks	EXTERNAL	Marks
Attendance	05	Conduction	20
Conduction of test/experiment	30	Evaluation of answer script	10
Practical Notebook	15	Viva-Voce	20
TOTAL	50	TOTAL	50

External evaluation will carry 30% weightage and internal evaluation will carry 70% weightage.

6.0 A BRIEF GUIDE TO PRACTICAL

Principles of psychological testing

We all are familiar with the term testing. We grow up taking various tests at our school, tests for our physical fitness, or tests for our selection in sport teams or tests for recruitment, and the like. You must have also attempted tests in some magazine or newspaper which rates you on friendship scale – how friendly you are to others or an interest test – what do you want to do in leisure time or what do you want to be in life, or how active you are in taking initiatives etc. the list can go on. One very common example of test is appearing for examination in school. This type of test is called achievement test. In achievement test previous learning or what has been learnt is measured. This is only one type of various tests under the umbrella of testing. But if you

think about psychological testing, your mind will take you to the topics like intelligence, personality, attitude, creativity, learning, and memory etc.

Here, we will briefly explain what a psychological test is and its types; and then we will discuss principles related to administration, scoring, interpretation and report writing.

Psychological test

In general terms, test is any procedure used to measure a factor or assess some ability. Included in this are intelligence test, which yields IQ (Intelligence Quotient) measures, aptitude test, which measure potential in some area, various personality tests which assess aspects of personality style, belief systems and attitudes. More specifically, a psychological test can be defined as ‘a standardized instrument designed to measure objectively one or more aspects of a total personality by means of samples of verbal or nonverbal responses, or by means of other behaviours’ (Freeman 1965: 46).

Thus, a psychological test

- Is a standardized instrument
- Objectivity is one of the characteristics of a standardized instrument.
- Measures one or many psychological attributes- mental ability, personality, interest, attitude, aptitude, etc.
- Measurement is done through verbal or non-verbal responses.
- Sample of behaviour may be observed or studied through psychological tests.
- The test results are given in terms of scores or categories.

A brief overview of the early developments in testing:

Scholars date the history of testing back to 2200 BCE with the examination of Chinese officials to determine their fitness for office. This rudimentary type of testing was refined during Han Dynasty around 202 BCE - 200 CE. Five topics were tested: civil law, military affairs, agriculture, revenue and geography. The system of Chinese examination took its final shape in 1370 when proficiency in the Confucian classics was emphasized. But the established system was abolished in 1906. Psychological testing is believed to have started with the work of Francis Galton on individual differences. The concept of individual differences is a basic concept underlying psychological testing. Francis Galton (1822-1911) was the first scientist to undertake systematic and statistical investigation of individual differences. He demonstrated that individual differences exist in human sensory and motor functioning, such as reaction time, visual acuity and physical strength. James McKeen Cattell extended Galton's work. Cattell also coined the term mental test in 1890. Before Galton, there were other important works in the history of psychology, but difference in human abilities was not focused upon until the work of Galton. Weber (1795-1878) experimented on weight discrimination, vision, hearing and the two point-point threshold. Fechner (1801-07) contributed significantly in the understanding of relation of mental processes to physical phenomena (for example, how the change in the intensity of sound will affect the auditory perception). Wilhelm Wundt (1832-1920) who established the first psychological laboratory in 1879 in Leipzig, Germany, was working on the measurement of mental processes years before. In 1862 he experimented with thought meter to measure the speed of thought.

Thus, psychological testing developed from two lines of enquiry:

- One based on the measurement of individual differences by Darwin, Galton and Cattell
- The other, based on the work of the German psychophysicists - Weber, Fechner and Wundt.

Modern psychological tests were constructed in response to the needs of classifying people with mental health disability. The Seguin Form Board Test (1866) was developed by O. Edward Seguin (1812-1880) to educate and evaluate children with intellectual disability. An important breakthrough in the creation of modern tests came at the turn of the twentieth century with the publication of intelligence test by Alfred Binet and T. Simon in 1905. With the time more developments were seen in the field of testing with a range of testing devices like personality tests, performance tests, aptitude tests, interest inventories, educational achievement and multifactor tests etc.

As a learner of psychology, it is suggested to read more on the development of psychological testing—how it was started, what were the landmarks in the history of psychological testing. Here, we are giving a brief overview of the early developments:

Table 1: A Summary of Early Landmarks in the History of Testing

2200 BCE.	Chinese begin civil service examination
1862 CE	Wilhelm Wundt uses a calibrated pendulum to measure the ‘speed of thought’
1884	Francis Galton administers the first test battery to thousands of citizens at the International Health Exhibit
1890	James McKeen Cattell uses the term mental test in announcing the agenda for his Galtonian test battery
1905	Binet and Simon constructed the first intelligence test
1914	Stern introduces the concept of IQ or intelligence quotient- the mental age divided by chronological age
1916	Lewis Terman revises the Binet-Simon scales, publishes the Stanford-Binet. Revisions appear in 1937, 1960, and 1986.
1917	Robert Yerkes spearheads the development of the Army Alpha and Beta examinations used for testing World War I recruits
1917	Robert Woodworth develops the Personal Data Sheet, the first personality test
1920	Rorschach Inkblot test published
1921	Psychological Corporation- the first major test publisher-founded by Cattell, Thorndike and Woodworth
1927	The first edition of the Strong Vocational Interest Blank published
1939	Wechsler-Bellevue Intelligence Scale published. Revisions published in 1955, 1981 and 1997.
1942	Minnesota Multiphasic Personality Inventory published
1949	Wechsler Intelligence Scale for Children published. Revisions published in 1974, 1991
Adapted from: Psychological Testing by R J Gregory 2004: 51	

Types of Tests

Tests can be categorized on the basis of administration, the behaviour they measure, mode of response and on the basis of the structure of the test. On the basis of test administration, there are two types of tests: Individual tests and Group tests. The tests which can be given to one person at a time are known as **individual tests**. **Group tests** can be administered to more than one person at a time by a single examiner. If we categorize tests according to the type they measure, these tests are put under a broad category: ability tests. **Ability test** measures skills in terms of speed, accuracy or both. For example, in the test of mathematical ability, the more problems you solve accurately within the time limit, the more will be your score. Ability is a broad term which encompasses aptitude tests, intelligence tests and achievement tests. **Achievement tests** measure previous learning, like how much has been learnt in English in one year by six grade learners can be measured by term end examination. **Aptitude tests** measure potential for acquiring a specific skill, for example how much can be learnt by a person in music if s/he is given specific training is the person's musical aptitude. **Intelligence tests** measure a person's general potential to solve problems, to adapt to changing circumstances and to benefit from experience. All the above three types of tests are inter related; sometimes these tests are included under the tests of human ability. Personality tests measure traits, temperaments and dispositions. **Personality tests** can be categorized on the basis of the structure of the test. Whether the test is clearly structured like a questionnaire or it is semi-structured or uses unstructured stimulus. Unstructured or semi- structured tests are commonly known as **projective tests**. The test stimulus in projective tests is ambiguous, like ink-blots in Rorschach inkblot test.

On the basis of time constraint in the test, if the test has simple items and has a time limit, then it is a **speed test**. On the other hand, a **power test** may have a generous time limit but with difficult items. Tests may also be classified on the basis of nature of items or content of items used. In this category, a test may be a verbal test, nonverbal test, performance test, or non-language test. A verbal test is a paper- pencil test. In non-verbal test, language is only used in instructions, figures and symbols are used in items. In a performance test, the human participant performs on a task rather than answering questions. Such tests do not use language in the test, but instructions may be given by using language, gestures, or pantomime. In non-language test, the test does not use any form of written, spoken or reading communication. Instructions are usually given through gestures and pantomimes. Such tests are administered to people or children who cannot communicate in any language. Test may also be objective and subjective. In **objective test** there is a specific response to be given (True/False) and the scoring process is free of personal judgement or bias. **Subjective test** consists of items such as essay questions or responding to inkblots, where there is less specific response. The scoring may thereby, be influenced by personal attitude of the scorer. Tests can also be classified as achievement tests, attitude tests, interest tests and personality tests.

It should be clear to you by now, that psychological tests are mainly used to assess individual differences in various human abilities and personality. The most common uses of tests are classification, diagnosis and treatment planning, self-knowledge, program evaluation and research. We will discuss two tests in later sections.

Basic Principles of Psychological Testing

By principles of psychological testing we mean the basic concepts and fundamental ideas that underlie all psychological tests. Reliability, validity, test administration and standardization are some of the fundamental concepts, that we will discuss here.

a) **Reliability**

Reliability is consistency. The reliability of a test is its ability to yield consistent results. A good test should be reliable – that is, it should give similar results whenever a person takes it. It should give similar results even if different persons administer and score it. Reliability is not an all or none matter, it is a matter of degree. ‘In more technical terms, reliability refers to the degree to which test scores are free of measurement errors’ (Kaplan and Saccuzzo 2009: 22). The British Psychological Society Steering Committee on Test Standards says that reliability is a reflection of ‘how accurate or precise a test score is’ (1999: 4). Measures of reliability are usually based on correlation coefficients. A correlation coefficient ranges from +1.0 to -1.0. It is the measure of the strength of association or similarity between two sets of scores obtained by the same person or group. In psychological tests, perfect reliability does not exist usually.

There are several different ways of assessing reliability: item-total correlations, test-retest reliability, split half reliability, factor and principal component analysis and inter-rater reliability. The choice of method depends on the needs of the investigator. In *test-retest reliability method*, the same test is administered twice to the same group and coefficient correlation is calculated for the scores on both the test. *Alternate forms reliability* is estimated with the help of alternate form of the same test. The investigators sometimes develop alternate form of the test which has same content and covers the same range and level of difficulty. Both forms of the test are administered on the same group and the test scores are correlated to find out the reliability of the test. It is also called equivalent or parallel forms reliability. *Split-half reliability* is estimated by correlating the scores obtained from equivalent halves of a test administered once to a representative group. In the item total correlations, the investigator calculates the correlation between scores on each item of the test and the total score on the test. *Inter-rater reliability* is calculated when the measured behaviour is rated by observers. Ratings of different observers are correlated to measure the correlation coefficient. The Table below gives a brief overview of the methods of reliability,

Method	No. of Forms	No. of Sessions	Sources of error variance
Test-Retest	1	2	Changes over time
Alternate forms (immediate)	2	1	Item sampling
Alternate Forms (delayed)	2	2	Item sampling Changes over time
Split Half	1	1	Item sampling Nature of split
Item total	1	1	Item sampling Test heterogeneity
Interscorer	1	1	Scorer differences

Source: Robert J Gregory (2004: 111)

There are different statistical methods used to assess reliability: Cronbach’s alpha, Kuder-Richardson (KR-20), Pearson correlation and Guttman’s coefficient and factor analysis. You can read more about reliability and validity on <http://psychology.wadsworth.com/book/gravetterwallnau5e/index.html>

What should be the accepted level of test reliability or when do we say that the particular test should be used as it has good reliability index? “There is no such fixed criterion for a good psychological test. Some authors suggest that reliability should be at least .95. But in the words of Guilford and Fruchter (1978), ‘There has been some consensus that to be a very accurate measure of individual differences in some characteristics, the reliability should be above .90. The truth is, however, that many standard tests with reliability as low as .70 prove to be very useful. And tests with reliability lower than that can be useful in research.’”

b) **Validity**

A valid test is one that measures what it is supposed to measure. ‘A test is valid to the extent that inferences made from it are appropriate, meaningful and useful.’ (Standards for Educational and Psychological Testing, 1999). The first essential quality of a valid test is that it should be highly reliable. If a test yields inconsistent results, (i.e. it is not reliable) it can not be correlated with any criterion (some behaviour or personal accomplishment etc.). But high reliability does not guarantee high validity of the test. The relation between reliability and validity can be discussed with the following example: ‘Sir Francis Galton’s sensory and motor measures could never have been valid if they had not been reliable... Yet even though some of Galton’s measures turned out to be very reliable, later evidence showed that they were not valid measures of intelligence. The measures yielded similar scores time after time, but those scores were poorly correlated with validity criteria such as school grades and teacher ratings of intelligence.’ (Morgan, King, Weisz and Schoplar, 1997: 520).

There are several different types of validity. One or more methods can be selected depending on the needs of the measure. Different ways of measuring validity have been grouped into three categories: Content validity, Criterion-related validity, Construct validity. *Content validity* is ‘an estimate of validity of a testing instrument based on a detailed examination of the contents of the test items; contents here means the actual constituent material of the test item’ (Reber and Reber, 2001: 781). Content validity depends on the judgment of experts on the relevance of the items used in the instrument. *Criterion related validity* is assessed by determining the relationship between test scores and some independent criterion. Gregory has included two different approaches under criterion related validity- concurrent validity and predictive validity (2004: 124):

- In concurrent validity, the criterion measures are obtained at approximately the same time as the test scores. For example, the current psychiatric diagnosis of a patient would be an appropriate measure to provide validation evidence for a paper-and-pencil psychodiagnostic test.
- In predictive validity, the criterion measures are obtained in future, usually months or years after the test scores are obtained. For example, a college entrance exam that is accurate in predicting the subsequent grade point average of examinees would possess criterion related validity.

Construct validity is ‘a set of procedures for evaluating the validity of a testing instrument based on the determination of the degree to which the test items capture the hypothetical quality or trait (i.e. the construct) it was designed to measure. For example, if a test is supposed to provide a measure of intelligence one should ask: what traits or qualities (or constructs) actually characterize intelligence? Do the test items actually tap such constructs?’ (Reber and Reber 2001: 781). Face validity is dependent on whether the test looks valid to test users, examiners and examinees. Gregory comments that face validity is important for social acceptability of the test but is irrelevant for psychometric purposes.

c) Norms

Suppose someone gets 50 marks on an intelligence test. This score has no meaning in itself. In psychological testing the scores obtained first from a test are called raw scores. These scores are simply overall score of the performance on the test, like the number of problems solved in an intelligence test. These initial scores are converted to some form of standard scores based on a norm group. 'A norm group consists of a sample of examinees who are representatives of the population for whom the test is intended' (Gregory 2004: 81). For example, if a test is designed to study the value system of twelfth graders, the test will be given to large number of such age group (rural- urban, rich - middle class - poor etc.) to determine the distribution of raw scores. On the basis of collection of scores, the test developer will provide derived scores. These scores are known as norms. Norms can be in the form of percentiles ranks, stanines, stens, age norm, grade norms or standard scores.

A percentile expresses the percentage of scores in a sample that fall below it. A score at 50th percentile indicates that 50% of the scores fall below it. Percentile should not be confused with percent. Percentile is a comparative score. It tells where your scores places you in particular sample (norm group) whereas percent tells the number of questions answered correctly. 50% expresses how much was attempted correctly on an intelligence test and this 50 percent can be placed at the percentile of 50, 90, or 80 depending on the performance of the sample. Percentile 1 is the lowest rank and 100 percentile is the highest rank.

Standard score is any derived score based on standard deviation. It is more commonly known as z-score. It expresses the distance from mean in standard deviation units. T-score is a variant of standard score. It was suggested by McCall (1922). In case of standard score, the value of mean is taken zero whereas in a T-score the value of mean is 50 and standard deviation of 10.

Stanine (or standard nine) scale was developed by the United States Air Force during World War II. In stanine scale all raw scores are converted to single digit system ranging from 1 to 9. Sten scale (standard ten) was proposed by Canfield (1951). It is ten unit scale with 5 units above and 5 units below the mean. Age norms express the level of performance with reference to age. Grade norms express the level of performance with reference to grade level.

There are many such norms developed for different tests, as mental age and I.Q. Learners will know more about them while using various tests with different norms.

Test Administration and Scoring

Test administration can be either individual or group. The administration of a test should be according to a uniform and specified set of instructions. This is the first principle of test administration. 'A test is considered standardized if the procedures for administering it are uniform from one examiner and setting to another' (Gregory 2004: 54). If a test is not administered according to the specified set of instructions, there will be no uniformity in the administration of the test. The result of such a test will not be reliable. Test administration should follow the guidelines given in the manual. Some important points that the investigator should know before administering a test are given below:

- Every psychological testing procedure, as we already said, has a purpose and rationale.

Before using a test, tester should see whether the test fulfills the purpose at hand. The question that one needs to ask is, why do I use this test, what is the purpose of using this

test? If all the questions are satisfactorily answered, then one should proceed and use the particular test. But if the use of the test is not rationalized on any ground - purpose, population, or context of using the test - the test should not be used.

- Before using a test, examiner must be familiar with the materials, instructions and the procedure to be followed in the test.
- An examiner should be sensitive to disabilities in the examinees. Disabilities related to hearing, vision, speech or motor control may affect test performance. In case of unrecognized disabilities, serious errors of interpretation may occur.
- Examiners should allot proper time for the entire testing process: setup, reading instructions and actual test taking by the examinees. Allowing too much time for a test is equally erroneous as allowing less time.
- Instructions should be read out in a clear and loud voice. Examiners must stop to answer the questions if the instructions are not clear to examinees.
- The physical conditions (testing room) should be suitable for the test. The conditions such as illumination, temperature and humidity should be taken into consideration before the test. The testing environment should be pleasant, quiet and well illuminated with proper writing desk (in case of a test where answer sheet is required to be filled up).
- Establishing rapport is the first thing that examiners are advised to do when giving a test to an individual or a group. 'Rapport is a comfortable, relaxed, unconstrained, mutually accepting interaction between persons' (Reber and Reber 2001: 597), especially between an examinee and an examiner. It is essential requirement to motivate examinees to cooperate during testing. It is more important in individual testing and particularly when examinees are children. Failure in establishing rapport may cause anxiety, hostility, and uncooperative behaviour in examinees.
- The scoring of the test should follow the pattern as specified in the test manual. If scoring is not numerical, the method of interpretation should also follow the guidelines as given in the test manual.
- Thus, a psychological test is a standardized instrument in the sense that it provides well defined procedure and instructions, the items used in the test are reliable and valid and the test depicts scores in terms of standardized scores. At present, when we have access to computer assisted test administration and scoring, the accuracy and precision in administration will require proper training and practice of the examiner both on technical and human grounds.

Report Writing

After administration of a psychological test, the findings are to be presented in the form of a report. Report should be written clearly. The report should be properly divided into sections and subsections and the findings should be tabulated wherever required.

The report should be written in passive voice. For example, instead of writing 'I gave the test booklet to the examinee', one should write, 'the test booklet was given to the examinee'. The report should be written in a standard format.

Being Qualified and Trained in Psychological Testing

There are two aspects of being trained in psychological testing:

- Having technical and theoretical knowledge of psychological testing and its applications
- Having skills necessary for the application of psychological testing, for example communication skills, being a good observer and empathetic listener, etc.

The above aspects are briefly discussed as follows:

a) Technical and Theoretical Knowledge

Some basic components of this knowledge are:

- Knowledge of test construction
- Efficiency in application
- Knowledge and efficiency in scoring and interpretation

i) Knowledge of test construction

Today testing is required in every field: schools, industries, selection agencies, hospitals, special education centers, rehabilitation centers and various other organisations. A psychologist may face the task of choosing a test from the available tests or developing a test as the situation demands. In both the situations knowledge of test construction is mandatory. If one needs to select a test, one should have the knowledge of basics of test construction. How the test is developed? Whether it has proper norms or it is standardized, what is the method of scoring, etc. All this information requires technical knowledge about the test construction process. Otherwise, decision of choosing will be fraught with biased assumptions. The theoretical knowledge pertains not only to the selection of test, but also to the construction of tests. One might face such a situation when no test is available, or the available test is outdated, or not suitable culturally. Suppose you are required to make an index of happiness of people in your country or your state or city. How to prepare such an index? You come to know that one such procedure is available in some other country. But the definition of happiness may differ from one country to the other. At one place, it may be family which is primary source of happiness to persons, but at the other, it may be secure future and material prosperity. Thus, one might decide to prepare a questionnaire to study the level of happiness.

ii) Efficiency in application

Which measure one should choose if one is find out whether a child has learning disability or not. One might need a range of procedures – paper pencil test (test of learning and intelligence), observations, interviews with the child, parents and teachers. Which test one should choose -verbal or non-verbal, some qualitative approach or quantitative or both, whether the test is fit for the cultural background. These decisions need not only theoretical knowledge but insight on the part of the investigator which comes with knowledge, practice and experience.

iii) Efficiency in Scoring and Interpretation

Scoring procedures in testing are developed through rigorous statistical procedures. While using psychological tests, one is required to have sound knowledge of statistical principles applied in psychological testing. How the reliability and the validity of the test has been calculated? How the norms of the test have been developed? Knowledge of these technical aspects helps both in construction, selection, revision and adaptation of a test. Interpretation is an essential aspect after scoring which also involves explaining the significance of the scores. What does it mean for a person who gets IQ score of

94? To fulfill all these purposes, an appropriate explanation is an essential requirement from the part of the investigator.

b) **Developing Skills**

The work of a psychologist is more like an artist. She/he needs to observe, listen, feel and then say something as less as possible. Observation here is not only a method used to study a specific problem. It should be developed as a habit. How to see things: people talking to each other in buses, trains, or offices; youngsters chatting outside a mall, people writing their views in newspapers and magazines, people behaving with each other- in families, in offices, in traffic, nothing should go unnoticed. It need not be a deliberate exercise once it is developed as a habit. 'A psychologist should be a good writer', said a wise man. Yes, whatever you observe pen it down. Psychology is a science in the methods it uses, but it is essentially an art in its application. This art will develop gradually when you observe and contemplate and develop the habit of writing things systematically. After observation, another important skill is communication skills. Psychologists working as therapists, counsellors, trainers or psychometricians require communication with others. Communication is a chain of events from the speaker to the Listener. The chain of events involves



Thus, communication involves other mind, a message (information) a code (language) and a channel (written-visual, spoken-auditory) through which information is transmitted. A psychologist should learn to be a good listener before learning to be a good speaker. She/he should learn where and when to speak and where not to. Being just a listener is not sufficient; a psychologist should be an empathetic listener. She/he should feel what others are feeling.

Psychologists should be sensitive to the cultural differences. Various behaviours have their roots in the cultural milieu of a person. The way people talk, greet, their eating habits and sometimes their sensitivity to their surroundings is affected by the environment they live in. If a psychologist is not sensitive to the cultural and environmental factors, there will be no meaning of the inferences drawn from observations and testing, and ultimately will be harmful for the individuals and society at large.

Knowledge of ethical principles during testing is also expected from a trained psychologist. Ethical guidelines for testing issued from time to time are called ethical principles and code of conduct. Psychologist should comply with these principles to avoid any mistake in research and testing. In general, we can phrase principles of ethical treatment as,

- 1) Right to safety
- 2) Right to respectful treatment
- 3) Right to confidentiality
- 4) Right to be informed – technically called informed consent – an examinee should be informed about the nature of the test, risk involved, purpose, and use of information of the test beforehand and only if she/he agrees the examiner should proceed with testing. Examinee should also get informed about the results of the study and use of the test findings.

All the above rights of examinees should be respected during testing and research. In a nutshell, a psychologist should take responsibility of working with humans or animals very honestly that will serve the purpose well for both the examiner and the examinee.

We will discuss specific tests in detail, in section below. As already mentioned, you will learn more as you apply these test in the field. Select only one from the tests described below. The two tests included in the syllabi are Eysenck Personality Inventory and 16 PF.

1) Eysenck Personality Inventory

You have learned the concept of personality, different theories of personality as well as various ways to measure the construct in Unit 7 on Personality.

Personality refers to organized, consistent and general pattern of behaviour of a person across situations which help understand his/her behaviour as an individual. There are a number of theories that explain and describe the concept of personality. There are two main trends in the area of personality assessment: use of unstructured projective techniques (for example, Rorschach test) and structured approaches such as self-report inventories and behaviour ratings. Personality inventories are questionnaires that assess personality. 'Personality inventories are questionnaires on which individuals report their reactions or feelings in certain situations. Responses to subsets of items are summed to yield scores on separate scales or factors within the inventory' (Hilgard and Atkinson 2003: 459). Several personality inventories are based on preexisting theories. Some examples of theory guided inventories are Edward Personal Preference Schedule (EPPS), Personality Research Form (PRF) (both based on Murray's need press theory of personality) and Myers-Briggs Type Indicator (MBTI) (based on Carl Jung's theory of personality types). Apart from theory based inventories, factor-analytic approaches contribute in developing theories based on the initial test findings. With factor analysis, psychologists identify personality dimensions that can define personality. Cattell has identified 16 personality factors using factor analysis.

About the test: Hans Eysenck (1953) arrived at two personality factors: introversion -extraversion and emotional instability (neuroticism) - stability. The third dimension added later is - Psychoticism - Socialisation. The three dimensions are defined below: (Hilgard & Atkinson 2003: 454)

- Introversion-extroversion refers to the degree to which a person's basic orientation is turned inward toward the self or toward the external world.
- Neuroticism (stability-instability) is a dimension of emotionality, with moody, anxious, temperamental and maladjusted individuals at neurotic or unstable end, and calm, well adjusted individuals at the other.
- Psychoticism is characterized by solitary, troublesome, cruel, lacking in feeling of sympathy, hostile to others. The person is sensitive seeker. He likes unusual and strange things.

The three dimensions are studied as Psychoticism (P), Extraversion (E) and Neuroticism (N) by Eysenck Personality Questionnaire (EPQ-R), which is the final revision of Eysenck's personality inventory in 1975. EPI was designed as a measure of introversion-extroversion by Eysenck in 1957 and revised many times. The 1975 revised edition was designed by H J Eysenck and S B G Eysenck. The questionnaire consists of ninety questions. These questions are carefully selected out of many items after factor analysis. The EPQ consists of four scales - three scales for the dimensions of personality and the fourth is Lie Scale (L). Lie scale assesses the validity of an examinee's responses. The statements on EPQ can be answered as 'yes' or 'no'. It is designed for persons aged 16 and older. EPQ with 81 questions is also available which can be used for children aged 7 to 15. EPQ can be used both as an individual test and as a group test. Some

statements from EPQ are:

Do you often break rules? Would you worry if you were in debt? Do you like to meet new people? Are your feelings easily hurt?

The EPQ is a highly reliable (test-retest correlations .78 (P), .89 (E), .86 (N), and .84 (L)) and valid questionnaire (internal consistency were in the .70(S) for P and .80(S) for the other three scales) for personality assessment. A major focus of research with the EPQ has been extraversion and introversion.

After the participant completes the test, the scores on each scale are tabulated and interpretation for each scale is described with reference to the explanation provided by Eysenck and as discussed in the manual.

2) 16 Personality Factor

We are aware about the number of approaches and theories that been developed to understand and explain the concept of personality. These theories are based on different models of human behavior. Each throws light on a significant aspect of personality but not all aspect of personality. Psychologists distinguish between type and trait approach to personality. Type approach attempts to comprehend human personality by examining certain broad patterns in the observed behavioral characteristics of the individual. Each behavioral pattern refers to one type in which individuals are placed in terms of the similarity of their behavioral characteristics with that pattern. Whereas, the trait approach focuses on the specific psychological attributes along which individuals tend to differ in consistent and stable ways.

Efforts to categories people into personality types have been made since ancient times. The Greek physician Hippocrates proposed a typology of personality based on fluid or humor. He classified people into four types (sanguine, phlegmatic, melancholic and choleric); each characterised by specific behavioral features. Ayurveda classifies people into the categories, Vat, Pitt, and Kapha, on the basis of three humoral elements called tridosh. There is another typology of personality based on the Trigunas, i.e. Sattva, Rajas and Tamas. All the three gunas are present in each and every person in different degrees. The dominance of one or the other guna may lead to a particular type of behaviour.

Sheldon using body build and temperament as the main basis, proposed Endomorphic (fat, round, soft, relaxed, and sociable), Mesomorphic (strong body build), Ectomorphic (thin, long, fragile body build) classification. Jung proposed another important typology by grouping people into introverts and extroverts. Recently, Friedman and Rosenman have classified individual into Type A and Type B personality. Type A personality seems to possess high motivation, lack patience, feels short of time, and be in a great hurry. Such people are prone to developing coronary heart disease and hypertension. Absence of such traits is Type B personality. Morris suggested a Type C personality, one that is prone to cancer. Type D personality is characterised by proneness to depression. Trait theorists are mainly concerned with the description of characterisation of basic components of personality. They are mainly interested in the 'building blocks' of personality. Human beings display a wide range of variations in psychological attributes, yet it is possible to club them into smaller number of personality traits. A trait is considered as a relatively enduring attribute or quality on which one individual differs from one another. They include a range of possible behaviour that is activated according to the demands of the situation. A number of psychologists have used traits to formulate their theories of personality, for example, Allport, Eysenck, Cattell.

About the Test: 16 Personality Factor Test is constructed by British psychologist,

Raymond B. Cattell. According to Cattell, there is a common structure on which people differ from each other. This structure could be determined empirically. With the help of statistical technique called factor analysis, he discovered the common structures. He found 16 primary or source traits. The source traits are stable, and are considered as the building blocks of personality. Besides these, there are also a number of surface traits that result out of the interaction of source traits. Cattell described the source traits in terms of opposing tendencies. Cattell developed Sixteen Personality Factor Questionnaire (16 PF), for the assessment of personality. This test is widely used by psychologists today.

The test was first published in 1949, thereafter revised in 1956 and 1962. Five alternative forms of the 4th edition were released between 1967 and 1969. Fifth edition of 16 PF was released in 1993. PF stands for 'Personality Factors' and there are sixteen personality factors, hence, it is known as 16 PF. These 16 factors are the major source traits. Cattell's theory asserts that every person possesses a degree of each of the following sixteen traits (Cattell also uses the term factors).

For each trait, factor label or code letters are used. The major source traits as represented on 16 Personality Factor Inventory is as follows:

Factors	Description
A	Outgoing- Reserved Outgoing-Reserved
B	Intelligence
C	Stable-Emotional
E	Dominant-Submissive
F	Sober-Happy-go-lucky
G	Conscientious-Expedient
H	Venturesome-Shy
I	Tough-minded-Tender-minded
L	Trusting-Suspicious
M	Imaginative-Practical
N	Shrewd-Forthright
O	Apprehensive-Placid
Q1	Radical-Conservative
Q2	Self-sufficient-Group-dependent
Q3	Undisciplined-Controlled
Q4	Relaxed-Tense

The 16 PF Inventory is a paper pencil test that consists of 185 multiple-choice items. The participant has to select one option. There is no right or wrong answer to the statements. On an average, it takes 35-50 minutes to complete the test. After completion, the scores are tabulated and interpreted with the help of manual.

Experimental Psychology-Background

The first psychology laboratory was established in 1879 by Wilhelm Wundt at Leipzig. In a way, experimental psychology as a formal discipline may be said to be more than hundred and thirty years old. Over the years, experimental psychology has expanded to a large extent. Psychologists have been able to develop precise methods, techniques and procedures of observation and analysis. With the help of experiments, psychologists have also successfully investigated complex behaviour of both human and animals, predict behaviour with a good deal of accuracy, and have been able to improve behaviour in real life situations.

Experimental psychology had its roots in philosophy and subsequently emerged as an independent discipline. Growth of Experimental Psychology has been possible not because psychologists themselves made all the contributions but also because of their ability to assimilate and adapt the findings of other sciences like physiology, chemistry, astronomy, sociology, etc. Among the philosophical writings which gave a prominent place for matters of psychological interest were those of **Descartes, Leibnitz, and the British Associationists**. These writers gave importance to issues like acquisition and growth of knowledge, memory, etc. which were directly related to an understanding of human behaviour. **Locke, Berkeley, Hume, Brown**, gave the earliest scientific principles of psychology, known as the Laws of Association, which were derived through intellectual analysis and not experimentation.

The mid 19th century witnessed significant developments in the field of biology and physics. The most important was the theory of organic evolution, propounded by **Charles Darwin**. Since, early psychologists had a close association with religion, theology, and philosophy, Darwin's theory gave a new outlook of establishing psychology as an independent experimental science. This paved the way to take help from developments in other areas like physiology, neurology, medicine, etc. in explaining behaviour. Attempts were made to design and carry out experiments on human behaviour.

In the meantime, the physicist-physiologist **Helmholtz** made an attempt to study the speed of reaction in frogs. Helmholtz demonstrated that the speed of nerve conduction in a frog could be measured. This gave way to study the speed of reactions in human beings. Significant contributions was made by **Donders**, a Dutch physiologist. This was the starting point of now famous 'reaction-time' experiments.

The next important development came from the work of **E.H. Weber**, a German physiologist, who experimented on sensation. Weber attempted to study the quantitative relationship between changes in physical conditions and accompanying psychological changes. Weber, called this area of experimentation as **psychophysics**. Weber's work was further developed by **G.T. Fechner**, a German physicist. The work of Weber and Fechner resulted in the formulation of Weber-Fechner law, the first quantitative law in psychology.

The problem of individual differences was addressed by **Galton**, who was mainly interested in studying and analyzing differences in human behaviour. The most important aspect studied was imagery. Galton devised a test to study the differences among people in imagery.

All these developments were taking place in Europe and this further helped in the establishment of the first psychology laboratory in Leipzig (by **Wilhelm Wundt** in 1879). After this, various other laboratories were established in places like Vienna, Berlin, Wurzburg, etc. These laboratories carried out experiments on laws of association, reaction-time, imagery, and sensation.

Another important development in experimentation was by **Herman Ebbinghaus**, regarding the processes of memory (retention of knowledge) and forgetting (loss in knowledge). This brought 'higher mental processes' into the domain of experimental psychology.

In the United States, attempt to develop experimental psychology was made by **E.L. Thorndike**. Thorndike had come out with his experiments on learning process and the unique feature in his experiments was the use of animal subjects. He was of the view that animal behaviour would provide very useful clues to study human behaviour. Thorndike's experiments on trial and error learning with cats as subjects and the 'puzzle box' as the apparatus were significant and provided the foundation for modern experimental psychology. Thorndike's work resulted in the first set of empirically derived quantitative laws in the area of learning. The introduction of animals in the laboratory helped in the development of experimental psychology, since, animal experiments provided more accurate observation, as well as, greater manipulation of experimental conditions to ensure better control.

Yet another major development was by Russian physiologists, **Bechterev** and **Pavlov**. Bechterev's 'objective reflex' and Pavlov's 'conditioned reflex' threw significant light on the origin of behaviour.

Experimental psychologists soon realised the significance of social factors, and the result was the development of experimental social psychology. Early contributions were made by **Allport, Newcomb, Lippitt, Asch, Sherif, Murphy, Lewin**, and others. Today, experimental social psychology has become an independent branch of study all together. Social psychologists have planned and carried out experiments that have helped us to understand the behaviour of human beings in different kinds of social situations. Such understanding has found application in industry, hospitals, schools and other situations where people are found to interact.

Thus, it may be concluded that experimental psychology gradually expanded to areas of learning and social behaviour. Over the years, experimental psychology also included the study of abnormal behaviour, and this resulted in the emergence of experimental clinical psychology to be an important field of application and inquiry. Experimental psychology has developed techniques of behaviour therapy and behaviour modification which may be applied in hospitals, clinics, correctional homes, prisons, etc. The findings of experimental psychologists are applied in factories, offices, hospitals, schools, etc. There is probably no area where experimental psychology cannot make its contributions. Its area of scope and application is much wider than those of most other sciences.

Now, we will discuss two experiments. You will select only one from the experiments described below.

1) **Experiment on Muller-Lyer Illusion**

In the Muller-Lyer illusion there are two horizontal lines, one is SS (Standard Stimulus), with 'arrow heads' and the other is SV (Variable Stimulus) with 'feather heads'. Both lines are equal in length. But the line with feather heads will be perceived by the participant to be longer than the arrow heads line. The participant adjusts SV till she/he perceives the two lines to be equal. The experimenter may find out how close the participant comes to match the two lines from the scale fixed behind the illusion board. The direction to the participant for adjustment should be varied. In half of the trials the SV should be set with a value considerably longer than the standard and in half of the trials it should be set considerably shorter than the SS. There are two conditions followed in all trials. They are: (1) space condition (right and left; R and L) and (2) movement condition

(outward and inward; O and I). Consequently, there are four combinations as RO, RI, LO, and LI. When these four conditions are counterbalanced, we have the sequences as RO, LI, LO, RI, LI, RO, RI and LO. For each sequence there are 10 trials and a total of 80 trials. There are four ascending and four descending series.

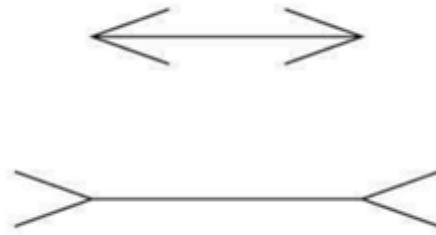


Figure 9.1: Arrow head and Feather head line

Experiment: Determination of equal stimuli by the Method of Average Error

Problem: The purpose of this experiment is to determine the extent of visual illusion in the Muller-Lyer illusion apparatus by using the method of average error.

Material Required: Muller-Lyer illusion apparatus, paper and pencil.

Procedure: The experimenter in advance should prepare observation table in record book for noting down the judgements. The table should have two space and two movement conditions with the sequence of RO, LI, LO, RI, LI, RO, RI, and LO. The experimenter should give the following instructions: “Look at this board, there are two lines. These two lines as you see are unequal in size. I will keep the length of this line as constant and go on varying the length of variable line in small units, either increasing or decreasing. At every step you should tell me whether SV is equal to SS or not. When you feel they are equal, I will stop”.

Result: In all, there are 4 ascending series (RO, LO, RO, LO) and 4 descending series (RI, LI, RI, LI). Thus, we have eight conditions. The means for R and L spaces and means for O and I movements have to be worked out. The main aim of this experiment is to determine the discrepancy between the SS (arrow heads) line and the average of the subject's judgements (Mj). This is the extent of illusion. This is the main constant error (Ec) of the experiment.

The formula to find out space error is : $MR - ML/2$;

MR = Mean of the right space

ML = Mean of the left space

The formula to find out the movement error: $MO - MI/2$;

MO = Mean of outward movement

MI = Mean of inward movement

The formula to find out constant error is : $Mj - SS = Ec$

Mj = Mean of all judgements

SS = Standard stimulus

Ec = Constant error

Discussion: Discuss the results obtained in Muller-Lyer illusion experiment. State the extent of illusion whether it is due to overestimation or underestimation. State whether the result is in accordance to the assumption of the experiment. The SS line should be underestimated in comparison with the SV. Compare the space and movement error and state which is greater and why. Is the constant greater than the space and movement error, if so, why? Any variation in the subject's judgement in the ascending series from the descending series has also to be explained.

2) **Experiment on Transfer of learning**

Bilateral transfer of learning occurs when there is transfer of performance to one side of the body following training of the opposite side, eg. improved left-handed performance following right-handed training. You will verify the phenomenon by conducting a simple experiment as explained below.

Problem: To demonstrate the phenomenon of bilateral transfer of learning.

Material Required: Mirror-drawing apparatus, stylus, stop watch, paper and pencil.

Procedure: The following instructions are to be given to the participant, "Look at this mirror, you will see a star image. The star image is a reflection of a pattern grooved on the wooden board and hidden by the screen. Take the stylus in your left hand (the experimenter will give the stylus to the participant and helps him/her to position it at the end of the nearest projection). Now you will have to look into the mirror image and trace the star pattern with the stylus. Be careful about the stylus not touching the edges of the groove. If you touch, it will be counted as an error. Try to do as speedily as possible." After the participant traces the path once with the left hand, she/he is asked to trace the path again. Time taken and the number of errors committed are noted down.

In the same way, now the participant is asked to trace the star pattern with the right hand for 10 trials. In each of these trials, the number of errors committed and the amount of time taken in seconds to complete the pattern are noted down. Again the participant is asked to perform the same task in the same manner with the left hand, and the errors committed and time taken in seconds are noted down.

Result:

- Tabulation of data: performance index (time taken and number of errors) for first trial with left hand, followed by trials with right hand (10 trials), and lastly, the second trial with left hand.
- Calculate the percentage gain in time (if any), for second trial with left hand.
- Calculate the percentage reduction in the number of errors (if any), for second trial with left hand.

Discussion: Compare the time taken in seconds and errors committed in the first trial with left hand with that of the second trial with left hand (after training with right hand for ten trials). Find out whether there is any transfer of training in the second trial with left hand and also if it is positive, negative or zero transfer.

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