

PSYCHOLOGY : ITS DEVELOPMENT AND STRUCTURE

By

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CERTIFICATE

I have great pleasure in forwarding the Dissertation of RAMA MISHRA on PSYCHOLOGY : ITS DEVELOPMENT AND STRUCTURE. It is being submitted in the part fulfilment of the Degree of Master of Library and Information Science (1988-89) of the North-Eastern Hill University.

I certify that the dissertation embodies the original work done by her under my supervision and to my entire satisfaction.

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I N T R O D U C T I O N

I N T R O D U C T I O N

The universe of knowledge is dynamic. It is everchanging. A knowledge of the universe of subjects is essential for every one related with the organization of knowledge. Library services can be greatly improved and the need of the readers better catered to, if Librarians, Information Scientists and Documentalists are well equipped with the knowledge of the structure and development of the universe of subjects. Since retrieval and dissemination of recorded knowledge is the basic aim of library service, the study of universe of subjects is important for librarians.

According to G. Bhattacharyya the objective of an information scientist is "to promote the use of existing information to help generation of new information by research workers specialising in different subject fields. For this purpose, he has to understand precisely the information needs of research workers. This amounts to understanding the subjects of their respective information need. To be effective, the understanding of a subject in this context implies primarily the knowledge of:

1. The denotation of the terms used in the subject, and its scope as recognized by different authorities; and

2. Its divisions, subdivisions etc., denotation of the terms representing them, their respective scope, and their mutual interrelationships or their respective structures as recognized by different authorities. As such knowledge of the structure and development of the subject is essential for library professionals".⁽¹⁾

In view of the above background, the present study on 'Psychology' has been conducted with the following objectives:

0.1 OBJECTIVES OF THE STUDY

The major objectives of the study are enumerated as under:

1. To study the development of the subject;
2. To assess the rate of growth of seminal contributions;
3. To ascertain the growth of subject on the basis of certain indicators of growth pattern;
4. To be aware of the different methodologies which are applicable in the subject and the changes which take place due to the growth of the subject;
5. To find out the incidences of compound and complex subjects in the discipline; and
6. To ascertain implications of the developmental and structural pattern of psychology on the design and development of information retrieval tools.

0.2 METHODOLOGY APPLIED IN THE STUDY

The study uses a mix of historical, empirical and quantitative methods. Historical method has been applied while analysing the development of ideas. Quantitative methods, on the other hand have been used to analyse and interpret the various aspects of developmental/and structural behavior.

0.3 PREVIOUS STUDIES

A study similar in certain respects to the one stipulated in this dissertation had been attempted in 1969-70 by Sinha⁽²⁾. He studied origin, developmental history, the period of empirical and measurement studies and the rise of systems of thought. Since then, a lot of new information has been added to the field of psychology. The subject, therefore, warranted a fresh look and approach.

0.4 PLAN OF WORK

In view of the above objectives, the present work has been conducted under the following heads:

1. An attempt has been made in the 1st chapter to apprise of the introduction, definition, scope and interrelation of psychology with other subjects;
2. The second chapter deals with the historical development and the contributions of psychological thought made in the field.

3. The third chapter embodies the various methods and techniques used by different psychologists for their studies.
4. In the fourth chapter, an attempt has been made to ascertain the growth pattern of the subject using certain variables, such as, books; periodicals; periodical articles; dissertations; and man-power etc.
5. Fifth chapter studies the structure of psychology on the basis of incidences of compound and complex subjects available in the field between two decades i.e. 1965 and 1985.
6. Lastly, in the sixth chapter, implications of the developmental and structural patterns of psychology upon the designing of information retrieval have been studied.

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CHAPTER I
NATURE AND SCOPE OF PSYCHOLOGY

NATURE AND SCOPE OF PSYCHOLOGY

1.1 DEFINITION

Psychology is usually defined as the science which deals with the scientific study of human and animal behavior. Webster's New Twentieth Century Dictionary of English Language (1977) defines psychology as "(a) The science dealing with the mind and mental processes, feelings, desires etc; (b) The science of human and animal behavior".⁽¹⁾ The Longman Dictionary of the English Language (1984) mentions that psychology is "The science or study of the mind, mental processes, and behavior in humans and animals".⁽²⁾ The subject matter of psychology includes behavioral process ~~is~~ which can be observed, for example, gestures, speech, and physiological changes, and processes which can only be inferred, such as thought and dream.

The word "psychology" is derived from two Greek words 'psyche' (soul or life principles) and 'logos' (discourse), meaning logic or the reasoning of the mind or soul. Plato and Aristotle for example during 4th century B.C. wrote treatises on human psychology which they regarded as the study of soul (Thompson and BeBold, 1971)^(2a). Psychology was for many centuries defined as the science (or philosophy) of the soul. However, during the course of time, mental philosophers explained 'Psyche' as 'mind' and psychology was hence defined as "study of mind".

Throughout its short history, Psychologists in all ages have defined the subject as they saw it.

Wilhelm Wundt, undeniably one of the greatest figure and pioneers in the development of modern psychology, defined psychology as the study of the immediate experiences of consciousness. According to Wundt, consciousness consists of physical elements or atoms. These elements or atoms of consciousness include sensation, memory, feeling, emotions, motives and volitional processes. He primarily used the method of observations through introspection. The analysis of conscious processes and the arrangement and the synthesis of elements were analysed through introspection. Wundt propounded that Psychology has to investigate the internal experience, for example, one's own sensation and feeling, thought and volition - "in contradistinction to the objects of external experience, which form the subject matter of natural science". (3)

William James (1890), a great psychologist and the forerunner of Functionalism stated that 'Psychology is the science of mental life, both of its phenomena and of their conditions'. (4) The phenomena are such things as we call feeling, desires, cognitions, reasonings, decisions and the like. By phenomena, though, he referred to the subject found in experience, however, this to him should not be construed as the experiences of the structuralists or as stated by Wilhelm Wundt as they gave emphasis on how and why of consciousness than what of consciousness. By the conditions, he meant that the bases for mental life were to be found in the body, mainly the brain. Thus, though he was mainly concerned with consciousness he gave emphasis on physical being also.

James Rowland Angell (1910) expressed the view that all consciousness, normal or abnormal, human or animal, forms the subject matter for which psychologists endeavour to give an explanation or to describe; moreover, no definition of this science, which designates more or less than just this, can be totally acceptable. (5)

Definitions such as the science of mental life continued in general use until the present century when psychology was redefined as the science of behavior. It marked an important new direction in psychological enquiry.

Behavior oriented definitions of Psychology

The first man who defined psychology as the science of behavior was an English Experimentalist, William McDougall (1905), who defined psychology as follows:

"Psychology may be best and most comprehensively defined as the positive science of the conduct of living creatures. Psychology is more commonly defined as the science of mind, or as the science of mental or physical processes, or of consciousness, or of individual experiences. Such definitions express the aims of a psychologist who relies solely upon introspection, the observation and analysis of his own experience, and who unduly neglects the manifestations of mental life afforded by the conduct of his fellow creatures". (6)

Here he used the word conduct, but later, in his book Introduction to Social Psychology (1908) he considered conduct

to be fairly synonymous with behavior. He added the word "behavior"⁽⁷⁾ to his definitions:

"Psychologists must cease to be content with the sterile and narrow conception of their science as the science of consciousness, and must boldly assert its claim to be the positive science... of conduct or behavior... Happily this more generous conception of psychology is beginning to prevail".⁽⁸⁾

This new and broader definition of the subject was strongly welcomed by a large number of psychologists. Walter Bowers Pillsbury (1911), one of the representatives of such evidence defined psychology as:

Psychology can best be defined as the science of human behavior. Man is treated as objectively as any physical phenomena.. Looking at matters in this light, the end of our science is to understand human action. The practical objective is to find out means of increasing the efficiency of man. Even if the understanding of human behavior is taken as the ultimate end of psychology, consciousness still has a very important part to play. A man's awareness of his own acts and their antecedents, is designated as consciousness. Internal observation and consciousness serve as tools for studying the behavior of an individual.⁽⁹⁾ Pillsbury thus gave importance to the conscious experience also as long as it threw some light on behavior. However, Watson criticized and said that Pillsbury was "going back on his definition" by allowing some value to introspection as he used the terms consciousness and

imagery in his definitions. To Watson, behavior and consciousness were exclusive to each other and if psychology is to be defined as the science of behavior, then all introspection or reference to consciousness should be totally renewed or discarded. However, it was Pillsbury who provided Watson with his definition of psychology as the study of behavior.

Watson (1919) the founder of behaviorism described that psychology should exist as an undisputed natural science. He said that "Psychology must discard all reference to consciousness; when it need no longer delude itself into thinking that it is making mental states the object of observation. He defined psychology and stated that "For the behaviorist, psychology is that division of natural sciences which takes human behavior - the doings and sayings, both learned and unlearned - as its subject matter".⁽¹⁰⁾

Kurt Koffka (1925) defines psychology as the study of ^{behavior.} The behavior of living, to him, in their contact with the outer world, in a scientific manner, can be defined as psychology.⁽¹¹⁾

Carr (1925), though belonging to functional School which gave emphasis on mental processes, began to put more emphasis on behavior. He defines psychology as the Study of Mental Activity⁽¹²⁾. Carr gave emphasis on adoptative behaviour which involved such processes as perception, memory, feeling, judgement and will. The experiences which are acquired, retained, organized and evolved are mainly for subsequent use in the guidance of adoptive behavior only. To him psychology did not deal with contents but with the processes. Mental activity to him should be concerned with what it consists of.

Gates (1931) conceived broadly, Psychology attempt to discover the basic laws which govern the behavior of living organisms. It seeks to describe, identify and classify the various human and animal activities. (13)

Boring (1939) while defining psychology mentioned that "What is man? To this question psychology seeks an answer". (14) Boring (1948) again points out that "Psychology is the study of human nature". (15)

In this definition of psychology, Boring points out that psychology is the study of man as a living being who responds to things and events and also to other people. According to him if one knows man, he can understand human nature and thereby know what psychology is. Boring also points out that the psychological unit is the single person who acts "more or less consistently with himself, although often differently from other persons. They act together in groups: families, societies, parties, nations, they communicate with one another by language. They talk as man to man, and also as author to his readers or statesman to his radio audience. He turns out to have many consistencies of behavior which make up what is called personality. To understand why man acts as he does in different circumstances, psychology has to study all the properties of this organism". (16) To him man has a need and drives around which psychology of motivation centers. Man's emotions are closely related to his needs. To satisfy his needs man acts. To understand man, it is important to understand his nervous system which connects stimulus with response and helps in the growth of

the individual. To establish new relations between stimulus and response man also learns. He also develops insight to perceive a new relationship. Since learning is not permanent, man forgets also. Next important aspect of learning is man's capacity of representations for which he creates images. Through perception he learns about the world he lives in. Through the five senses, nervous system gets the data of perception. So this is what psychology is about - man, the organism: man's capacity (1) for perceiving; (2) for responses; (3) for learning; and for (4) symbolization. Boring also mentions that psychology studies both the behavior and consciousness of man.

However, his definitions neither tell us as to what type of science psychology is, nor does it find any place for animal behavior in psychology. As such Munn's (1951) definition is worth mentioning. To him psychology is today the investigation of behavior along scientific lines including from the stand point of behavior, much of what the earlier psychologists regarded as experience.⁽¹⁷⁾

Clark and Miller (1970) defines psychology as the study of behavior. According to them/^{its} subject matter includes behavioral processes that are observable, such as gestures, speech, and physiological changes, and processes that can only be inferred such as thought".⁽¹⁸⁾

Thus we find that early psychologists defined their field as the "study of mental activity", however, at the beginning of the present century with the rise of behaviorism, its concern was

mainly to study those phenomena that could be measured objectively and since then psychology became "the study of behavior". In contemporary psychology, the word behavior is used in very wide context. It includes the investigation of animal as well as human behavior, of normals as well as abnormals and of children as well as of adults. Behavior does not imply merely the physical activity but it also includes internal processes. This was on the assumptions that information from experiments with sub-human organism and also animal behavior was of interest in its own right. With the development of cognitive and humanistic psychology, most current definitions of psychology include references to both behavior and mental processes.

1.2 SCOPE

Psychology as a pure branch of science is flourishing. Methods of enquiry in psychology are well developed. Old controversies about whether psychology should be related with 'mental life' as has been shown by introspectives or with behavior are no longer relevant as studies have revealed the usefulness of introspections as well as observations of behavior, especially in the verifications of conclusions based on the other. Nowadays, both behavioral and observational techniques are used widely in the laboratory and in order to get the desired result, psychologists are now employing more than one method of investigation.

Technical advances have increased the sophistication of our laboratory experiments. To control the apparatus, the computers are being used, with the help of which, it has become possible

to do experiments which otherwise would have not been possible with simpler devices. Computer can check the correctness of the subject's use of language in case of learning, of a complex artificial language. Another special feature of laboratory experiments is stimulation which reproduces in most essential details the characteristics of a real life situation. As a result it is now possible to predict how people will react in a new environment. Psychologists have learned to make more effective use of naturalist observation. Now in place of interview method, videotapes are being used which makes it possible to observe the same piece of behavior over and over again. Statistical, mathematical and descriptive techniques have been developed to deal with the increasing complexity of the material which psychologists handle. In the branches of psychology such as psychophysics, physiological psychology of sense organs, memory, thinking and intelligence, there have been continuous developments. Developments in the area of psycholinguistics have been dramatic.

While psychology as a pure science has met with a relative amount of success, the same cannot be said of the applications of psychological knowledge. Nevertheless, psychologists have had some success in achieving deeper insights into human behavior, and these fallible insights are the ones which have had the greatest influence on related professions such as medicine or social work.

Psychology is not merely a theoretical study, it has immense practical value in finding the solutions of various problems concerning different aspects of human behavior.

Clinical Psychology which is being increasingly used in a number of hospitals in Western countries, serves to cure various types of abnormalities, psychoses, neuroses etc.

As the name suggests, psychology provides invaluable knowledge to young people, helping them to decide on a career best suited to their capabilities. It helps employers find the right employee and parents deal with the problems of children.

Educational Psychology has been greatly beneficial not only to the teacher but to the student and parents as well. It has made accessible to the teacher, the best educational techniques so that she may in turn bring out the best in the educand.

Psychologists today are in much demand by Governments for the selection of suitable personnel for different public services.

Industry and commerce have by far reaped the benefits of psychology the most. A study of consumer psychology has helped the industrialist sell his goods successfully and the results of such a study are most visible in the field of advertising. Psychology has also achieved success in bridging the gap between the industrialist and labourers.

In the legal profession, psychology has helped the guardians of law in the detection of crimes, false witnesses and other complex phenomena.

Psychology is also paying rich dividends in the political area. With the growth of psychology, its applications are steadily growing too. The scope of psychology, theoretical as well as applied, encompasses every facet of human behaviour. It is therefore be correct to say that where there is behavior, there exists psychology and this field is expanding wonderfully with the ever increasing knowledge of psychologists.

Psychology is also a profession dedicated to the application of psychological knowledge and techniques in human problems.

1.3 FIELDS OF PSYCHOLOGY

Today psychology is characterized by rapid growth and specialization. Most psychologists nowadays concentrate on a particular field of study. On the basis of the specialities chosen by American Psychological Association, psychology may be divided into the following categories or sub-fields. The areas may, for convenience, be divided into those that are professionally oriented and those that are academically oriented, with a third category including all interface areas:-

Academically Oriented Areas

- | | |
|-----------------------------|---------------------------|
| 1. Experimental Psychology | 6. Comparative Psychology |
| 2. Physiological Psychology | 7. Bio-Psychology |
| 3. Social Psychology | 8. Psycho-linguistics |
| 4. Personality Psychology | 9. Psycho-genetics |
| 5. Developmental Psychology | |

Professionally Oriented Areas

- | | |
|----------------------------|------------------------------|
| 10. Clinical Psychology | 16. Criminal Psychology |
| 11. Counselling Psychology | 17. Abnormal Psychology |
| 12. Industrial Psychology | 18. Psycho-Pharmacology |
| 13. School Psychology | 19. Military Psychology |
| 14. Engineering Psychology | 20. Environmental Psychology |
| 15. Legal Psychology | |

The Third Category may include

- 21. Psychometrics
- 22. Educational Psychology

Experimental Psychology

Experimental Psychologist try to understand the fundamental causes of behavior. They do the basic research and study the fundamental processes such as learning, and memory, sensation and perception, motivation etc. They study how the behavior is modified and how the modification is retained by the person, the functioning of the sensory systems, and the factors that urge them or and direct the behavior. A number of experimental psychologists known as physiological psychologists are engaged in studying the relationship of the brain and other biological activity of behavior. Experimental psychologists during the course of their research work generally use experimental method. Controlled experiments are their major research method. However, experimental methods are also used by psychologists other than the experimental psychologists.

Physiological Psychology

Physiological psychology is the study of physical basis of behavior. It applies itself to functioning of the brain and nervous system in the activities as perceiving and thinking of man and other vertebrate animals. Conventionally, physiological psychologists is experimenting with nervous systems and draws his conclusions about its normal functioning on the basis of the behavioral irregularities which follow. This branch of psychology explains the mechanism of metabolism, the secretion of hormones by endocrine glands and other factors regulating the working of the internal bodily environment. Physiological psychology is thus seen to be more physiological than psychological.

Social Psychology

Social psychology is the study of the individual in the group and the relations of groups to one another. We all belong to many different kinds of groups, for example, our family, an informed clique, and our social class etc. The group to which an individual belongs influences his behavior and shapes his attitudes in many respects. Social psychology, mainly investigates the effect of group membership on individual behavior, abilities, motives and personality traits as well as social behavior. Topics in the area include prejudice, attitude change, conformity, leadership, group dynamics, racial problems and differences, moral development, drug uses, social change, community problems, poverty, social power, crowding and population density, interpersonal attraction and

aggression etc. Social psychology merges into sociology. Social psychologist is concerned with small groups and their effect on an individual, while the sociologists in contrast have more interest with the larger groups and on the actions of a greater volume of people. Social psychology is as old as sociology and cultural anthropology. Its specific development, however, along psychological lines is usually traced from the works of William McDougall in 1908.

Personality Psychology

Personality may be defined as an individual's characteristic pattern of thought behavior and emotions. The causes of the complex behavior patterns of a specific individual has historically attracted the attention of psychologists. The complexity of the subject matter of personality makes it's one of the most fascinating topics in psychology. Personality psychologists focus on the problems of individual differences - how we come to be different from one another.

Developmental Psychology

Developmental psychology is concerned with psychological aspects of individual development. Developmental psychologists attempt to comprehend complex behaviors by studying the beginnings and the systematic ways in which they change with time. Tracing the right and developmental part of our particular behavior leads to a better understanding of it. As behavior changes and develops at a speedy rates in the early years of life, child psychology

pertaining to the study of children's behavior forms a larger part of developmental psychology. But developmental changes also occur in adolescence, adulthood and old age, and so the study of these changes also form a part of developmental psychology. It has both research and applied aspects. A great deal of research has been carried out on the development of thinking in children. On the applied side developmental psychologists are often concerned with the behavior disorder of children.

Comparative Psychology

Comparative psychology is the study of the comparison of behaviors of different animal species. It studies about the natural history of animal conduct. Animal behavior research aims to achieve two primary objectives. The first is to find principles and theories which control the behaviour of animals. The second possible objective is to understand whether an animal's behavior in the laboratory or in its natural habitat affects the overall evolutionary fitness, and in case it does then what manner.

Bio-Psychology

Bio-Psychology is a comparatively new branch of psychology designed to make the student professionally competent in general and special areas of a biologically oriented psychology. A good many Western Universities offer a Master's or Ph.D. degree in bio-psychology involving specialized training in the fields of Anatomy, Biochemistry, Biophysics, Chemistry, Mathematics, Medicine, Pharmacology, Physics, Physiology and Zoology. A research worker

in bio-psychology is required to deal with problems falling between psychology and the biological fields of physiology, anatomy and zoology. A good know-how of the physical and biological sciences as well as of psychology is a must in the area of bio-psychology.

Psycho-linguistics

This new discipline of psychology brings together linguistics and psychology. Communication is the common ground in this case. The field deals with the psychological mechanism underlying acquisition, processing and use of language.

Psycho-genetics

Psycho-genetics mainly deals about the inheritance of behavior. In such studies strain differences and selective breeding are normally taken into considerations. This is an area of great possibilities.

Clinical Psychology

Clinical psychology serves to apply practically the research findings and research methodology in the fields of mental and physical health. Clinical psychologists attempt to understand human behavior. Hetherington (1964) viewed that clinical psychologists "will above all have had a training in the careful observation, assessment and recording of the way people behave and of the experiences they say they have".⁽¹⁹⁾ Clinical psychology is the dynamic answer to adjustment problems faced by people. It is mainly concerned with the various types of abnormalities, psychoses and neuroses.

One of the pioneers in this field was Sigmund Freud. This area of psychology is developing fast. An American survey in 1951 showed that clinical psychology is being used in about 43% of the American hospitals.

Counselling Psychology

The work of the counselling psychologist is akin to that of the clinical psychologist, the only difference being that the former deals with people afflicted with milder emotional and personal problems. Counselling psychologists help people in varied ways, such as helping people choose a career, solve their problems of family life. In doing so, he makes use of wide variety of sophisticated psychological inventories. Thus his work is usually in a non-medical setting. They are trained psychologists with Ph.D. or Ed.D degree dealing with personal problems not classified as illness but as academic, social, or vocational problems of students. It is mainly related with understanding and providing help for people with emotional problems in relation to the community and environment. The psychologists in this area are involved in interpretation of psychological tests and communicate for educational, vocational, personnel and for social work. They are trained to make use of interviews, case studies, biographical data and report writing. Since its inception, this branch has undergone significant developments.

Industrial Psychology

Industrial psychology is concerned with the use and conservation of industry's human resources. Industrial psychology includes all the means of personnel selections by the use of tests, interviews and other devices. It is also related with measuring efficiency of work. It is also used to improve communication within the organization and also to allivate industrial strike. It is that subject of psychology in which psychological principles objective lies in selection and job analysis, training, organization behavior and industrial efficiency. The field is concerned with problems of fatigue, monotony, absentism, performance, job evaluation and system's analysis.

School Psychology

Psychologists, who provide counselling services in schools, testing and guiding individual students, are called school psychologists. School psychologist's job consists of testing and counselling those students who need special attention. Testing, thus, provides information which may be helpful in the diagnosis of behavioral problems and difficulties. In some colleges and universities, school psychologists evaluate and administer admission examinations. The basic function of school psychologists is to enable the students to adjust better to their school and scholastic life.

Engineering Psychology

Engineering psychologists are mainly involved with the problems of destructive and more frightening technologies, the misuses of technology which creates lots of pollution in the society and drains the natural resources. On one level they serve the technological processes which are related with human factors in industry, for example, personnel selection, employees morale, and the design of complex machines to help in reducing the human error. On the other hand, they are concerned with bigger problems of an industrial civilization. Engineering psychologists thus help in future planning in preventing environmental pollution, over-crowding and proper utilization of natural resources etc. A new term for this area is environmental psychology.

Legal Psychology

Psychology has carved a niche for itself in the field of law and justice. Psychologists in the field of legal psychology use psychological tests and research method to provide expert testimony. Court's decisions are greatly influenced by an assessment of a defendant's intellectual and personal social functioning. Furthermore, legal psychologists can discern the reliability of testimony. They consider how testimony is affected by the psychological processes, such as, perception, emotion, and forgetting, factors bearing an influence on the ability to recall.

Criminal Psychology

Criminal psychology deals with the study of offenders, motives of offences, whether acquisitive, violent, sexual or connected with traffic. The motive behind the above crimes is quite natural since they are a result of feelings experienced by ordinary adults at various times. Feelings such as greed, rage, lust, impatience, the need for excitement. It is the abnormally strong motive which cannot be resisted, that interests clinical psychologists, psychiatrists and psychoanalysts. Examples of this are sadism and pedophilia. People committing serious personal violence are generally depressed, aggressive psychopaths or schizophrenic.

Abnormal Psychology

Abnormal psychology is the study of morbid deviation from normal behavior such as functions like motivation, perception, imagination, thinking and memory. Abnormal behavior may be grouped under psychoneuroses, psychoses, and psychosomatic disorders, brain damage, brain disease and the personality disorders. Psychologists while understanding abnormal behavior among people, associate themselves closely with physicians and avoid using psychological methods such as psycho-therapy etc. Much effort of these psychologists are directed towards understanding the social-experimental-psychodynamic factors. This sub-field includes the study of different forms of abnormality, determinants of abnormalities, psycho-sexual development, topographical and dynamic aspects of

mind, dreams, mental mechanism, general idea of neuroses and psychoses, mental deficiency and therapeutic practices.

Psychopharmacology

It is an expanding area of study which is known as both 'Psychopharmacology' and behavioral pharmacology. It is concerned with chemical substances that influences behavior, emotions, perceptions and thought processes by direct action on the control of nervous systems. It is concerned with the research of either the administrations of drugs used as a means with the help of which behavior is investigated or behavior is used to analyse the drug action. 'Psychopharmacology' is concerned with the investigation of drug effects on the various cognitive, emotional and perceptual states of man. The basic reason why psychologists study behavioral effects of drugs is to develop an understanding of clinically useful drugs, to know the changes which they show in both normal and abnormal behavior, and what drugs should be used, when such an understanding helps in the discovery and development of new drugs of importance in clinical situations. The drug effects also provide a useful tool for investigating the structure and expression of behavior.

Psychopharmacological agents may be grouped as: (1) Anti-psychotic drugs; (2) Antineurotic drugs; (3) Antidepressive drugs; and (4) Lithium salt etc.

Most of the studies on the behavioral effects of drugs when take place in the laboratory make use of experimental method.

Military Psychology

Psychological services and research are firmly established in military services. Military psychology aims to provide screening instruments and techniques for purposes of selection and classification in different job areas, to develop training methods and devices that will expedite the learning process, to develop management techniques that will assist the commander in providing the necessary leadership. It helps in maintaining morale, high motivation and in joining groups of individuals into unified cohesive groups. It ensures that all weapons, equipments and supplies are designed keeping in mind the capabilities of the operator and maintenance man.

Environmental Psychology

Environmental psychology can be defined as the mutual relationship between the physical environment and people. It emerged as a field in the early part of the 1960s. The course of development of environmental psychology over the years has been in: (1) a holistic molar perspective; (2) an applied problem solving perspective; (3) a broad and selective methodologies; (4) a range of levels of analysis; and (5) a range of approaches to concepts and theory. The areas of research in this field include topics such as: perceptual and cognitive processes, orientations to places and settings, social and behavioral processes, environmental design and environmental problems. Another facet of this branch is related to social processes.

Psychometric

Psychometrics considers test data from a quantitative point of view. Two divisions, theoretical and applied can be identified in this area. Psychometric theory provides mathematical models to the psychologists in research areas whereas applied aspect of this field implements these models.

Development of psychology as a science and the quantification of psychological data are closely related due to the application of mathematics in its various branches. The use of mathematics and statistics is increasing day by day in psychology. The increased sophistication in the use of advanced mathematics has given birth to a new branch in psychology. Mathematical techniques have become part and parcel of mental measurement which is now known as psychometry. Mathematical models have been used in studying certain specific aspects of behavior. In this area, the psychologist mainly study the use of mathematical models, non-parametric statistics, probability theory, and use of electronic computers. Quantitative models of sensation, perception and information processes by human being, recent theories of stimulus detection and recognition, problems of scaling, utility theory, decision theory, memory and related areas form constituent parts of mathematical psychology.

Educational Psychology

Educational psychology is an experimental study and measurement of the inherited foundations of intellect, morals and skill,

the examination of individual differences and their causes, the improvement of mental functions. The study of human development forms a major component of educational psychology. The courses in this field generally include the study of the learning processes with special emphasis on instinct, habit formation, memory, association thinking.

Educational psychologists are mainly interested in the application of psychological principles to the education of children in schools. They provide advice and guidance in school systems, for example, they conduct testing programmes to identify and help people with special needs. Such as students with learning disabilities or those with unusually high intelligence. They are concerned with ways of increasing teacher effectiveness. Educational psychologists are engaged in the investigation and treatment of psychologically disturbed behavior at school. Ansubel (1968) says, "There is ... a very close relationship between knowing how a pupil learns and the manipulable variables influencing learning, on the other hand, and knowing what to do to help him learn better, on the other hand". (20)

1.4 INTER-RELATIONSHIP OF PSYCHOLOGY WITH OTHER SUBJECTS

In recent years, psychology has shown a considerable growth both in number and in diversity of problems with which it is concerned. It occupies a crucial position among the disciplines that endeavour to understand man scientifically. It is related with its

neighbouring fields also. On one hand, it is related with Life Sciences, closely related with biology and psychiatry, for it studies the behavior and mental functions of living organisms, on the other it is a part of social sciences, related to Anthropology, Sociology, Political Science, Economics, Education, Geography and History for it deals with behavior in complex social environments. Another direction of relation is shown with Mathematics through the use of statistics and quantitative theories. Relationship of psychology is also seen with Philosophy, Religion, Art, Ethics and Languages. It is also related with physicians, psychoanalysts, teachers and other individuals involved in various aspects of psychological problems. Some of such inter-relationships with other disciplines are discussed below:-

Psychology and Natural Sciences

Natural sciences such as Physics, Chemistry and Biology are not of course, behavioral sciences; yet scientists in these disciplines sometimes have occasion to study behavior. Some of our most useful knowledge about human perception, for example has come from physicists and biological scientists who ventured to measure human reactions to different kinds of physical stimuli. Anatomists and physiologists who are primarily concerned with structures and functions of the body, have also contributed greatly to our knowledge of behavior by studying physiological factors related to behavior. Zoologists have long been interested in the behavior as well as the classifications of animals, and a special branch of Zoology - ethnology - is concerned with

animal behavior. Zoologists have contributed much to our understanding of animal and, by extension, human behavior.

It has become increasingly difficult to set boundary lines between the sciences which study behaviour. No such boundaries really exist in practice. Scientists of different levels work side by side on the study of behavior. As it is impossible to distinguish certain types of sociologists from certain types of psychologists by the work they do or methods they employ, similar statements might be made about certain types of psychologists and physiologists.

Psychology and Medicine

Psychologists have always been involved in the study and treatment of diseases pertaining to the mind. More recently they have begun to discover the relationship between mental states and physical diseases. Dr. Mary McLaughlin, Director of Community Medicine at Long Island Jewish Hill Side Medical Centre stated that our life style greatly influences the nature of the various ailments constantly afflicting us. Emphy Sena observed that cirrhosis of the liver, two types of cancer, venereal disease, alcoholism, obesity and drug abuse are some of the less desirable and products of a victim's life style.

McLaughlin carried out a study on 7000 adults over a period of five years. A section of these adults constantly abided by a routine which required them to eat three meals a day, abstaining from the temptation of snacks; not missing out on breakfast;

maintaining a moderate weight; get seven or eight hours of sleep every night; exercising moderately; avoid smoking and alcohol, the latter being permissible in small amount. The results of this exercise revealed that those individuals who followed the above routine, had the health status of persons almost thirty years younger. Thus we see that by identifying the factors which lead people to overeat, avoid exercise, smoke, drink excessively, psychologists can formulate a code for life guaranteed to help people lead longer, healthier and happier lives.

Psychology and Mathematics

Psychology is also related with Physics and Mathematics, mainly in respect to its methods. Psychology borrows methods from Physics and Mathematics and sometimes the ideas or models behind these methods. Mathematical techniques, especially Statistics are used in psychology. Statistics is highly developed in psychology. Generally without the knowledge of Statistics, it is usually impossible to investigate a psychological problem adequately. The use of probability in statistics enables us, paradoxically, to state the degree of uncertainty with some certainty.

Psychology and Anthropology

Anthropology literally means the study of man. Most specifically Anthropology may be defined as the system of behavior in terms of which the members of the society interact.

A phase of Anthropology called Physical Anthropology studies the various races of mankind, their size, weight, intellectual and emotional traits and various physical characteristics. Cultural anthropology deals with the various cultures as also how the culture of particular people in comparison to another. In this area, the anthropologists are required to study the typical personalities in each culture and the influence culture has on it, the institutions of the culture, the way people behave in it, i.e. their ways of meeting crisis and rejoicing. Physical anthropology lays emphasis on the individual, while cultural anthropology is more interested in groups. These two branches of anthropology are closely related having common problems and at the same time supplementing each other. This is possible only because in order to understand individual, one must understand his culture and vice versa.

Psychology and Economics

Economics can be defined as the science that describes and predicts the behavior of the various kinds of economic man - one who in his everyday business relationships is solely concerned with achieving the greatest possible material advantage for himself.

Work in economics may be broadly classified under two heads - (1) Macro - and (2) Micro-economics.

Macroeconomics deals with the economy of industries as a whole, while microeconomics is concerned with the behavior of individual economic man and individual firm. Description of the economy and economic behavior with it, or norms either for purpose of public policy (normative macroeconomics) or advice to the consumer or businessman (normative micro economics).

Economic psychology has progressed rapidly during the last twenty years. Research in economic psychology can contribute substantially to psychological knowledge. It is often believed that the theories of psychology can solve the problems inherent in inflation or business cycle. Studies of spending, saving, investing and the like can contribute to the development of knowledge of motives, habits, groups and other areas of psychology. An analysis of economic behavior can prove more effective in studying some important psychological problems rather than through work in areas more traditional to psychology.

In economic literature, the term "economic behavior" is generally interpreted in three ways. Firstly, according to some theorist, it is the behavior of the economic man i.e. the behavior postulated in the theory of rationality. Secondly, the term has been used to describe the behavior of prices, incomes or the economy of the nation. Thirdly, "economic behavior" is represented by studies of how businessmen and consumers behave through analysis of decision formation, its circumstances and its antecedents. Economic psychology states that it is imperative to analyse the

results of human behavior in order to understand the inter-relationship between prices, demand, supply and so on.

One to one relationships between stimuli and response have been implicitly assumed in many areas of economic research. Propositions such as "consumer expenditures are a function of income", or "business investment is a function of profits", imply such relationships.

Economic activities are visible in our day to day lives. The housewives spend much of their time in purchasing goods, people involved in business are preoccupied or surrounded by economic activities. Also, persons who are not in business often make economic decisions, such as buying a car, saving money rather than spending it etc. The study of economic behavior also holds an exceptional place among the studies of complex aspect of social behavior.

Psychology and Sociology

Sociology is another science directly related with human behavior. It deals with people in groups but generally in smaller groups. Group behavior is the primary concern of sociologists. They also study the influence of groups on the individuals who comprise the groups, Sociology deals with social problems, including such things as crime and juvenile delinquency, divorce, the development of and changes in the family, war and other forms of group conflict. They are also concerned with the influence of social forces on personality and the ways in which these forces

operate on the individuals. Both the sciences thus have a great deal in common. They are concerned with individual psychology and reason why this behavior differs from the concern of sociology for the nature and behavior of the group. The two sciences have areas of overlapping but the point of view and the emphasis are different. Psychology deals with the society as a whole. Psychological findings are used in sociology on individuals because they are responsible for constituting the society.

Psychology and Political Science

Political psychology is the application of methods and concepts in social, developmental and personality psychology to explain the political attitudes and behavior. Research works in this area are mainly related with political consciousness and political actions of the citizens, the features and practices of leadership, process of decision making, policy making and the management and decision of conflict. Political scientists examines the areas of psychology. His attention is to be focussed on literature such as that dealing with leadership, the public opinion, authoritarianism and other related topics which have the closest substantive applicability to his own problems.

Psychology and Philosophy

Not very long ago, most psychology departments were not autonomous but were simply part of Philosophy departments. Reason being that philosophy lies partly in the history and partly in the nature of psychology. Psychology for ancient

Greeks and medieval thinkers was the study of soul. During 17th century Rene' Descartes equated soul with thought, and it came to be regarded as the study of mind. British empiricist, philosophers, such as Locke, Mill, Berkeley and Hume were essentially psychologists in the sense that they made effort to describe mind through introspection - it was only in late 19th century that psychologists reacted vigorously and rejected traditional philosophy.

Psychology and Religion

The psychological study of Religion gives us an elaborate account of the experiences said to be religious such as devotional, mystical, conversion etc. It defines the degree of correlation, if present at all, between religious practices, beliefs, moral preferences and intense experiences. It points out the factors that give shape to these elements. The consequences and functions of any of the religious elements can be traced out for an individual or group with the help of psychology. It also contributes to or borrows from philosophical or theological reflections concerning human nature. Quantified empirical data, case studies, field studies, historical and biographical material help the psychologists immensely in studies. The earliest book entitled Psychology of Religion appeared in 1899. Thus we see that a psychology of religion has been given due importance from the start of modern psychology. Empirical techniques and personality theories have been applied readily to

religion and have even developed in small measure so as to deal with the phenomena of religion. The psychology of religion as an aid for the purpose of religious education was encouraged by the church and theological schools during the early decade of the present century. However, the middle of this century saw the above technique being set aside and the therapeutic and counselling skills of the clergy became more important and popular. But again, we now see especially in U.S. the former discipline being encouraged. The society for the scientific study of religion wherein the chief body of psychologists and sociologists of religion has been publishing quarterly journal since 1960.

Psychology and Art

This is a study of the areas in which psychological and aesthetic theories overlap. It unfurls the diversity in art and psychology. It may be divided into four areas of investigation, i.e. (1) mechanism, for example, vision, perception, natural skills cognitive; (2) processes, for example - imagination, perception, creativity; (3) personality, for example - motivation, need, preference; and (4) practices, for example - representation, symbolization, graphically. Psychology of art utilizes the results of general psychological enquiry. Under this is included specially devised experimental techniques for clinical investigations of disturbed peoples, art works and some cross cultural and comparative stratic too.

Fechner is the pioneer of a true psychology of art. His contribution has been in the developing of the subject in the wider context of debates, on the value of many drawings, the genius madness controversy and the nature of perceptions and imaginations.⁽²¹⁾ The psychology of perception is of great interest to artists and aestheticians as it dwells on the topics of form, space, distance, motion, colour, figure etc. The above psychology tells us that perception is selective, inducing us to test out perceptual hypotheses which are influenced by past experience, prior knowledge, correct tastes and emotional states.

Psychology and Language (Psycholinguistics)

Lounsbury⁽²²⁾ (1963) mentions that "Linguistics is concerned with the structure of the verbal response, only within certain relatively narrow limits it is concerned with the stimulus conditions under which a verbal response is produced or with the nature of the stimulus - response connections and its establishment in the individuals".

Language is the most characteristic behavior of the human species which distinguishes it from other animals. Language forms the chief mode of communications between human species. It also forms the total point in human affairs that is why many specialists have chosen it as their field of study. The psychologist studying language behavior finds himself in the presence of the linguist, philosopher, anthropologists, communication engineers, journalists, political scientists, rhetoricians etc. All aspects of psychology have an impact on language behavior.

Learning theory and learning phenomena contribute heavily to the "psyche" in psycholinguistics. However, the contributors to an understanding of language behavior vary from one learning theory to the other. Three levels of complexity in learning theory models have been applied to language: single stage S-R model, a two mechanism S-R model and a three stage model that incorporates S-S, R-R as well as S-R associations. Each succeeding conception is less parsimonious than its precedent but never the less apart from including the assumptions of the precedents adds more assumptions.

Psychology and Ethics

The activities of psychologists directly affect the private lives of other human beings. Whether in educational research or in clinical work, psychologists are almost always concerned with and in a position to influence the experiences of others. Psychology aims to contribute positively for the welfare and betterment of human kind, of course, but there is always the potential for negative effects. Psychologists have an ethical responsibility to protect these undesirable effects.

Throughout the years of its existence, the American Psychological Association has been concerned with the ethical practising psychology. Any evidence of unethical practice, whether in research or clinical work, is ground for dismissal from the organisation. Furthermore, the organization has published and periodically revised a book entitled Ethical

Principles of Psychologists which prescribes the obligations of psychologists for the human being with whom they deal.

With regard to research, these principles assert that the psychologists will take all necessary steps to protect the confidentiality of the records of any individual, will not knowingly use any procedures that will result in harm or injury to the person, willfully disclose the purpose, procedures, and result of any study in which an individual participates, and prior to any interactions, will obtain from the individual his or her fully informed voluntary consent to participate. Clinical psychologists are obliged to follow much the same rules, but, in addition, must ensure that any testing performed on the client is fair to that individual and that any therapeutic steps are designed to ensure the welfare of the individual.

Ethical considerations in psychology are important but complex. There are many border line cases. All reputable psychologists know that there must be no exceptions to the rule that the ethics of the profession must be adhered to in every professional interaction in which they engage.

Earlier the area has largely been the province of philosophers, theologians and politicians. For the most part, these groups have been more concerned with what man should be than with what man is.

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CHAPTER II

HISTORICAL DEVELOPMENT OF PSYCHOLOGICAL THOUGHTS

HISTORICAL DEVELOPMENT OF PSYCHOLOGICAL THOUGHTS

2.0 INTRODUCTION

The history of psychology is as old as the history of mankind who has always been fascinated by his own behavior and behavior of others. Historically, psychology started as a branch of philosophy, that is, mental philosophy which is concerned with the study of the mind. Since the last century psychology developed so much that it became independent of philosophy and by the second decade of the 20th century it began to charter its own course in the world of sciences.

An analysis of the history of psychology, indicates that the system-based approach has been followed. Emphasis has been given to the individuals who have played important role in the development of psychology. In the present study, the history of psychology has, for convenience, been dealt with under the following sub-headings:

- 2.1 The Beginning;
- 2.2 Ancient thoughts of psychological problems;
- 2.3 Religion-based psychology;
- 2.4 Philosophy-based psychology;
- 2.5 Scientific roots in psychology;
- 2.6 Emergence of psychology;
- 2.7 System-based psychology;

- 2.7.1 Structural psychology: German in origin, with 1879 as an outstanding date; named and sharpened in America;
 - 2.7.2 Functional psychology: Named in America in 1898;
 - 2.7.3 Associationism: In America in 1898 and in Russia in 1903;;
 - 2.7.4 Psychoanalysis: Originated in Austria in about 1900;
 - 2.7.5 Personalistic and organismic psychologies: Originated in both Germany and America in about 1900;
 - 2.7.6 Hormic psychology: Originated in Britain in 1908;
 - 2.7.7 Behaviorism : Originated in America in 1912;
 - 2.7.8 Gestalt psychology: Originated in Germany in 1912;
- 2.8 Field Theory; and
- 2.9 Current trends in Psychology.

2.1 THE BEGINNING

It is a slightly difficult task to judge the beginning of the recorded history of Psychology. The "Edwin Smith Surgical Papyrus," named after its western owner, is amongst the earliest documents which seem to concern partially with psychological issues (Caudle, 1984) (1).

2.2 ANCIENT THOUGHTS OF PSYCHOLOGICAL PROBLEMS

Ancient history of psychology begins with the early Greeks, from the Hellenic period to the time of Aristotle, who believed in a world they could observe. They were isolationists keen on learning about the various aspects of nature. Democritus (ca.460-

370 B.C.) offers the best example of early Greek naturalistic psychology. Socrates (469-399 B.C.) deviated to an extent. He dealt with ethics, aesthetics, economics and political behavior. He was, in a way, one of the first social scientists. Socrates spoke of the Psyche, i.e. the spirit or soul.

The origins of some of our views on mental life can be traced from the work of Plato and Aristotle. With the exception of the latter, the early philosophers were at large anti-scientific and not in favour of man's quest to find objective answers about himself. Plato did not believe in experimentation. Aristotle, as opposed to Plato, was an observer and is referred to by some psychologists as "the first psychologist".

Aristotle - For understanding Aristotle's psychology, it is important to take into consideration his metaphysics. In Aristotle's view, things were made up of form and matter, neither of which could exist without the other. Form made us human beings, while matter, the particular individuals that we are. One of the major works of Aristotle is known as "De Anima"⁽²⁾ In this book, he first, has discussed the Psyche or Soul. Aristotle mentioned that the Psyche was neither material nor mental stuff but rather one form of the organism, namely, its action.

Boring (1948) mentions that "his pertinence for the history of psychology lies in three contributions. First, in his orderly, architectural construction of a system of knowledge

in which the study of the soul may be brought into relation with the study of living organisms. Second, in his definition of the nature of the soul and its activities in such fashion as to make the soul an expression of the living creature, and the living creature an expression of the soul, extirpating every rudiment of the dualism of soul and body which primitive man on the one hand, and his great master Plato on the other hand, had so carefully defined. Third, in his settling down to the work-a-day task of describing and interpreting human experience and behavior in concrete terms".⁽³⁾

2.3 RELIGION BASED PSYCHOLOGY

With the development and spread of Christianity, a new era of evolution in psychology started. It is identified as the rise of the spirit. The spirit became independent of the laws of nature. The dark ages and the middle ages fall within this era. The major personalities during religion based psychology are St. Augustine and St. Thomas Aquinas.

St. Augustine (A.D. 354-430) - St Augustine's attitude towards God and man was made clear in his book Confessions⁽⁴⁾ (St. Augustine 1912). God was the creator of man, heaven and earth. God was in man and man was in God.

For St. Augustine, the soul was an image of God (the creator of man, heaven and earth) and it was consequently more important than the body, the soul became magnified and the body became insignificant. St. Augustine's implications on intro-

spection are very profound for modern psychology. It became the chief analytical instrument of the mind in the structuralist psychology of the early twentieth century. It also proved to be useful to the Gestalists who applied it, with some variation, to their study of perception. Sensations and perceptions being personal inward experiences, introspection came to be the main way of achieving an understanding of them. Introspection is used by modern psychoanalysis too where it is an extremely important source of data in the variant 'free association'.

Thomas Aquinas (ca 1225-1274) - According to Silverman

Aquinas undertook the task of interpreting Aristotle's work. He tried to reconcile Aristotle's objectivity with the intellectual dogma of the church in the thirteenth century. While Aristotle did not distinguish man from the lower animals, Aquinas emphasized it. Aristotle spoke of the mind in terms of behavior whereas Aquinas sought to separate it from the body. Such a view is called dualism. Aquinas's belief in the mind and body being entirely separate entities posed a challenge to psychology for a good many centuries.

Sinha (1969), about religion based psychology mentions that "The mode of thinking in religion is essentially authority centred. What is named as religious psychology deals with the study of the phenomena of religion in individuals, groups, and races of man. The basic sacred books of most of the religions have some psychological elements in it. These elements constituted the religion based psychology".⁽⁵⁾

2.4 PHILOSOPHY - BASED PSYCHOLOGY

In the late nineteenth century, psychology formally broke away from philosophy. At this time men trained in philosophy and other disciplines decided to discard philosophical speculations and took to experimentation so as to put to test the theories that had been proposed. Many such theories have been important in philosophical thinking.

The true Renaissance may be considered to have begun as early as the fourteenth century and reached its peak in the sixteenth. It gloried in all types of explorations, physical as well as intellectual. In every area man sought new knowledge. Murphy (1948) said that "The spirit of unrest and of discovery became more and more conspicuous in the interests, spirit and modes of thought of those who devoted themselves to art, to letters, to philosophy and to practical affairs"⁽⁶⁾.

The fifteenth century saw a change in man's style of enquiry. He shed his old beliefs and enthusiastically sought new knowledge. Various forms of philosophy including political philosophy and literature too were reborn. A new spirit for scientific enquiry, which bridged the gulf between medieval and modern psychology, emerged.

Towards the beginning of the 17th century, Francis Bacon, a true product of the Renaissance, stressed on the importance of objective observations. He pointed out the vital link between theory and research. He said the former provided guidelines but the latter the answers.

Questions about the nature of the mind, occupied the thoughts of philosophers for the next three centuries to come. Rene Descartes, the man largely behind these questions, propagated the ideas of Plato and the dualism of Aquinas. Descartes was of the opinion that ideas were innate and had found their way into the mind due to God. He had a rationalistic view of knowledge and unlike Bacon, felt that reason was solely responsible for discovering the truth. He regarded the mind as being separate from the body and as the non-physical "thinking matter" while the physical body to be the machine doing the mind's work. It was therefore obvious that an answer to these views would have to be found in psychology if it hoped to emerge as a science one day.

During the philosophical period of the seventeenth and eighteenth centuries, philosophers wrote on various problems related to psychology, of which four have had an immense impact on the history of psychology. They are: (1) The mind body problem; (2) Empiricism; (3) Associationism; and (4) Nativism.

2.41 Mind Body Problem

A mind body dichotomy is the one that is seen to persist through virtually all the early as well as present day philosophical writings. Dichotomy means split into separate parts. Early psychologists believed that there was one substance, the mind and another entirely different substance, the body.

Animals, however, possessed only a body, while man had both. Thus, along with the mind body dichotomy, there existed a dichotomy between humans and animals too.

St. Augustine and St. Thomas believed in the division of the body and the soul, but were not concerned with as to how the two might be related. It was Rene Descartes, Goltfried Leibnitz, and Benedict Spinoza who took up the question of the relation between the two. Each arrived at a different solution.

Rene Descartes (1596-1650) - Owing to his avid interest in psychological issue, Descartes has sometimes been called the father of modern psychology. Descartes (1931) brought out his most important work The Passions of Soul⁽⁷⁾, compared the working of the human body to a machine and felt that animals too were machines. However, unlike the animals, man had a soul. The relationship between body and soul has been best described by Descartes himself in the above mentioned book where he says "Thus when the soul desires to recollect something, this desire causes the gland, by inclining successively to different sides to thrust the spirit towards different parts of the brain until it comes across the part where the traces left there by the object which we wish to recollect are found".⁽⁸⁾ Descartes thus introduced the concept of duality in man, that is, the distinction between soul and body.

Goltfried Leibnitz (1646-1716) - Leibnitz's contribution to psychology was his theory of the monad, which according to him was a point of force, indestructible and immutable. As monads did not effect each other, there was no interaction. God, to him was the Supreme monad and a human was made up of a number of monads. Since there was lack of interaction between the monads, each was self contained. Any interaction was pure coincidence, hence their activity parralled. Leibnitz parralled spirit or mind monads to body monads.

Benedict Spinoza (1632-1677) - Spinoza on the other hand believed that the mind and the body were not separate entities, but different aspects of the same substance i.e. nature or God.

2.42 Empiricism

Empiricism started in Great Britain against the continental philosophies which had a profound impact on modern psychology. Empiricism implies that one's facts are obtained from observation rather than speculation. The major contributors to this movement are: Thomas Hobbes (1588-1679), John Locke (1632-1704), George Berkeley (1685-1753) and David Hume (1711-1776).

Thomas Hobbes (1588-1679) - Thomas Hobbes was a contemporary of Descartes. However he rejected his concept of interactions between the body and soul. He held that sensations are the source of all knowledge. Chaplin and Crawiec (1968) mention that "Memory and imagination he explained as decaying sense

impressions which are held together by association. These teachings enabled British philosophy to break completely with the Middle Ages and initiated the philosophical school of empiricism which paved the way for the psychological school of association".⁽⁹⁾ Thomas Hobbes's (1650) major contributions is known as Human Nature .⁽¹⁰⁾

John Locke (1632-1704) - British psychology began during the year 1690 with the philosopher John Locke and continued till two centuries later i.e. upto modern psychology. Locke extended Hobbes's principle of the empirical sources of human knowledge. Locke's (1670) famous doctrine has been discussed in his book entitled An Essay Concerning Human Understanding.⁽¹¹⁾ It was revised several times and the fourth edition appeared in 1670. Locke wrote that all the contents of the mind came from experience. He said that an infant's mind is just like a piece of white paper, a tabula rasa, on which experience writes. When we experience something it may be of two types: The first being very simple or complex pure and come from sensation only. The simple ideas on combination give rise to the complex experiences. Lundin has aptly remarked that "Locke's importance lies in that he brought out the first completely worked out empirical theory of knowledge. Many issues raised initially by him still bear relevance in philosophy".⁽¹²⁾ Thus the empiricists emphasized the necessity of sensation for all knowledge. They maintained that all knowledge, everything anyone knows is the result of empirical sense impressions - sights, sounds, smells and so forth.

There are no innate ideas, they said. A person is born into the world knowing nothing. He is a tabula rasa, a white tablet on which the quill of experience has not yet written. Everything he learns, all his ideas and knowledge, come through one or more of these senses. One of the empiricist, Bishop Berkeley, even went so far as to say that the very existence of objects depends upon their being sensed by someone. Objects do not exist unless they are perceived. To him existence was perception.

George Berkeley (1685-1753) - His importance lies in association, which explained the perception of depth and distance or the third dimension. His principal psychological works are - An Essay Towards a New Theory of Vision (1709)⁽¹³⁾ and A Treatise Concerning the Principles of Human Knowledge (1710)⁽¹⁴⁾

In his first book Berkeley pointed out the possibility of perceiving visually in three dimensions, whereas in actual sense our eyes experienced only two dimensions. In his second book, Berkeley incorporated a lot of what Locke had already said but took a fresh approach to the problems of how we get knowledge.

David Hume (1711-1776) - One of Hume's (1896) earliest work is, A Treatise on Human Nature⁽¹⁵⁾. Hume as opposed to Locke and Berkeley, suggested three laws of association: resemblance (similarity), contiguity (togetherness in space and time) and cause and effect. His predecessors, on the other hand had

suggested only two: contiguity and similarity. Hartley's psychology is contained in his Observations of Man (1801)⁽¹⁶⁾ published in 1749.

2.43 Associationism

The movement associationism emerged out of empiricism, the associationists took it for granted much of what the empiricists had said. They argued about the number of laws of associationism that there should be.

David Hartley (1705-1757) - Hartley is known as the father of British associationism. Hartley suggested the law of contiguity. He explained that when two sensations, either together or one after the other, reached the brain, they would generate vibration in such a manner that they become connected. Later, when one idea set up a vibration, the other vibration would also follow. Thus he endeavoured to relate the mental (ideas) to the physical (vibrations).

✓ James Mill (1773-1836) - With the writings of James Mill and his son John Stuart Mill (1806-1873), association psychology flourished. They provided a more systematic basis by a systematic analysis of association. In his book An Analysis of the Phenomena of the Human Mind (1829)⁽¹⁷⁾, Mill described his simple minded associationism. To him ideas were the primary concerned of the mind which consisted of sensations and ideas. He believed that ideas were derived from sensation itself. What Mill meant

by ideas are today known as image. Like Hartley, Mill was concerned with only one law of association, that is, contiguity.

His above mentioned book was a classic of the nineteenth century. His son, on the subject of association, agreed with his father but added some more laws: similarity, intensity, frequency and inseparability.

Alexander Bain (1818-1903) - Another Scotsman Alexander Bain, along with Herbert Spencer (1820-1903) brought the British association movement to a conclusion. Bain's major contributions were The Sense and the Intellect (1855)⁽¹⁸⁾ and The Emotions and the Will (1859)⁽¹⁹⁾ which may be considered as the first books on psychology as such. Boring (1950) has suggested that in addition to association theory, Bain was considered as the first modern physiological psychologist. Thus he brought out many theories in this area. He described the sense organs and their functioning. He also mentioned about reflex arc and how the brain worked. He is also known for his doctrine of will and psychological Parallelism. Spencer (1870) wrote Principles of Psychology⁽²⁰⁾. In this book, he has considered association to be the binding principle of psychology. Spencer's evolutionary theory says that in the beginning of the universe, everything was related to everything else in an expanding totality.

2.44 Nativism

Nativism was a reaction against empiricism. It suggested that early experiences were not necessarily the base of the issues people perceived of their world. Its basic implications are to be traced in modern Gestalt Psychology.

Immanuel Kant (1724-1804) - Immanuel Kant, an important figure of nativism insisted on subjectivism and said that the mind could not be reduced to the brain or to bodily processes. Kant pointed out that experience was unitary phenomenon. According to his theory of nativism "our tendency to perceive space and time as such was not entirely dependent on experience, but was native or in born". (Lundin, 1985)⁽²¹⁾. Gestalt psychologists, also accepted this notion, but as a modified form and mentioned it as Primitve organisation of experience .

John Herbert (1776-1841) - Another important figure in the area of nativism is known as John Herbert who accepted some of the ideas of Kant. Herbert was of the opinion that psychology could be mathematical. It can not be experimental.

2.5 SCIENTIFIC ROOTS OF PSYCHOLOGY

During the middle of the nineteenth century, enormous advances took place in various fields of sciences. The scientific revolution during this period had started having an immense impact on western culture and mainly on academic culture. With the major thrust being given to the experimental approach in the areas like Chemistry, Physics and Physiology during this period,

it stimulated the introduction of experimental approach into psychology. This success made possible the transformation of psychology to an experimental science independent of speculative philosophy.

During this period three basic theories affected modern psychology: (1) The development of neurophysiology; (2) Psychophysics; and (3) Theory of evolution.

Discoveries relating to the structure of the nervous systems including the discovery of Luigi Galvani; discovery of Charles Bell on distinction between sensory and motor nerves; contribution of Marshall Hall; contribution of Johannes Muller; and the work of Herman von Helmholtz.

Luigi Galvani (1737-1798) - Galvani started his studies in 1791 on the stimulation of frog's legs. With the help of this experiment, he came to the conclusion that animal tissues could generate electricity.

Charles Bell (1774-1842) - Bell discovered the distinction between sensory and motor nerve functions which was known as Bell's Law, which was later on called Bell-Magendie Law.

Marshall Hall (1790-1856) - Hall attempted to make distinctions between voluntary and involuntary movements of the body. To him conscious movements appeared to be dependent on the higher centres of the brain i.e. the cerebrum. Unconscious movement, on the other hand, was the function of the cerebrum and the spinal cord.

Johannes Muller (1801-1858) - Muller's doctrine of specific energies of nerves, may be explained in the form of following six laws: (1) The nerves serve as intermediates between perceived objects and the mind; (2) There were five kinds of nerves, and each imposes its specific quality on the mind; (3) The same stimulus affecting different nerves give rise to the qualities specific to that set of nerves; (4) Since the mind is located in the brain, there is an equivalence of internal and external stimuli; (5) The senses have different relationship with the physical stimuli; and (6) The mind has a selective power over the energies. Muller in 1833 became Professor of Physiology at the University of Berlin and his Handbook on the Physiology of Man (1838)⁽²²⁾ was one of the most outstanding text of its time.

Herman von Helmholtz (1821-1894) - Another German psychologist of the nineteenth century, Helmholtz turned his attention to the study of the senses. He began to investigate in the laboratory, the mechanism and structure of the eye, the ear, and the other sense organs. Psychological sciences owes a lot to Helmholtz specially for his contributions in the field of experimental psychology. His major contributions include: (1) the young Helmholtz three colour theory of vision; (2) the application of the theory of specific energies to experiences of the distinctive qualities of sense such as loudness and colour; (3) the resonance theory of learning; (4) the empirical theory of perception; (5) the theory of unconscious inference; (6) the

reaction time experiment; and (7) the energeticist doctrine as implied in the theory of the conservation of energy (Sahakian, 1975) (23).

Helmholtz pointed out that conduction is not instantaneous. He suggested that thought and movement follow one another at a measurable interval. His work Physiological Optics (1856-1866) (24) was published in three volumes. His research work on acoustical problems resulted in On the Sensations of Tone (1870) (25). Thus his work supported greatly the development of empirical traditions, mainly in perception and sensation.

Like Helmholtz, Edward Hering (1834-1918) was concerned with sensory physiology. He was mainly known for an alternate theory of colour vision.

Soon after the mid-nineteenth century, two Germans became interested in an area called Psychophysics which was the second stage of development and thereby led the beginning of experimental psychology. They were Ernst H. Weber and Gustav Theodor Fechner. They believed, as did most psychologist of that time, in the mental physical dichotomy and Handbook of the Physiology of Man was a standard work.

Ernst H. Weber (1795-1878) - Weber in 1834 propounded a law known as Weber's Law. According to this law Boring (1950) clearly mentioned that "the just perceivable difference between two stimuli gets larger as the stimuli gets larger. Two men shouting may be more noise than one man, but, if you add only one extra

shouter to fifty shouters, you will never hear the difference" (26)

This law made possible the experimentation with the mind (sensation) as well as with the brain. Weber found that just noticeable difference $j n d$ between two weights could be expressed as a ratio. This was an important event in the history of psychology which led to the introduction of quantitative methods. Weber (1968) explained his law as, "In comparing objects and observing the distinction between them, we perceive not the difference between the objects, but the ratio of this difference to the magnitude of the objects compared. If we are comparing by touch two weights, the one of 30 and the other of 29 half ounces, the difference is not more easily perceived than that between weights of 30 and 29 grams. . . since the distinction is not perceived more easily in the former case than in the latter, it is clear that not the weights of the differences but their ratio are perceived. . .

That which I have set forth with regard to weights compared by touch holds also of lines to be compared by sight. For, whether you compare longer or shorter lines, you will find that the difference is not sensed by most O's (Observers) if the second line is less by a hundredth part. We perceive not the absolute but the relative differences" (27). This just noticeable difference could be measured.

Gustav Theodor Fechner (1801-1887) - Another German Psychologist, Fechner also took a set of physical objects such as, weighted containers and compared these physical objects to the impressions

these objects created. Fechner argued that by carefully measuring the physical stimulus at one hand and observing the consequence of the stimulus on the observer's mental experience on the other hand, one can determine the relationship between the mental and physical world. He then, graphed the relationship between these two measures, putting the physical measures along the vertical scale and the mental measures along the horizontal scale. Then he stated an equation for this relationship - The Weber-Fechner Law (Lewis, 1963) ⁽²⁸⁾. Fechner employed three methods. They are: (1) Method of j n d (Weber's method); (2) Method of right and wrong cases (originated by K. Vierordt in 1852); and (3) The method of average error. All were used to derive threshold value of sensations (upper, lower and intermediate).

In the year 1860, with the publications of his Elements of Psychophysics ⁽²⁹⁾, Fechner became the teacher of the new experimental psychology. While defining psychophysics as "an exact theory of the relation of body and mind", Fechner (1966) regarded psychology as an exact science which can be compared to physics. ⁽³⁰⁾

Charles Darwin (1809-1882) - Evolutionary thinking of the nineteenth century influenced the psychological theory to a great extent. In this area Darwin's theory is of greater importance. Charles Darwin, though a biologist, his theory of evolution has had a profound and lasting effect upon the subsequent course of psychology. Darwin published his Origin of the Species ⁽³¹⁾ in

1897. The book turned out to be one of the most influential books of the time as well as of the twentieth century. In 1871, he published Descent of Man.⁽³²⁾ Subsequently his book on The Expression of the Emotions in Man and Animals (1873)⁽³³⁾ is an unquestionable psychological work. In this work he suggested that during emotional activities man and animal both resembles as far as facial and postural expressions are concerned.

Darwin, being a dualist, applied his theory to both mind and body. He, along with his successors, indicated that there is a continue of animal form. As such there is no dichotomy between animals and human beings as far as their physical substance is concerned. He showed that through the actions of various natural forces, one animal form could and did develop into another. This doctrine is called evolution. He pointed out that man's body had developed from lower animal form and man's mind perhaps had also evolved from the minds of lower animals. Psychologists of this period, sitting in their armchairs, wrote about the apparent mental activity of animals which can never be treated a substitute for controlled observations. Thereby, psychologists realised that they have to go into the laboratory for controlled observation of what animals actually did. Thus began some of the early experiments. But still they were busy narrating what their animal subjects did in terms of mental activity and the problem of how mind could affect the body. Darwin theory had profound influence on functionalists and on Freud and on entire psycholo-analytic movement.

Munn and others (1972) have appropriately remarked that Darwin's theory "had a tremendous effect on the growth of psychology because it suggested not only that the body of man is descended from animal ancestors, but also that there may be a continuity between the human mind and the animal mind".⁽³⁴⁾

Sir Francis Galton (1822-1911) - Galton following Darwin's thesis, believed that constant variation existed from one generation to the other. Thus individual differences always exist. Galton's concern for individual differences induced him to enter into the area of psychological statistics and measurement of mental abilities. His statistics and its application to psychology entered American psychology through James McKeen Cattell. Galton's major contribution is known as Hereditary Genius⁽³⁵⁾. Galton devised a method of percentiles for assessing differences in intellectual ability and achievement. The method of correlation was also first introduced by Galton, which was further refined by Karl Pearson (1857-1936), F.Y. Edgeworth and W.F.R. Weldson

2.6 EMERGENCE OF PSYCHOLOGY

Psychology is said to have been born in 1879, when Wilhelm Wundt (1832-1920) founded the psychological laboratory. Prior to this, everything was philosophy or what Thouless called 'pre-scientific psychology'. Experimental studies in psychology grew very rapidly with the introduction of psychophysical methods. Studies in physics and physiology, which had an obvious relevance to psychology led Wundt to establish a separate research laboratory.

For Wundt, psychology was the study of immediate experiences. He was of the view that conscious experience, like matter, could be analyzed into elements, the procedure which he followed was experimental introspection. He gave emphasis on sensations mainly on sensory experiences called perception. As has been mentioned by Sahakian (1975), Wundt formulated three laws of physical development. They are: (1) the law of mental growth; (2) the law of heterogony of ends; and (3) the law of development towards oppositions. According to Wundt, human mind is not a passive substance, rather it is an activity; an actuality; and a process. To him, the experience in natural science is mediate but in psychology it is 'immediate and underived'. "The concept of a mind substance immediately gives place to the concept of the actuality of mind as a basis for the comprehension of physical processes" (1907)⁽³⁶⁾ Wundt brought out a number of publications between the period of 1862 to 1920. In 1900 he began the publication of his Volkerpsychologie (Folk or Ethnic Psychology)⁽³⁷⁾ which he continued until the year of his death. This is the study of man and society.

Herman Ebbinghaus (1850-1909) - Investigations from Wundt's laboratory and elsewhere soon extended psychological observation to behavior. In place of describing the conscious experience, investigations of learning, memory, and related problems started. Herman Ebbinghaus began the specific study of memory processes. He decided to study how he himself learned. For this purpose, he developed the memory drum of nonsense syllable (Qux, Kun etc.). With the help of this study, he believed that there was a rela-

tionship between the mental event and physical events. Historically, it is important because he brought the mental phenomena into the laboratory for study.

William James (1842-1910) - James also focused interest on learning and memory, as well as inborn human behavior and related problems. His fame in psychology was assured with his publications The Principles of Psychology (1890) (38).

2.7 SYSTEM BASED (SCHOOL OF THOUGHTS) PSYCHOLOGY

In the later period of the nineteenth century and early part of the present century, experimental research developed and at this stage need for integration of the psychological research was felt not only to relate disconnected theories but to give direction to further research. This need brought forth various 'Psychologies' or 'systems of psychology' or 'Schools of thought in psychology'. However, each School defined psychology in their own way with restricted contents and methods. As a result at the early stage several schools of thought emerged which may be identified as: Structuralism, Functionalism, Behaviorism, Gestalt Psychology, and Psychoanalysis etc. Although none of these schools achieved universal acceptance among psychologists, each served as a focal point for various groups and gave direction and meaning to their work. The answers to such questions as, how is the mind-body relationship to be viewed, what role does consciousness have in psychology, and what are the basic units of psychology, were provided by these schools.

2:71 Structuralism

Edward Bradford Titchener (1867-1927) - Titchener transplanted Wundt's psychology in America. As stated by Lundin (1985) "three questions were posed by Titchener, the 'What', the 'How' and the 'Why' of psychology. The what refers to his systematic introspective analysis of mental phenomena. The how refers to the problem of synthesis. The why is to be found in the way mental events correlate with the brain and nervous system events" (39). According to him Titchener's psychology deals with mind as the total sum "of mental processes occurring in the lifetime of the individual". Consciousness, to him was the sum total of mental processes occurring at any given present time" (Wolman, 1979) (40). Like Wundt, Titchener also stated three basic elements of consciousness. They are: (1) sensation i.e. elementary perception; (2) images - the elements of ideas; and (3) affection - elements of emotion. He gave importance to the problems of attention, perception, association, and emotion. Introspections and experimentations, he considered to be the methods of psychology. According to Titchener (1898) (41) the primary aim of the experimental psychologist has been to analyze the structure of mind, to unravel out the elemental processes from the tangle of consciousness. His major contributions are known as: An Outline of Psychology (1896) (42); Experimental Psychology (1901-1905); Lectures on the Experimental Psychology of Feeling and Attention (1908) (43); Experimental Psychology of the Thought Processes (1909) (44). During 1910 he also wrote on Textbook of Psychology. (45)

The major impact of structuralism on modern psychology was the importance of experimental approach followed in the study of sensory psychology, sophisticated laboratory instruments are being used today extensively in the study of vision, hearing, smell, taste, and pain etc.

2.72 Functionalism

A number of prominent American psychologists promulgated a system of psychology which they named as functionalism, whose primary interest was the study of the mind. The system arose as a protest against structuralism. It is said that 1896 marks the formal date of the birth of functionalism in psychology in the United States. By 1925, it had established itself as a School at the University of Chicago. A good deal of controversies existed between the two Schools of Structuralism and Functionalism. By the time the latter had reached its peak, the former had begun to decline.

William James along with three other founders: John Dewey, James Rowland Angell, and Harvey Carr were primarily responsible for the rise of functionalism as a School, which laid stress on functions rather than consciousness.

William James (1842-1910) - James was a dualist who believed in the reality of both mind and body. His was a functional psychology whose aim was to study consciousness as an ongoing process. James viewed the mind functionally, as an instrument making it possible for the individual to adjust well to his environment as well as

bringing about changes which serve to enhance his well being. James's concept of consciousness differs from that of the Wundtian structuralist in that he believed consciousness to be a stream rather than to be comprised of elements. To break it up into elements is to lose its flowing nature. One of the other major contributions of James is known as his theory of emotions which he proposed along with Carl George Lange (1834-1900), known as James-Lange Theory of Emotions. According to James "we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be" (James, 1890) ^(46a).

John Dewey (1859-1952) - Dewey who succeeded James, believed that the study of the organism as a whole, functioning in its own environment, was the proper subject matter for psychology. His functionalism is found in his book Human Nature and Conduct : An Introduction to Social Psychology (1922). ^(46b)

James Rowland Angell (1867-1949) - Angell on the other hand, also gave emphasis on the functional aspect of the consciousness rather than the usefulness of mental elements. In his own words "functional psychology is synonymous with descriptions and theories of mental action as distinct from the materials of mental constitution" (1907) ⁽⁴⁷⁾. Angell stated that functional psychologists study mind as judging, feeling and the like. They try to ascertain mental and physical relations of the organisms. He further stated that (1) functionalism conceived as the psychology of mental

operations in contrast to the psychology of mental elements; or expressed otherwise, the psychology of the how and why of consciousness as distinguished from the psychology of the what of consciousness; (2) the functionalism which deals with the problem of mind conceived as primarily engaged in mediating between the environment and the needs of the organism. This is the psychology of the fundamental utilities of consciousness; and (3) functionalism may be described as psychophysical psychology, that is the psychology which constantly recognizes and insists upon the essential significance of the mind-body relationship for any just and comprehensive appreciation of mental life itself" (Angell, 1907) (48).

Harvey Carr (1873-1954) - Carr placed more emphasis on behavior. He accepted introspection but at the same time gave importance to observation also. Carr relied on experimentations for the purpose of gathering data. During 1930 he wrote a chapter on "Functionalism" for the volume Psychologies of 1930.

Functionalism thus broadened the scope of psychology. Functionalists were mainly concerned with animal and child psychology, problems with abnormal psychology, and psychological testings.

2.73 Associationism

Associationism served as a principle rather than a formal School of Psychology. Several psychologists have used it as a basis for their research and explanation. As regards the histori-

cal background of the principle, Aristotle was the first person to talk about it. Plato, Locke, Berkeley, Hume, Hartley, Mill and Bain, all spoke of associationism in their own way.

Hermann Ebbinghaus (1850-1909) - Ebbinghaus was concerned with the problem of testing associationism and later on he tested their strength of recall. During 1885 he published his first work on memory which started as the first experimental work on the subject. Though he was mainly interested on memory he felt that for remembering it is important that one must learn something. In order to minimize the effects of associations which has already been established between words, he introduced certain nonsense syllable. It mainly consisted of two consonants separated by a vowel so that the same may not form the three letter word in the language, eg. BED, FUR etc. During learning and remembering process, in order to establish association, Ebbinghaus realized the importance of repetition also, i.e. frequency of presentations. In a number of his experiments, he used himself as a subject.

Ivan Petrovich Pavlov (1849-1936) - Pavlov was mainly concerned with the physiological process of digestion. He evolved a surgical technique, with the help of which he could expose the salivary glands of a dog. His principal contributions include the areas like: digestion, blood circulation, conditioned reflexes and the role of nervous systems. He established the laws of coordination of various portions of the digestive tract and the digestive activity's dependence on indigestion. Unlike the other physio-

logists of the day who studied organs and tissues in isolation, Pavlov gave emphasis on organism and its activity as a whole. In his classical experiment on dogs in connection with conditional reflexes, he noted that the introduction of acid solution into the mouth of a dog caused salivation by reflex action. The sound of a bell at the time of injecting acid had a conditioning effect on the dog and later on simply a bell may cause salivation without acid. Thus the dog learned by association which he called as objective association.

Vladimir Bekhterev (1887-1927) - Bekhterev also a physiologist, developed his interest towards psychology. His area of interest was the application of conditioned reflex to man as well as animals. He used the terms "associated reflex". His main concern was the science of "human reflexology" and diverted his attention towards motor responder. By this he pointed out the withdrawal of the finger from an electrical shock. He treated the shock as the unconditioned stimulus (US) and the response as the conditioned response. With the shock he combined some neutral stimulus such as bell (CS), as a result the subject would withdraw (CR) merely to the sound. These newly established reflexes, he said, are observable as opposed to the mental responses. During 1928, his original book which was in Russian, was translated into English under the title General Principles of Human Reflexology⁽⁴⁹⁾. Bekhterev thus rejected the subjective notion of Wundt and the structuralists. He was of the view that thinking, learning and motivation could be reduced to mechanistic functions.

Edward Lee Thorndike (1874-1949) - Thorndike was another associationist who developed his attitude towards psychology and developed a systematic theory of associationism. His theory is treated as one of the first organized theories of learning (Hilgard, 1956). To him psychology was the Study of Stimulus Response Conditions and association held the two together. Like Pavlov, Thorndike had a profound impact on learning theory. His contributions is well known in trial and error learning, law of readiness, law of exercise and law of effects etc.

2.74 Psychoanalysis

Psychoanalysis evolved within the fold of psychiatry and hence it has a medical and clinical tradition. It differs from other theories, systems and schools which had been developed by the so called academic psychologists whose primary aim was to conduct experiment in order to prove the validity of their theories and ideas. The original objective of psychoanalysis was to understand better abnormal behavior and to discover viable techniques of treatment (Lundin, 1985).

Sigmund Freud (1856-1939) - Freud, ^{the} founder of psychoanalysis was a practising Physician throughout most of his adult life.

The history of psychoanalysis may be categorized as three Freudian process and one post-Freudian period. During the first period which ran from the early 1900's to 1930, Freud introduced four major notions in psychology. These were: unconscious; motivation; infantile experience and principles of mental functioning (Freud [1911] 1958) (50).

The second period stressed on metaphysical thinking. The main attempt during this period was to provide a model of personality reflecting the motivational theory of psychoanalysis.

The third period consisted of the contribution in *The Ego and the Id*.

In the fourth period - the post-Freudian, the structural point of view was developed much more elaborately, independent variables other than drive, both intro-organismic and extra-organismic, were described and theorized about; and primary and secondary process notions were fitted into an 'ego psychology'.

The most important psychoanalysis contributions of Freud are mentioned as: new orientation to psychology and mental disorder; a theory of personality (i.e. ego and super-ego); libidinal stages of personality development; subconscious degree mechanism; infantile sexuality; sexuality as polymorphous; unconscious motivation; psychopathological characteristics of 'normal' everyday 'living'; the variation of irrational behavior; a theory of social psychology; psychological interpretations of religious behavior and thought; psychic energy and its transformations into physical disorder (psychosomatic medicine); psychogenic interpretations of mental and physical disorders; interpretations of instincts (eros and thanatos) and their sublimations; topography of the mind with its unconscious, preconscious, and conscious dimensions; and dream interpretation (Sahakian, 1975) (51).

In 1987 Freud came to the conclusion that in order to psychoanalyse his patients, he must first analyse himself. His dreams provided much of the material for his self analysis. The Interpretations of Dreams (1953)⁽⁵²⁾, was the result of Freud's self analysis. This major work discusses, apart from dream analysis, a number of major psychoanalytic concepts amongst which the oedipus complex is one. Freud's deterministic views were further established in his book Psychopathology of Every Day Life (1901)⁽⁵³⁾. Psychoanalysis started to draw attention during the first decade of the 20th century. Freud did not write a systematic psychology. His psychology must, therefore, be glanced from his numerous writings which are compiled in the standard editions of the Works of Sigmund Freud, 24 Vols; edited by J. Strachey.⁽⁵⁴⁾.

In his early writings Freud made two basic subdivisions of mind: conscious and unconscious. The preconscious was treated as the part of unconscious only which was nearest to the threshold consciousness. As Freud's system developed, the physical apparatus, or the mental components became more important for him. He termed it id, ego, and superego. According to Freud these three systems function and operate in a unified order in any normal person. The proper functioning of each one is important as if one of these becomes more powerful, the other would suffer. The id being the oldest comprises that is inherited or present at birth which consist of both life and death. The id to him was the first and most basic aspect of personality. As has been mentioned by Sahakian that these innate qualities are mainly unconscious and

most important of these are known as instincts. The id operates according to the most basic law of life, the pleasure principle. The id casually is unaware of the demands of society and tries only for pleasure and reduces instinctual tension to bring the person into a comfortable state. For example, a sneeze reduces tension of nose. Freud said that everything that happens in the id remains unconscious.

Instincts which are the essential part of the id are comprised of two main parts: (1) Productive and life giving instincts, for example sex; and (2) Death or destructive instincts, the basic aim of which is to reduce living things to an inorganic state. Destructive instincts like aggressiveness lead to ill health but an aggressiveness rage can induce self destructiveness i.e. suicide.

The ego is often referred to as the executive of personality, because it makes the hard decisions that balance the needs of the id against the demands of reality on the one hand and the demands of the superego on the other. It is that part of the id which has been modified by the first influence of the external world acting through the perceptual conscious.

Ego, which is basically an organization, a mental organization which is interpolated between their sensory stimuli and the perception of their somatic needs on the one hand and their motor acts on the other, and which mediates between them. The ego is known as the executor of the personality. Such a role

requires it to mediate among three forces making demands upon it. They are: (1) Those of the world of realities; (2) forces of the id; and (3) those of the superego. While doing so, the ego must not lose its own identity and remain autonomous.

The third part of personality in Freud's system is the superego which is that part of personality which represents moral ideals and strives for perfection rather than pleasure. It develops from the ego partly as a result of learning.

Freud (1939) in Moses and Monotheism⁽⁵⁵⁾ said about superego "In the course of individual development a part of the inhibiting forces in the outer world becomes internalized; a standard is created in the Ego which opposes the other faculties by observation, criticism, and prohibition. We call this new standard the super ego.

The superego is the successor and representative of the parents (and educators) who superintend the actions of the individual in his first years of life; it perpetuates their functions almost without a change".

Freud named the primary sources of energy which exist in organism as libido. Because libido is present before birth, it is some way or the other coordinated with id. The energy underlying all physiological needs in the id has been termed as libido. Freud, in the context of libidinal development listed the stages of psychosexual development as: (1) oral stage; (2) anal stage; (3) phallic stage under which is included the

oedipus phase for boys or electral phase for girls; (4) latency stage; and (5) genital stage. Freud (1905) first introduced the concept of libidinal development in his book "Three Essays on the Theory of Sexuality"⁽⁵⁶⁾, wherein he viewed it to be perfectly normal development. A fixation at any stage leads to future mental maladjustment. The child being the father of man, normal infant and childhood development is imperative to adult mental health.

From 1913 to 1930, Freud became more interested in Socio-Psychological phenomena. His first book related to social psychology Totem and Taboo⁽⁵⁷⁾ was published in 1913. His social psychology is also discussed in Group Psychology and the Analysis of the Ego (1921)⁽⁵⁸⁾. Group formation is based on the emotional relationship between people. Each group will have its own leader who becomes the common target for each members of the group. Freud termed this concept of group formation as "herd instinct". His social psychology was further extended in his book The Future of an Illusion (1927)⁽⁵⁹⁾ wherein he has discussed the psychology of religion. Freud said that in order to cope up with his environment, individual takes the shelter of religion. It is from the same need that all the achievements of culture and religious ideas too have been born. Religious ideas have emerged for the purpose of defending oneself against the crushing superior force of nature. In his last work Moses and Monotheism (1939), Freud had written

on a topic with which he was not very well acquainted with. Here he hypothesized that Moses was an Egyptian and not Jew, a dominant leader murdered by his rebellious people. This act created in the Jews an unconscious sense of guilt which was inescapable. Such an action he equated to neurotic behavior. In this work Freud, the analyst sought to evaluate people on unconscious hidden motivations and to the fact that people are not really what they appear to be.

Alfred Adler (1870-1937) - While Freud laid emphasis on man's biological nature and the unconscious mind, Alfred Adler in contrast, stressed man's social nature and was of the opinion that the conscious side of personality was more important. Adler was against Freud's emphasis on sexuality and proposed compensation for inferiority as a major contributing factor in the shaping of personality.

Carl Gustav Jung (1875-1961) - Jung was also a follower of Freud, but he broke away to pursue his own studies for he objected to Freud's narrow sexual interpretation of libido, the basic energy of life. Jung worked independently on the concepts of collective unconsciousness, introversion, extroversion and the role played by myths and religion and personality. He did not say that sexuality was unimportant but rather that it should be placed in a much broader context than Freud did.

2.75 Personalistic and Organismic Psychologies

According to personalistic approach psychology is based on understanding. Understanding psychology - a psychology that tries to understand rather than to explain. Wilhelm Dilthey (1833-1911), an influential personality, said that there should be developed a descriptive and analytic psychology.

Edward Spranger (1882-1963) - Dilthey's views on psychology were implemented by Edward Spranger, who fully accepted the difference between the explanatory, analytic, atomistic psychology which related to the sensory elements and the descriptive, understanding molar psychology which concentrated on the human mind and structure. Spranger studied about the understanding of the person as a whole because the meaningful totalities of life were destroyed by the study of elements alone. According to him, an objective study of psychology was difficult because psychology depended a lot on psychologists' personal philosophy and the cultural influences on their strong beliefs. Spranger gave emphasis on the molar approach which the total individual could relate. The total situations were the cultural values found in society. Thus Spranger discarded physiological explanations and gave importance to what and why of experiences.

For Spranger, psychology means to grasp in a meaningful way the mental relationships which are perceived in an objectively valid cognition. We understand only meaningful structures (understanding) always encompasses the meaning" (60).

Spranger in 1928 pointed out six human goal directed patterns pertaining to six areas of cultures. They are: scientific theory, aesthetics, economic life, religion, sociability and power politics.

The theoretical type is concerned with the finding of the truth in a rational and systematic manner. His approach to things is always inquisitive one.

The aesthetic person is more concerned about the charm, beauty, and harmony of things than the truth and usefulness.

Economic type is concerned with the practical aspects of life and looks for material values and material success. For him, science and education are tools for economic achievements.

The religious person's main concern is inner truth and harmony. He attempts to seek internal unity with the universe.

The social character is friendly, considerate and compassionate. He loves his fellow men and unselfishly helps them. His main values are sympathy, and moral good and not truth and beauty.

The power politics person tries to control people and is concerned with methods of influencing and ruling.

William Stern (1871-1938) - William Stern offered his personalistic psychology during the year 1906. His contribution to psychology, mainly in the history of mental testing, is important. His productive work also includes child psychology,

educational and clinical studies and several other areas. His basic aim was to develop a philosophy which should reconcile the atomistic attitude. For him, person has unity, value and purpose. The person is a whole of many parts. The typical person is an adult human being and has an environment. An individual keeps relations with his environment in three ways. These three levels of relations are: the biological level of nutrition, the psychological level of conscious experience and the valuational level which he treated as province of philosophy. The main concern of psychology is the conscious experience.

Psychology according to Stern (1938) the science of the person having experience or capable of having experience, experience being identified and interpreted in terms of its matrix, the unitary, and goal-directed person" (61). Stern divided the entire field of psychology into the areas such as: (1) sense perception; (2) memory and learning; (3) thought, intelligence, and imagination; (4) drives, instincts and volition; and (5) affective life. Stern also wrote that we perceive a Gestalt independently of any particular sensory stimulus. For him, there was Gestalt without a Gestalter. Stern also equated character to personality. He stated "it designates the make up that the person possesses in his totality, but considers this totality from one definite stand point only, that is the predisposition to acts of will. (62)

Gordon W. Allport (1897-1967) - Allport is considered one of the American representatives of personalistic school of thought. Allport agreed that within a given culture people has a tendency to develop "roughly comparable" ways of behavior or "modes of adjustment". Still individuals behave differently. Two individuals never behave in the same way.

Behavior is a continuous flow of energy. Each following act represents a convergent mobilization of all the available energy of the time. The drive using "plastic and modifiable nervous system provide energy for action. Allport viewed drive as vital impulse which leads to the reduction of some segmental organic tensions". He gave emphasis on learning by experience rather than by heredity. The basic drive can be treated a cause of an infant's behavior but not of an adult's. Allport agreed with Stern's idea of personality and put emphasis on acquired goal-directed factors. He calls these factors as traits. In his book Personality : A Psychological Interpretation (1937), he states that "A trait is a generalized and totalized neuropsychic system (peculiar to the individual) with the capacity to render many stimuli functionally equivalent, and to initiate and guide consistent (equivalent) forms of adoptive and expression behavior". (63)

According to Allport, personality is what a person actually is and does. It is the dynamic organisation of these psychological systems that make him adjust with his environment.

Regarding motivation, Allport (1940) mentioned that it refers to the individual's emotional nature including his susceptibility to emotional stimulation, his customary strength, and speed of response, the quality of his prevailing mood, and peculiarities of fluctuation and intensity in mood.

Organismic Psychology

Kurt Goldstein (1878-1965) - Goldstein is one of the strongest defenders of organismic psychology. Goldstein believes that in order to understand the organismic behavior in true sense, the reflexes would provide a misleading approach. It is because reflex is treated as a constant uniform response to a constant stimulus. But such constancy of single stimulus is not possible to acquire except under constant conditions in the rest of the organism. A reflex, for him, is an act of the entire organism. It can only be understood as a particular manifestations of the whole organism. For example, it is not possible to have the knee jerk in regular, uniform strength unless the leg is in a certain position and isolated from the rest of the organism by instruction to the subject to think of anything else. He views that one must proceed from the whole to the parts, not from the parts to the whole.

Goldstein (1963) spoke of "only one drive, the drive of self actualization. Preferred behavior is one of good Gestalt or the coming to terms of the organism with the world. Good Gestalt is a form of coming to terms of the organism with the

world, that form in which the organism actualizes itself, according to its nature, in the best way". (64)

Abraham Maslow (1908-1970) - Maslow uses the term self actualization . His concept is more specific than that of Goldstein. He believes that certain basic needs have generally priority. Demands for food, sleep, warmth and comfort come first - and only when these are satisfied does the need for safety arise. After this the need for love and belongingness arises, which when satisfied, gives rise to the need for esteem. After all these have been fulfilled, he starts finding some way to express and develop his own potentialities. Maslow's system is described by him as holistic-dynamic and related to organismic and Gestalt theory. New experience is not just added to the previously accommodated stock of the organism. It is absorbed to the organism as it exists of the moments, and changes it in its entirety. To the study of normal personality, Maslow's contribution consisted in a survey of the personality features of 43 individuals. The distinguishing personality characteristics are discussed in his book Motivation and Personality (1954) (65) .

2.7.6 Hermic Psychology

During the time when Freud and his fellow associates were involved in the launching of their psychoanalytical movement, William McDougall (1871-1938), a British Psychologist was formulating his hermic and dynamic system of psychology. He developed a new social psychology which influenced greatly the psycho-

logists, anthropologists, sociologists and political scientists of the present century during the first two decades. His impact on psychology gave emphasis on instincts and goal seeking behavior. McDougall's notion resembles very much with Freud's theory of human nature on instincts and with the psychology of motivation. In 1899, McDougall was interested in psychophysics of vision, functioning of brain and the concept of attention. In 1905 he published Physiological Psychology⁽⁶⁶⁾. His introductory text in social psychology, An Introduction to Social Psychology, first appeared in 1908, which during the course of time saw twenty three editions. During 1960s it came out in various reprints. Prior to this, there had been no social psychology. Experimental psychologists of that time were mainly concerned with problem of sensation, perception, learning, memory and reasoning. Prior to his work, it were social scientists who were mainly concerned in this area. McDougall's hormic theory and the instinctual source of hormic energy of behavior are discussed in this book. McDougall in this book, for the first time, set down his theory of instinct and hypothesized that "Instincts are the prime movers of all human activity". Instincts he defined as "an inherited or innate psycho-physical dispositions which determines its processor to perceive and to pay attention to objects of certain class, to experience an emotional excitement of particular quality upon perceiving such an object, and to act in regard to it in a

particular manner, or at least, to experience an impulse to such action" (67).

McDougall considered, that broadly there are two types of innate propensities: the specific instincts and the non-specific tendencies. The specific instincts, for example, fear, anger and sexual desire may be described in terms of cognitive, affective and conative mental processes. Since instincts have a sensory aspect, inherent behavior, can be modified with the help of learning and experience. The non-specific or the general tendencies, on the other hand, have no specific character. We may thus say that McDougall's hormic theory is basically an instinct theory of human behavior. McDougall also believed that much of our social life involves more than one instinct.

In 1920, he published Group Mind (68). In this book he explained as to how an individual instinct functions in explaining the crowd behavior. He postulated that a "social aggregate has a collective mental life, which is not merely the sums of the mental lives of its units, it may be contended that a society not only enjoys a collective mental life but also has a collective mind". In 1927 his research findings about Lamarckian theory of the hereditary transmissions of characters were published in an experiment for the testing of the Hypothesis of Lamarch. During 1929 his another publication came out in collaboration with Watson, The Battle of Behaviorism. (69)

Robert Session Woodworth (1869-1962) - Woodworth a contemporary and a successor of McDougall was strongly interested in fostering the psychology of motivation. His systematic position was first set down in his Dynamic Psychology⁽⁷⁰⁾ published in 1918. This text dominated the field of scientific psychology for nearly 25 years or so. His Contemporary Schools of Psychology (1964)⁽⁷¹⁾ is still being used. Subsequently in 1938, his another publication Experimental Psychology⁽⁷²⁾ came out. His final book Dynamics of Behavior⁽⁷³⁾ appeared in 1958.

While discussing the functional approach to behavior, Woodworth viewed that there is an inter-relationship between organism and environment. He referred it as dealing with the environment, meaning thereby that while making muscular responses to received stimuli, the organism uses stimuli as indicators and muscles as adoptive movement.

His psychology was mainly concerned with cause-effect relations i.e. the response and the event which caused it to occur. He is considered as the early S-R (Stimulus-Response) psychologist.

However in place of accepting the stimulus-response formula, he brought in-between process of organism (o) which is active between these two. Thus he presented the concept of S-O-R. Woodworth is also well known for his cognitive theory of learning. Importance of his theory lies in his concept of mechanism and drive. Mechanism states about how a thing is done

whereas drive indicates to why it is done. Woodworth and McDougall both agreed the necessity of motivation. Woodworth named it as 'drive', while McDougall treated it as 'instincts'.

2.77 Behaviorism

The movement known as 'behaviorism' was formulated by Watson (1878-1958). It was a type of revolt against structuralism and mentalism of Wundt, and his fellow associates. Behaviorism is the study of behavior and not of any inner mental life. The connection of the stimulus with the motor response through a nervous arc, formed the basis of his view of behavior. Thought for him is associated with organs of speech rather than with the brain. The first statement of Watson, the recognized founder of Behaviorism, appeared in the article Psychology as the Behaviorist Views it ⁽⁷⁴⁾ during 1913 in Psychological Review. It was recognised as the manifesto of behaviorists. It opened a new era in psychology, mainly in the field of experimental psychology. A year later, this paper appeared in the form of a book, Behavior : An Introduction to Comparative Psychology (1914) ⁽⁷⁵⁾. His classic paper claimed that "Psychology as the behaviorist views is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods" (1913) ⁽⁷⁶⁾.

Watson ruled out introspection and the study of consciousness, which could not be studied directly. His most significant book Psychology from the Standpoint of Behaviorist ⁽⁷⁷⁾

appeared in 1919 which was revised in 1924 and 1929. In this book Watson accounted stimulus response for all psychological phenomena and that could explain human as well as animal behavior. He further discussed that psychologists in place of studying their own behavior should study other's behavior. The book is concerned with prediction and control of human behavior. He showed that all psychological problems could be approached from a new point of view.

During 1925, he wrote Behaviorism⁽⁷⁸⁾ which was revised in 1930. He agreed that some manner of behavior was inborn but that was very less and comparatively un-important when the role of experience was considered. Although, he totally rejected the theory of instinct he did believe the concept of instinct. According to him, instinct was an inherited pattern reaction which emerged under the right stimulation. He considered instinct a system of unconditioned reflexes and any thing done while following instinct is a complex response of a numbering reflexes one after another of sensory stimuli in contact with the animal's body or at a distance in his environment.

Watson's psychology is known as S-R (Stimulus-Response) psychology. By stimulus he meant, any object in the general environment or any change in the tissues, due to the physiological condition of the animal. Watson discarded the notion of sensation because it is not possible to observe other's sensation. What can be observed is the response to certain

stimulus. Watson divided all human behavior into explicit and implicit. Explicit behavior includes all activities which could be observed, for example, walking, talking and smiling etc. Implicit behavior includes secretion of glands, contractions of muscle and nerve functions.

Other Early Behaviorists

Albert P. Weiss, Karl Lashley, Walter S. Hunter and Edwin B. Holt are known as the early behaviorists. Among them Weiss and Lashley were reductionists while others were not.

Albert P. Weiss (1879-1931) - Weiss's reductionistic aspect of behaviorism is seen in his book entitled A Theoretical Basis of Human Behavior ⁽⁷⁹⁾ published in 1952. Weiss gave emphasis on the biological and social components as far as the analysis of behavior is concerned.

Karl S. Lashley (1890-1958) - Lashley, one of the experts in the physiology of the nervous system, established that physiological psychologists do not need the concept of consciousness. He conducted various experiments with Shepard J. Franz and as a result developed two doctrines: mass action and equipotentiality.

Mass Action

The principle of mass action states that learning does not depend on particular neural connections of the brain but on

the entire brain. The function of learning is because of the total of the brain tissue involved. To prove this, Lashley conducted an experiment. He taught a number of cats to escape from a puzzle box and then removed certain parts of the cortex of their brains. Then the cats were put back in the box. They could no longer escape from the box as before but on being taught they could soon relearn the process (Wolman, 1979) ⁽⁸⁰⁾.

Equipotentiality

According to this principle every part of the brain is equally important. On the removal of some parts, the remaining parts could carry on their functions. This he illustrated by the experiment carried out on the visual area rats brain. This was removed and although the rats lost pattern vision, they could still differentiate intensity of light and find their food. His doctrines are discussed in his book Brain Mechanism and Intelligence : A Quantitative Study of Injuries to the Brain ⁽⁸¹⁾ published in 1929.

✓ 2.78 Gestalt Psychology

For the old standard theory of psychology, the year 1912 was a trouble period. It was the time when in America, Behaviorism had started a violent attack, while in Germany, the new School of Gestalt Psychology was making a beginning to attack. The behaviorists and the Gestaltist knew nothing of each other. A few years later when they did get to know each other, they

were just as hostile as they had been to the older views of Wundt and Tichener.

The Gestalt approach to psychology developed under Max Wertheimer (1880-1943), Kurt Koffka (1876-1941) and Wolfgang Kohler (1887-1967). Since Wertheimer conducted the initial experiment, he is considered the founder and the others co-founders. Each have to their credit psychological works of some distinction. The manner in which the free association tests could be used to detect an individual's hidden knowledge (example: a person suspected of a crime) was shown by Wertheimer. Koffka did important work on imagery, while Kohler specialized on problems of hearing.

Wertheimer's important discovery is known as Phi phenomena. Its main theme is that movement is a product of the observer and not the stimulus. He conducted his movement experiment by flashing light at quick intervals through a small hole on a screen in a dark room. The same thing was done with a second hole and its light was flashed to the right hand side of the first with timed intervals (one fifteenth of a second). This caused the lights to jump to and fro from one side to the other i.e. produced an oscillation and the light was not seen in two distinct lines. Rather these two light flashes appeared to be a single light and motion.

The three founders of Gestalt movement contributed in the areas such as: Pragnan (precision), similarity, proximity,

closer, good condition, psychological isomorphism, trial theory, insight learning, productive thinking, isolation, effect, and relational theory as well as ideas, such as, Phi phenomena and Gestalt. Gestalists do not correlate stimuli with sensations. Instead, emphasis is laid on correlating patterns of stimuli with specific structures.

Learning and perception are interrelated. The laws of perception can be applied to learning, while elaborating this interrelationship, Koffka said that the principle which is generally applied to learning is Pragnang or the goal directed altitude to restore the balance. Whenever there is disequilibrium of forces or tension in the psychological field, learning takes place. Learning process, which is guided by the principle of Pragnang removes the tension. Koffka in Wertheimerian terms defined it as psychological organization. Pragnang plays an important role in motivation.

The other laws of learning or the laws of mental organization are known as: (1) Similarity; (2) Proximity; (3) Clouser; and (4) Good condition.

According to law of similarity, during the process of learning similar elements are learned more quickly than the dissimilar elements. It also states that objects observed in like form or colour will be perceived as assuring a grouped formation. This law is applicable to memory and recall.

The law of proximity explains that objects are perceived as a unity when they are observed in close proximity.

Koffka explained the law of closure as applied to learning as follows: "so long as activity is incomplete, every new situation created by it is still to the animal a transitional situation; whereas when the animal has attained his goal, he has arrived at a situation which is to him an end situation" (1924) (82). Thus the law of closure indicates the idea of striving for completion that is - imperfect wholes tend forward complete, closed or perfect situation.

The law of good condition implies that elements showing consistency in their configuration or structure are learned better.

The doctrine of psychological isomorphism expresses that brain functions have a tendency to take the appearance of particular molar events corresponding to the same structure that are found in experience. Kohler (1947) defined isomorphism as the thesis that our experiences and the processes which underline these experiences have the same structure.

Learning according to Gestalt theory is acquiring insight grasping relations, perceiving the meaning as a whole. After gaining insight, one learns solving the problematic situation genuinely and not by chance. Kohler conducted his experiments of insight learning on chimpanzees.

Regarding the trace theory and isolation effect Gestalists are of the view that memory traces of forms exist and are perceived at one time and subsequently recalled. Memory traces in turn are related to the isolation effect, that is - a distinctive item on a list is recalled more quickly than similar ones that get merged into each other such as in the case of nonsense syllables.

About relational theory, Gestalists discovered from doing experiments with chickens that animals learn structural relations rather than responding to positive stimuli. Kohler found that an animal which has learned to respond to the lighter of two greys has learned the relation and not the positive value of the stimulus so that if the animals were presented with another pair of two greys (one including the lighter grey to which it was trained to respond and another still lighter), the animal will respond not to the grey to which it is accustomed but to the lighter shade because a relation has been learned (a Gestalt) rather than a positive stimulus.

Thus Gestalt studies in neurophysiology, figural after effects, figure-ground, etc. are important. Gestalt psychology has influenced the different areas of psychology, including studies in child, social, education and clinical psychology and its experimental work stands on its own merits.

2.8 FIELD THEORY

Kurt Lewin (1890-1947) - Lewin, primarily responsible for field theory is considered as the founder of a School, closely related to Gestalt psychology. He started his career independently but later on he closely associated with Kohler and Wertheimer. His career in psychology may be divided into three periods:

(1) He developed a theory of motivation in Berlin. He conducted various experiments on adults and some on young children also; (2) During 1935-1944, he made certain outstanding achievements on the study of groups of children under democratic leadership as compared to autocratic; and (3) In 1944, he conducted research on the problems of industrial strike, prejudice and hostility between groups.

2.81 Environmental Forces and Topological Psychology

Lewin considered his psychology as topological and vectoral. The terms such as "topology" and "vector", he borrowed from physics and mathematics. Topology is a form of geometry where concepts of "outside", "inside" and "boundary" are used. It investigates the property of space. Since topology was not sufficient to account for his ideas, he needed a concept of force or vector which he took from mathematics.

Lewin started his system with the concept of life space. He viewed life space as a psychological field, the space in which person moves. It is the totality of facts by which one's

behavior is determined at any given moment. Person's environment, for Lewin, is psychological environment. Topological psychology describes behavior in terms of life space.

Life space is a bigger concept and includes both the person and his surroundings. In other words a person's life space includes himself and other people and objects as he perceives them. As a result, Behavior (B) becomes functions of life space (L) and in turn is a function of the person (P) and his environment (E), as such

$$B = f(L) = f(P, E)$$

Life space, said Lewin, is more than subjective process that is to perceive the world through introspection. His topological psychology is dealt in his books Principles of Topological Psychology⁽⁸³⁾ and A Dynamic Theory of Personality⁽⁸⁴⁾.

Psychological field of Lewin also includes: (1) force; (2) the position of the person within the total psychological field; (3) the position of other parts of the field in relation to each other; and (4) potency. Force acting in a particular direction causes change due to strength, direction and the point where force applies. Strength and direction can be represented by a vector and are called vectoral forces. Valence (attraction) is a field of forces with a central field as a structure. A positive valence attracts and a negative valence repels. Assuming that environment is psychological, when a person moves

from a part of life space to another locomotioning, the change in structure occurs. While doing this, a barrier that resists locomotion may be encountered. This barrier may completely stop locomotion - i.e. it is impassable or may have different resistance at different point (inhomogenous) or may be outer and includes the individual.

2.82 Field Force in Social Science

In 1951, Lewin published his papers under the title: Field Theory in Social Science⁽⁸⁵⁾. Two main aspects of field theory in social science are: (1) social space; and (2) group dynamics. Social space deals with the properties of the group instead of individuals. Lewin states that even reality is social, "Reality for the individual is, to a high degree, determined by what is socially accepted as reality... reality therefore is not an absolute. It differs with the group to which the individual belongs" (1948)⁽⁸⁶⁾. (In the last few years of his life he turned his attention to social psychology in particular group dynamics). Group behavior is a function of a person and the social situation both being necessary. Groups bring about a marked change on their members and so reciprocal relations affect each other. Attractive groups exert more pressure than weaker groups. Like the person in his life space make up the psychological field so to the group and surrounding make up the social field. A characteristic of the group is the great interdependence of its members.

Lewin (1942) listed the following six main features in his field theory. They are: (1) The use of constructive rather than a classificatory method; (2) An interest in the dynamic aspects of events; (3) A psychological rather than a physical approach; (4) An analysis which starts with the situation as a whole; (5) Behavior as a function of the field at the time it occurs; and (6) A mathematical representation of the field⁽⁸⁷⁾.

Thus his essential idea was that of a field. At each instant, the individual's behavior is determined as a structured whole comprising the subject and his environment. Together they form the life space, which includes the totality of the facts.

2.9 CURRENT TRENDS IN PSYCHOLOGY

As psychology matured, schools of psychology pertaining to specific view points headed by a handful of individuals gave way to a number of derivative theories as well as eclectic research centres. The growth in the scope of psychology as a discipline led to the schools of thought being met with different fate.

Structuralism eventually disappeared as a discipline as it came to depend on baseless lines of investigation and an exceedingly narrow scope. Functionalism no longer existed as a separate school. It did, however, become the main study of American psychology. This was made possible due to the increa-

sed investigations on the concept of adaptation and adjustment to the environment through learning and other mental processes. Many concepts of Gestalt psychology were incorporated into the psychology of perception. Furthermore, the Gestalt concepts of organization were introduced in the theory and study of personality and social psychology. The use of association as the main concept of a theory of learning was elaborated by the latter day theoreticians.

Amongst all the schools, behaviorism stayed closest to the goal set by its founder Watson's Stimulus-Response conditioning, however, to great extent it has been supplemented by the operant conditioning of B.F. Skinner, who paid attention on behavior. The behaviorists are now more interested in problems of learning. The psychoanalysts are now interested in motivation. The neo-Freudians, though, accepted some of the Freudian concepts but have also laid an important role for social factors in the development of personality.

In the early 1930's, psychologists began to put more emphasis on theory and research. "The period between 1930 and 1950 was the period of the rise of logical positivism, of the hypothetico-deductive method, of proved rigid formulas for developing psychological theory" (Woodworth, 1965)⁽⁸⁸⁾. Psychologists called it as the Age of Theory. By 1930s, most universities established separate departments of psychology. They were no longer affiliated with philosophy or biology. During 1930s and 1940s, psychological research flourished.

Developments of psychology during the last fifty years may be observed in the major areas of psychology; namely, Learning; Perception; Social Psychology; Personality; Physiological Psychology; Cognition; Language; Motivation; Abnormal and Clinical Psychology; and Mental Testing.

The learning theories of 1930s have had quite different fates. At one extreme, Tolman's theory is not conspicuous for being observed into general use. At the other extreme, Skinners systems. Hubb's theory were taken over in the work of Gibson in applications to human verbal learning and of Hunt in new approaches to human concept formation that began to appear in 1960s. Hubb's theory - treatment of habit growth is the fundamental feature of the Rescorla-Wagner model that recently dominates all research on basic problems of conditioning. Learner, presently is not a bundle of reflexes but rather a highly sophisticated information processor. He is equipped with a memory system of unlimited capacity. However, in comparison to the computers, it is slow. Effective use of memory system is made possible by the development of attentional mechanisms which may help in effective retrieval. In 1980s a serious attack has been made on early language learning with the development of computers and other learning researches. In the field of human cognition, computer simulation has provided effective results. This approach is discussed in the work of John R. Anderson's Architecture of Cognition (1983) (89).

Until World War II, inspite of the contributions of Gestalt Psychology towards the perceptual process, the Helmholtz's views were not disturbed at large. Egon Brunswik, Gibson and Hebb are mainly responsible for three main theoretical approaches at the mid century. Brunswik implied that the Gestalt laws of organization states as to which part of stimulus field belongs to the same object. He focused directly on how the viewer achieves the correct perception of objects and events. He further, concluded that through perceptual learning, organisms come to rely on eyes just to the degree which are correlated with some objective property of things, people or events. This is called likelihood principle, which is an explanation for both perceptual achievements and for illusions and other anomalies. Gibson in 1950 dismissed the idea of depth cues, illusions, and Gestalt phenomena. He argued that the array of light presented to the eye by the normal environment can be mathematically specified as variables of stimulation. Hebb's theory was taken over by Gibson and began to appear in 1960 as new approaches to concept formation. Hebb ^{was} concerned with the neurophysiological mechanisms of perception. In the 1950's and 1960's 'microelectrode' recording of the activity of individual neurons in live animals are important. Hubel and Wiesel in 1962 brought forth important findings in this connection. The phenomena in form and motion perception is amplified in Ohzak and Thomas's (1986) work⁽⁹⁰⁾. The latest development in perceptual process relates to the computer models of perceptual processes. The growing body of research relating to these

issues includes contributions by Cutting (1986)⁽⁹¹⁾; and Hochberg's (1988)⁽⁹²⁾ books. The use of computer to frame and test perceptual explanations has changed the views of American behaviorism. With the use of computer functions, terminology and flow charts, one can describe sensory and mental processes in ways that can be instantiated in programmes and embodied in machines.

In the area of social psychology, research work and theories have increased. These have increased our understanding of social determinants of people's thoughts, feelings and actions. The discovery of chlorpromazine has revolutionized the treatment of severe mental disorders. The discovery was based on a synthesis of basic research findings in a number of different fields, none of which had originally been related to chemotherapy for schizophrenia. Evaluations of social psychological interventions and research in real world settings can become the source of new hypothesis to be tested in controlled laboratory experiments as well as inform theory in social psychology. Social psychologists are focusing the attention on a number of new issues. With reference to energy and resource conservation, they are striving to understand why we are so wasteful of our limited energy and how a change of an attitude can be brought about. Health psychology is today the 'hottest' applied area in social psychology. Among the various issues with which social psychologists concern themselves, the

latest is AIDS and steps are being taken to include behavioral changes and to decrease the risk of being afflicted by the malady. A detailed discussion on the current issues of social psychology are found in The Historical Background of Social Psychology (1985)⁽⁹³⁾, Zimbardo's 'on transforming experimental research' (1975)⁽⁹⁴⁾ Human Inferences : Strategies and Shortcomings of Social Judgement by Nisbett and Ross (1980)⁽⁹⁵⁾.

The study of personality in 1937 was almost completely cut off from the rest of the mainstream of academic psychology. For the first 20 years personality psychology did not have a strong footing. It simply attracted the attention of the people who were interested to understand how people work. After 1950, Dallard and Miller along with Rotter made an effort to integrate personality with social learning theory. With this started experimental work in the field of personality psychology and like general experimental psychology, the emphasis was placed on perform experiments under controlled conditions. Thus, the two branches of psychology become more closely linked. Recently the interaction have also started with clinical psychology too. The different aspects of personality psychology have been discussed by Cantor and Kihlstrom (1987)⁽⁹⁶⁾.

Physiological psychology first began to grow during the 1950's and it was around this time that it gained an identity as a subdiscipline in psychology. Simultaneously, subdisciplines of the other neurosciences, such as, neuroanatomy, neurochemistry, neuropharmacology, neurophysiology, neurobiology, neuroethology

and neurobehavior were beginning to develop too. In 1960, UNESCO in Paris helped to form, The International Brain Research Organization at the international level. In 1970 at the national level in USA, The Society for Neuroscience was formed. Eric Kandall (1976)⁽⁹⁷⁾ stated that neurons in organisms can be traced from receptor to effector and stimulated, recorded from, or manipulated by chemical treatment in such a manner that direct evidence of neural function with relation to behavior can be obtained. Neuro scientists of other disciplines are studying psychological and behavioral problems. Discussions on such changes are referred in Physiological and Comparative Psychologists (1986)⁽⁹⁸⁾.

Earl Hunt's (1987)⁽⁹⁹⁾ survey of cognitive psychology provides an excellent presentation of the development of cognitive psychology. The state of cognition and behaviorism in early 1950's was mostly concerned with thought experiments that too mostly in the term of behavioristic paradigms. Experiments on the uses of tools by chimpanzees and mathematical human problem solving (Wertheimer, 1959) quoted that actions are often controlled by an internal reasoning process. The behaviorists developed more complicated theory of stimulus-response bonding in consideration of internal response produced stimuli. This change in behaviorism amounted to an explicit acceptance of mental representations. Newell and Simon (1956)⁽¹⁰⁰⁾, however, offered the better language for the mind. Their argument was that human thought and mechanical computing are analogous. Two

principles have been put forward to facilitate on understanding of this analogy, viz, the cybernetic principle and the idea of a stored programme computer. During 1958,⁽¹⁰¹⁾ they claimed that a theory of behavior is similar to a design for a machine that can emulate that behavior. A detailed explanation of human information processing in thinking, learning, concept attainment and other similar areas has been discussed in detailed in their famous programme (1961,1972)^(102,103). Other publications are: Thought and Choice in Chess⁽¹⁰⁴⁾ by Adrian D. deGroot published in 1966; Studies in Cognitive Growth⁽¹⁰⁵⁾ by Bruner et.al. (1966) and John H. Flavell's The Developmental Psychology of Jean Piaget published in 1963⁽¹⁰⁶⁾.

Another closely related area of recent development between 1955 to 1972 is concerned with language. Behaviorist viewed language as an important aspect of general laws of learning. Chomsky, and most other modern linguists reject the idea that language is a specific case of general laws of learning. They uphold that humans have a species-specific predisposition to consider certain forms of language in a certain order. Psychologists are more concerned with how language is actually used than with what could be said, but is not. A theory of language behavior must lay greater emphasis on the problems of referential meaning and structural limitation.

In the late 1960s the Defence Advanced Research Project Agency (DARPA) of the department of defence provided the fund for the construction of several demonstration projects for speech

input in computing system. HEARSAY system (Lesser and others, 1965)⁽¹⁰⁷⁾ is of considerable importance in cognitive psychology where computer played chess with a human. The period from 1972 to 1987 has been signified by an increased concern for macro cognition and by the study of language as a problem solving behavior. The work of S. Kosslyn (1980)⁽¹⁰⁸⁾, Shepard and Cooper (1982)⁽¹⁰⁹⁾, and Kahneman, Slovic and Tversky (1982)⁽¹¹⁰⁾, Kahneman and Tversky (1984)⁽¹¹¹⁾ are important in this area. Thus modern cognitive psychology is based on a well articulated view of mind.

In the area of motivation, much motivational theory assumed a passive organism with a nervous systems which reacts to stimulation but is not itself intrinsically active. Presently the concept of nervous system has changed and has given a way to homeostatic drive theory. Freud gave more emphasis on unconscious mind which comprised of egoistic instincts and emotions. But recent cognitive study lays emphasis on motivation and emotion which can accomodate the irrational drives and emotions of which Freud and McDougall spoke. These concepts are discussed by Weiner (1980)⁽¹¹²⁾ and Harre (1985)⁽¹¹³⁾.

Another current development has been in the area of personality. R.B. Cattell in his Personality : A Systematic, Theoretical, and Factual Study published in 1950 mentioned that personality "is that which permits a predictions of what a

person will do in a given situations" (114). Representative selections of current developments in the area of personality is dealt in Personality and Motivation published in 1957 (115). In 1960's the attention was diverted towards situationism. In 1973, Psychological Review (116) paper by K.S. Bower revealed the main features of The Doctrine of Situationism. The important casual factor in behavior, including social behavior exists in the environment rather than organism itself. Thus the satisfactory explanation of the causes of behavior could be provided by describing the environmental conditions associated with it. Current developments in the area of personality are discussed in Goldberg's book (1981) (117) and Synder and Ickes (1985) (118).

In the early 1950's several developments occurred which gave birth to a major change in the direction of abnormal and clinical psychology. This decade saw the appearance of major tranquilizers as a treatment for psychosis and frequent use of other kinds of somatic treatment, such as electro-convulsive therapy (ECT) and Psychosurgery. In 1960s, a movement arose against traditional views of psychopathology. In 1961 the book The Myth of Mental Illness (119) by Thomas Szasz pointed out that psychiatric diagnosis was grossly not reliable. In 1975, another book appeared which was edited by Thomas Schett as Labeling Madness (120). Carl Roger's client-centred therapy in response to apparent failure and psychoanalytic therapeutic

also appeared on the scene. Another development in the area was rise of behavior therapeutic which involved application of the principles of conditioning. Falek and Moser in 1975 brought out Classification of Schizophrenia ⁽¹²¹⁾ which highlighted the improvement in diagnosis. The developments of standard, formal, structured interviews etc. were developed to replace the older tendencies. Schedule for Affective Disorders and Schizophrenia was brought out by Spitzer and Endicott in 1977 ⁽¹²²⁾.

Another obvious development has been observed in the area of mental testing. Throughout the major period of the half century, a vast increase in number of tests publications was observed. Emphasis was much on improvement of quality of tests. However, the present trend during 1970s and 1980s brought some change. This was mainly due to the meteoric rise of computer technology. Classical theory relating to ability and achievement testing has been replaced by latent trait theory also known as item response theory. Computers are coming into use for the administration of tests. It appears they will replace paper-and-pencil testing altogether.

The increasing computerization and formalization is found throughout psychology. Examples of this are discussed in cognition and psycholinguistics but application of computer is seen in every part of the field.

Finally, the amazing growth of the various fields of applied psychology, clinical, educational, industrial, human engineering, and variety of related fields are developing rapidly. Thus, psychology today has a distinctly different face from that which it had generation ago. Views on the present issues are seen in multivolume series Psychology : A Study of a Science ⁽¹²³⁾ (1969-73) edited by Sigmund Koch.

In conclusion we can say that the aims and objective of contemporary psychology can best be deduced from an analysis of its history. The theory that history repeats itself is very aptly illustrated by psychology. Ancient Greece contributed two cycles to the evolution of psychology, namely, the objective-naturalistic cycle and the subjective-dualistic cycle.

The objective side, which is very much in evidence in the writings of the ancient Greeks of the Hellenic period especially Aristotle, reveals that psychology started with a naturalistic explanation of psychological events. This gave way to the body route through the natural sciences like biology and physics. In the second decade of the 20th century, John Watson came with different theories. His major effort was to make psychology the study of real events which could be observed. However, this cycle does not seem to be coming to an end in the near future.

The second cycle, the subjective, arose with the early christian writings, those of St. Augustine in particular. Church

Fathers propagated it and it eventually followed through the lines of philosophy. Even empiricists such as John Locke followed a subjective approach, for though they felt that they were dealing with a real world, their work basically comprised the study of inner experience. When Wundt dissociated himself from philosophy so as to establish psychology as a separate discipline, he tried to do so along scientific lines but his method of introspection proved to be totally subjective. The subjective dualistic tradition was upheld by later structuralists and the Gestalt movement too. Schools like associationism, functionalism and hormic psychology which followed, made an attempt to take a more objective attitude but did not accomplish in serving themselves from the dualistic tradition. More recent developments have been the coming up of the movements of existential and humanistic psychology as a reaction against the behavioristic movement which is growing in strength. The adherents of the former movement have made the inner man - his feelings, desires and experiences, their subject of study, thus revatilizing the concept of the inner man, which had been so vital in the middle ages, and even popularising it. This cycle too shows no sign of stopping.

Thus, viewing these two cycles of psychology, we can see clearly that history repeats itself. A great deal of knowledge has been accumulated in the meantime and in that we can undertake and identify psychological events. We are more knowledgeable today than during the time of ancient Greece or the Middle

Psychology today is no more cohesive than it was in the early years. More people deal with psychology now than ever before and psychology has many more theories to boast of. The subject commands strong interest and a wide following because it is a subject comparable to history and mathematics and a practice like medicine.

Freudian psychology does not find as much space in introductory texts as it once did. This does not, however, imply that Freud's approach to psychology is dead. The popularity of Neo-Freudianism and Erikson's theory based on Freud's psychoanalysis, negotiate the very thought that Freudian psychology has become obscure. Erikson's Eight Stages of Man ⁽¹²⁴⁾ is a widely discussed work.

The Humanistic and Existential movements reaction against the objectivism of behaviorism has been the proposal of an analysis of the inner man with the method of phenomenology forming the basis.

Contemporary behaviorism appears to be very much alive and doing very well too. Skinner's operant conditioning, as a methodology, has laid down various basic principles of behavior in many species. Its applications to teaching, psychopharmacology and behavior therapy are distinct and clear cut. Much of experimental psychology has its roots in behavioristic tests.

Behaviorists and physiological psychologists were staunch supporters of the view that psychology is a science. D.C. Hebb (1974) and K.H. Pribram upheld that since man is a social animal, psychology including clinical and social psychology, is a biological science.

Sigmund Koch (1973)⁽¹²⁵⁾ fears that psychology is breaking up under the strain of the constant squabbling among theorists and experimentalists. Leahy (1980)⁽¹²⁶⁾ believes that to integrate the principles of psychology it needs a personality like Issac Newton to do to psychology what Newton did to physics.

As to the future of psychology, a number of psychologists still feel that psychology ought to be a branch of natural science. Furthermore, these groups are more interested in the application of psychology. Remediation and human engineering are illustrations of the above trend.

2.10 INDIAN SCENARIO

There has been a close relation between Indian philosophy and Indian psychology. The fundamental truth regarding the nature of reality is the basis of Indian psychology, and hence the main approach of psychology has been to solve the intricate problems of the human mind. By and large, Indian philosophers have tried to study the various aspects of human life and the universe in their own way and have explained the ways to unravel the mysteries of such aspects and the

same has been the ultimate goal of the Indian psychologists. Adopting the different techniques and using various introspections, the Indian philosophers and psychologists pursued the quest of having a total vision of life and the universe. The approach has been based on personal experience.

One of the major understandings has been that the consciousness pervades the entire universe, it also animates all organic and inorganic matter. Lower and higher organisms have in many respects great similarity, the difference between them lies only in the degree in the quantum of consciousness and its three fold nature or guna (Sattvika, rajasika or tamasika). As such the scope of Indian psychology has been the entire life including the physical atom, the amoeba, the vegetable kingdom and the animal kingdom. Almost all schools of Indian philosophy affirm the existence of the universe. However, Indian psychology is undoubtedly clear about the fact that individual consciousness is directly related to the universal consciousness. Philosophers have extensively discussed the finer details regarding the mutual relation of individual consciousness and cosmic consciousness. Whether there is a slight difference, or no difference between the two is not that important as far as the psychological approach is concerned. There is a relation between the two is of more concern to the psychologists. This has been the basis for Indian psychology to give importance to the so called mystical

realms of superconscious, which is a topic not usually given importance by Western Psychology.

Indian psychology, as stated earlier, being closely related to philosophy, classifies knowledge into three types: the direct cognition (pratyaksa), inference (paroksa) and intuition (aparoksa). These aspects are dealt by Nyaya psychology. Intuition or yogi prolyabsa has been primarily dealt by Vaisesika Vedanta or jaina and yoga. In the words of Swami Vivekananda, "There is a continuity of mind, as the yogis call it. The mind is universal. Your mind, my mind, all these little minds are fragments of that universal mind, little waves in the ocean, and on account of this continuity, we can convey our thoughts directly to one another". Indian psychology does not regard that there is any mystery in intuition, telepathy or extra sensory perception.

Philosophy being the basis of Indian psychology, it has a different foundation as compared with the Western psychology. In many aspects like scope, methodology and validity of conclusions, Indian psychology surpasses Western psychology. A number of problems like continuity of experience, nature and origin of mind, psychological basis of mind, mind-body relationship, survival and immortality of mind, extra-sensory perception, dream phenomena, heredity versus environment etc., not solved by Western psychology has been tackled by Indian psychology.

However, in totality, the Indian psychology has been complementary to Western psychology and hence a synthesis of both is necessary.

There is some difference in the methodology adopted by Western and Indian psychologists. Observation and experimentation widely used for psychological studies have their own limitations and hence the need for psychoanalysis and introspection is being felt, which are not new to Indian thinkers and have been used in India whenever necessary. Psychological behavior being purely subjective, can not be studied like physics and chemistry, has been realised by Indian thinkers and hence psychoanalysis has been given significant importance. This idea has been borrowed and is being now widely used in the West.

Psychology in different ways has been in existence in Indian context for a long time and in one form or another the various psychological parameters have been given due significance in our ancient literatures like Upanishads, Vedas etc. Indian thinkers have long back accepted: (1) experience and observation (pratyaksa); (2) reasoning (Upamana); and (3) intuition or testimony (sabela). Upanishads mention these methods and Samkhya endorses the same.

The intuitional or the introspectional method is the most suitable method for psychology because it helps to study the total mind instead of different functions separately. Spiritual insights have been properly understood and given due importance right from the Upanisadic age. Therefore, the chief method is of insight and introspection.

2.11 CHRONOLOGICAL DEVELOPMENT OF PSYCHOLOGY

Table 2.1 - Chronological Development of Psychology

Year	Contributor	Field and Contribution
1265	Aquinas, St. Thomas	Theology - Summa Theologica Vol. I and II.
1619	Descartes, R	Father of the physiological psychology and of reflexology
1650	Hobbes, T	Empiricism and Associationism - Human nature or fundamental elements of policy
1651	Hobbes, T	Empiricism and Associationism - Leviathan
1690	Locke, J	Association of Ideas, Theory of Knowledge - An essay concerning human understanding.
1709	Berkeley, G	Vision - Theory of vision
1760	Bouguer, P	Measurement of the threshold for visual brightness.
1812	Hall, M	Reported the distinction between the voluntary and involuntary movements of body, stimulating the study of reflex action.

Year	Contributor	Field and Contribution
1825	Gall, FJ	An Anatomical Theory of Personality - Phrenology : The localization of the functions of the brain.
1826	Muller, J	Father of Experimental Physiology - Elements of Physiology.
1829	Mill, J	Association Psychology - An analysis of the phenomenon of the human mind.
1834	Weber, EH	He gave us Weber's law - Which asserts that the just perceivable difference between two stimuli gets larger as the stimuli get larger.
1850	Helmholtz, H. von	Theoretical work of perception audition and vision.
1850	Helmholtz, H. von	Measurement of the speed of the nerve impulse.
1855	Bain, A	Doctrine of Association - The senses and the intellect.
1858	Hamilton, W	Law of Redintegrations and theory of logic - Lectures on Metaphysics.
1859	Bain, A	Association - The emotions and will.
1860	Fechner, GT	The method of determining threshold, worked out the methods for measuring sensation.
1861	Broca, P	Discovered the localization in the human brain of a centre for speech.
1862	Helmholtz, H. Von	Experimental psychology : fixed-pitch theory of vowel tones. - On the sensations of tone as a physiological basis for the theory of music.

Year	Contributor	Field and Contribution
1862	Wundt, W	Founder of Experimental Psychology - Beitrage Zur Theorie der Sinneswahrnehmung Theory of sensory perception.
1862	Wundt, W	Structuralism - Beitrage Zur Theorie der Sinneswahrnehmung.
1869	Galton, F	Psychometrics - Hereditary genius : an inquiry into its laws and consequences.
1869	Helmholtz, H. von	Experimental Psychology - The mechanism of the ossicles of the year and membrana-Tympani.
1870	Fritsch, G and Hitzig, E	Discovered the localization of motor functions in the cerebral cortex.
1872	Plateau, F	Measurement of sensation
1872	Spencer, H	Revolutionary Psychology - Principles of psychology.
1873	Wundt, W	Founder of Experimental Psychology - Principles of Physiological Psychology.
1873	Wundt, W	Theory of actuality, theory of feeling and methods of introspection - Principles of physiological psychology (The first half appeared in 1873 and the later in 1874, underwent six editions from 1873 to 1911).
1874	Brentano, F	Advanced the cause of Phenomenology, Intentional Psychology - Psychology from an empirical stand point.
1879	Galton, F	Psychometrics - Psychometric experiments.
1879	Wundt, W	Structuralism - Founder of psychology as an independent science.

Year	Contributor	Field and Contribution
1883	Delboeur, L	Expanded plateau's theory of sensory measurement in terms of the 'sensed contrast' between sensations.
1885	Ebbinghaus, H.	Quantitative techniques in the study of memory and learning.
1886	Ward, J	Extended the Brentano on Phenomenology - article 'Psychology' in Encyclopedia Britannica.
1887	Külpe, O	Functional Psychology - Zur Theorie der Sinnlichen-Gefuhle.
1890	Cattell, J. McK	Mental test and measurement
1890	James, W	Functionalism - Principle of psychology.
1895	Breuer, J and Sigmund, F	Studien Uber Hysterie : method of treatment to cure hysteric patients.
1895	Kulpe, O	Functional Psychology - Introduction to philosophy : A handbook for students of psychology, logic, ethics, aesthetics and general philosophy.
1896	Muller, GE	Psychophysical method, memory and color perception.
1896	Tichner, EB	Structuralism - an outline of psychology.
1898	Thorndike, EL	Law of Effect - Animal intelligence : an experiment study of the associative processes in animals.
1900	Wundt, W	Structuralism - Volker Psychologie 10 vols.
1900	Sigmund, F	Interpretation of dream - Concept of unconscious and hidden motive.
1901	Tichner, EB	Concept of sense distance and theory of supraliminal sensory intervals - Experimental Psychology : A manual of laboratory practice 2 vols.

Year	Contributor	Field and Contribution
1901	Kulpe, O	Experimental study of thought processes
1903	Thorndike, EL	Theory of transfer - Educational Psychology
1904	Angell, JR	Psychology : An introductory study of the structure and functions of human consciousness.
1904	Hall, GS	Hall remains important for child study movement with its many consequences for education and developmental psychology - The faces on the child and the introduction of questionnaire method.
1904	Pavlov, IP	Nobel Prize Winner - Conditioned reflexes.
1905	Freud, S	Theory of sex - three essays on the theory of sexuality.
1905	McDougall, W	Hormic Psychology - Physiological Psychology, Outline of Abnormal Psychology.
1905	McDougall, W	Purposive Behavior - Physiological Psychology.
1907	Wundt, W	Theory of Actuality - Outlines of Psychology.
1908	Titchener, EB	Structuralism - Lectures on the experimental psychology of feeling and attention
1909	James, W	Functionalism - Pragmatism : A new name for old ways of thinking.
1909	Külpe, O	Functional Psychology - Outlines of Psychology.
1910	Titchener, EB	Structuralism - Textbook of Psychology.
1910	Berekeley, G	Subjective idealism, phenomenalism, universal immaterialism - Magnum opus, the principles of human knowledge.

Year	Contributor	Field and Contribution
1911	McDougall, W	Purposive Behavior - Body and mind; A history and defence of Animism.
1912	Wertheimer, M	Isomorphic relation between seen-movement and critical short circuit. Discovery of Phi phenomenon.
1913	Thorndike, GL	Learning - Psychology/Learning. of
1913	Watson, JB	Behaviourism. Personality - Psychology as the behaviorist views it.
1914	Holt, EB	Response as the essence of cognition - The freudian wish and its place in ethics.
1914	Koffka, K	Special features of mental growth.
1914	Watson, JB	Animal Psychology - Behavior : An introduction to comparative psychology.
1915	Frenzi, S	Concept of love.
1917	Jung, KG	Psychoanalysis - Psychology of the unconscious.
1918	Woodworth, RS	Dynamic Psychology
1919	McDougall, W	Theory of instinct - Introduction to social psychology.
1920	Freud, S	Theory of Psychoanalysis - Freud developed psychoanalytic approach.
1920	McDougall, W	Social psychology - The group mind; a sketch of the principles of collective psychology, with some attempt to apply them to the interpretations of national life and character
1920	Adler, A	Theory of individual psychology - He did not share Freud's belief.

Year	Contributor	Field and Contribution
1921	Freud, S	Concept of libido and its phases - Group psychology and the analysis of the ego.
1921	Woodworth, RS	Imageless thought and voluntary action - Psychology
1922	Koffka, K	Gestalt Psychology - Perception : An introduction to Gestalt - theorie in <u>Psychological Bulletin</u>
1923	Freud, S	Concept of Superego, ego and id.
1923	McDougall, W	Purposive behaviour - Outline of psychology.
1923	Wertheimer, M	Objects as immediately given to consciousness. Set forth a group of principles as illustration of how the perceptual field could be organized.
1924	Koffka, K	Gestalt Psychology - Growth of the mind.
1925	Wolfgang, K	The Mentality of Apes.
1925	Carr, HA	Functionalism - Psychology : A study of mental activity.
1926	McDougall, W	Outline of abnormal psychology
1928	Pavlov, IP	Classical conditioning - Lectures of conditioned reflexes.
1928	Hull, CL	Learning - Aptitude testing
1929	Lashley, KS	Brain mechanism and intelligence.
1930	Watson, JB	Behaviorism
1930	Rank, O	Cause of neurosis in relation to anxiety during birth.
1932	Tolman, EC	Purposive behaviour in man and animal - Purposive behavior in animals and men.

Year	Contributor	Field and Contribution
1933	Hull, CL	Learning - Hypnosis and suggestibility : A experimental approach.
1935	Guthrie, ER	Learning - Psychology of learning.
1935	Koffka, K	Gestalt theory covering bearing memory emotion, voluntary and involuntary action - Principles of Gestalt Psychology.
1936	Lewin, K	Structure of mind. Field theory - Principles of topological psychology.
1937	Hull, CL	Learning - Mind mechanism and adopted behaviour.
1938	Guthrie, ER	Learning - Psychology of human conflict.
1938	Skinner, BF	Skinner boxes - Behavior of organism : An experimental analysis.
1940	Hull, CL	Masterpiece in theory construction - Mathematico-Deductive theory of rate learning.
1943	Hull, CL	Quantitative theory of simple and complex forms of learning and behaviour - Principles of behavior.
1945	Wertheimer, M	Productive thinking
1947	Kohler, W	Identity of field structure of psychological experience and underlying brain process. Deemphasized the role of learning in perception - Gestalt psychology : An introduction to the new concepts in modern psychology.
1949	Thorndike, EL	Conditioned reflexes - Selected writings from a connectionist's psychology.
1950	Cattell, RB	Personality : A systematic, theoretical and factual study.

Year	Contributor	Field and Contribution
1951	Hull, CL	Learning - Essentials of Behavior.
1951	Lewin, K	Field theory - Field theory in social science.
1952	Hull, CL	Learning - A Behavior system : An introduction to behavior theory concerning the individual organism.
1953	Skinner, BF	Learning - Science and human behavior.
1956	Hilgard, ER	Theories of learning.
1956	Spence, KW	Behaviour theory and conditioning.
1957	Skinner, BF	Learning - Verbal behavior, Schedule of reinforcement.
1958	Skinner, BF	Received the American Psychological Association Distinguished Contribution Award.
1958	Woodworth, RS	Behavior's primacy theory of motivation - Dynamics of behavior.
1959	Bandura, A	Adolescent aggression
1963	Bandura, A	Social learning and personality development.
1965	Herrmann, T	Best known for his work in cognitive psychology, psychology of language, and philosophy of psychological science.
1965	Chomsky, N	Aspects of theory of syntax.
1968	Skinner, BF	Received the National Medal of Science Award
1969	Bowlby, J	Attachment theory - attachment and loss.
1969	Schultz, D	History of psychology - A history of modern psychology.

Year	Contributor	Field and Contribution
1971	Skinner, BF	Learning - Beyond freedom and dignity.
1972	Newell, A and Simon, HA	Human problem solving
1973	Bower, KS	Situationism in psychology : An analysis and a critique
1977	Bandura, A	Social learning as the main basis for behavior acquisition, self-reinforcement or self gratification - Social lear- ning theory.
1977.	Spitzer, R and Endicott, J	Schedule for affective dis- order and Schizophrenia.
1978	Skinner, BF	Learning - The shaping of behaviorist.
1979	Herrmann, T	Cognitive Psychology - Psychology as a problem.
1980	Nisbett, RE and Ross, L	Human inference. Strategies and shortcomings of social judgement.
1980	Kosslyn, SM	Image and mind
1982	Herrmann, T	Cognitive Psychology - Speech and situation.
1982	Shepard, RN and Cooper, LA	Mental images and their transformations
1983	Skinner, BF	Learning - A matter of consequence.
1984	Kahnman, D and Tversky, A	Choices, values and frames
1985	Allport, GW	Historical background of social psychology
1985	Gardner, H	Mind's new science - A history of the cognitive revolution.

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CHAPTER III
METHODS AND TECHNIQUES
IN PSYCHOLOGY

METHODS AND TECHNIQUES IN PSYCHOLOGY

3.0 INTRODUCTION

Psychology is the scientific study of behavior. The aim of science is to provide new and useful information in the form of verifiable data; data obtained under conditions such that other qualified people can make similar observations and obtain the same results. Generally speaking, method means a systematic procedure for understanding research. Random House Dictionary of the English Language defines the term "method" as "a manner or mode of procedure, especially an orderly, or systematic way of instructions, inquiring presentations".⁽¹⁾ By method we mean the techniques used by researchers in the construction and verification of certain principles.

3.1 SCIENTIFIC METHOD OF PSYCHOLOGY

Even as late as 1900, the term 'science' was restricted to the findings, theories and techniques in Physics, Chemistry and Biology. Today, the methods employed for the acquisition of knowledge are given more attention and importance than the fields of study. Science is the observation, interpretation and classification of facts by methods which can be verified and are at the same time, objective. Science seeks to explain. The gathered facts and data are reviewed on the basis of their

relationship, casual or otherwise, with each other. The main feature of science has been described as being empiricism i.e. obtaining evidence by means of direct experience (Munn, 1969)⁽²⁾.

The set of attitudes and techniques which have emerged as guidelines for research and the interpretation of its results, have been assigned the general term "scientific method". Each discipline has its own particular subject of these methods. However, the attitudes of objectivity, honesty and scholarship are considered common by scientists of all disciplines. Psychology as a science uses the scientific method which is a group of methods formed to establish general laws through evolutionary theories that try to describe, explain and predict various phenomena. This method makes use of theories stated in an explicit manner. From such theories hypotheses are formed which are evaluated systematically and critically through objective, controlled empirical findings and conclusions which are available for scrutiny and analysis by the public and replication in the scientific method.

Scientific approaches are analytical in manner. Complex situations are analysed into various pertinent variables. Among these variables, relationships are investigated and theories which are in order with the empirical results, are formed and evaluated in a critical manner. The scientific method has a critical approach to the analysis of data and its interpretation.

Scientists pay serious attention to the study of interpretation of results of issues such as observer bias, subject bias and perplexing variables.

The science of psychology studies behavior in such a way which is not dependent on any moral evaluations and does not involve making any decision which is related with some ideal. The basic aim of the psychologist is to observe behavior in an objective manner, to describe it accordingly, to establish cause - and - effect - relationship. The psychologists seek to formulate "general laws of behavior" (Arnoult, 1972),⁽³⁾ which organizes and explains the observations made. The final aim is to understand and not pass judgement.

Replication and cross-validation is also important for the scientific community; that is to produce duplicate studies and conduct studies by defining variables in different ways or using different types of samples to accept the validity of a scientific theory. It is because, a single study rarely provides a sufficient basis to accept or discard a theory. In general, scientific method consists of the following five steps:

1. Careful observation of events;
2. Formulation of hypothesis;
3. Execution of the research;
4. Interpretation of research, and
5. Communication of hypothesis and experimental results to scientists and other interested persons.

According to Dunham (1977) "scientific method is a sequence of behavior that can be conveniently described as consisting of four stages: observation, description, hypothesis formation and verification"⁽⁴⁾.

3.2 METHODS AND TECHNIQUES IN PSYCHOLOGY

To study the various issues regarding behavior, psychologists have devised new methods or adopted old method from other sciences. The methods in psychology differ in both the kind of information about behavior they yield and types of behavior to which they are best suited. They are not mutually exclusive, however, and can sometimes be applied in combination to the same problem to gain a broader perspective. There are many ways of making observations in psychology. Various psychologists have used different methods and techniques in their investigations. Methods and techniques most commonly used for psychological research to study behavior (methods for data collection) and analysis of behavior in varieties of personalities, may broadly be subdivided as under:

- | | |
|-----------------------------|------------------------------------|
| (i) Psychophysical Method; | (v) Interview Method; |
| (ii) Experimental Method; | (vi) Psychological Testing Method; |
| (iii) Observational Method; | (vii) Clinical Method; and |
| (iv) Field Studies; | (viii) Psychometric Method. |

3.21 Psychophysical Method

The early history of mental measurement embodies two independent dimensions of psychophysical assessment; the psychophysical tradition and the mental test tradition. Herbert created the ground work of psychophysical tradition and much later to the development of Psychology. Galton founded the psychological tests traditions for measuring individual differences. Weber extended Herbert's contributions and proposed the concept of jnd (and its associated laws) to discriminate the stimulus in a subsequent decreasing or increasing order (proportionally). Fechner provided scale value to physical stimulus and founded a few methods which had been historically known as Weber-Fechner laws. Within this frame includes the method of Average error; the method of minimal changes and the constant method. Fechner viewed that these methods are also to measure the sensations directly and also provide a direct link between mental and physical dimensions of the stimulus. This approach also offers, according to Fechner methods of systematic observation of behavior and the physical stimulus which could be presented in precise, controlled and varied conditions. As such, the psychophysics must be defined as an "exact science of function relation of dependency (body and mind)" (Fechner 1889) ⁽⁵⁾.

The further development in the psychophysical methods as proposed by Fechner concerns three experimental procedures e.g. Method of Adjustment; Method of Limit; and Method of Constant Stimuli.

3.211 Method of Adjustment

Under MOA the 'S' is instructed to control the variation in the stimulus and is expected to match it to a standard stimulus or to find out the jnd from a stimulus.

3.212 Method of Limits

The stimulus in this case is changed by the repeated increments as long as the subject detects the change. A constant stimulus is also presented sometimes, for comparison. In the next stage, the stimulus value is raised to the next series of high value and the stimulus is changed by decreasing steps.

3.213 Method of Constant Stimuli

In this method two stimuli are presented. First is the constant (the standard) and the second for comparison. In the latter the stimuli varies over a range of values both, larger and smaller than the standard. The standard comparison pairs are usually given in a random order.

The psychophysical methods formulated by Fechner have also been subject to criticism and some of his observations are not acceptable. The controversy usually concerns the inefficiency

of his methods in explaining day-to-day reaction to stimuli, because in psychophysical observation it is presumed that the 'limen' is determined by psychophysical factors and is accepted as a complex reference controlled by several factors.

3.22 Experimental Method

In the prehistoric era, Psychology, similar to other branches of sciences was based on methods and procedures which are claimed to be non-experimental and less objective in nature. With the advancement of the scientific methods, the early researcher in Psychology also adopted to the emerging trends which were largely tuned with experimental procedures and analysis. The major concern of Psychology is to discover methods and laws for control, regulation, adjustment and control of human being with their varied settings. In pursuit of the same, from time to time, varied procedures and processes have been evolved to determine the behavioural processes on variety of its presentations in interactions to the external overt and for covert activities or actions. In order to discover the casual relationship between human interaction and environmental setting, a number of experimental and field studies have been made. Also human responses have been subjected for evaluation over scientific instruments in advance laboratories, which of the present state no less equipped with electronic tools than the other branches of sciences.

Two types of experimental approaches are common. They are: (1) exploratory; and (2) confirmatory. Exploratory experiments are performed in the absence of sufficient knowledge to formulate a possible solution. They are thus, conducted in the preliminary stages of investigation. Confirmatory experiments are done to test the explicit hypothesis. This is with the accumulation of informations at the advance stages.

Historically, ^{about} the advantages of experimental conditions in human studies, Woodworth has categorically mentioned that "(1) experimenter makes the event happen at a certain time and place, so is fully prepared to make an accurate observation; (2) controlled conditions being known conditions, the experimenter can set up his experiment a second time and repeat the observation; and - what is very important in view of the social nature of scientific investigations - he can report his conditions so that another experimenter can duplicate them and check the data; (3) the experimenter can systematically vary the conditions and note the concomitant variation in the results" (6)

3.221 Experimental Design

The conceptualization and development of 'design' is essential to experimentations. Usually logical schemata determines the nature and order of different phases of experiments, which is contingent upon the experimental design. Formulated experiments involve a planned introduction of the factors of a situation with objective of associating it with a change in that

situation. This makes possible to introduce the variables which have been commonly known, initially the independent and the dependent variables. However, experimental design do not only serve to relate variables to their effects but they are also to rule out alternative experiments. The rationale and logic underlying the experimental designs have been suggested by a few experimentalists.

Experimental designs serve not only to relate variables to their effects but also to rule out alternative explanations.

Asher has suggested the following logic underlying the experimental designs:- (1) it holds the situation constant, introduce the treatment, observe the change; (2) if a situation cannot be held constant but is changing, observe the patterns of change, introduce the treatment, determine whether the pattern of change has been disturbed; (3) hold two or more equivalent situations constant, keep one situation like the others in all ways but the treatment, introduce the treatment to the other; and (4) relate the pattern of treatment of application, withdrawal to the pattern change, if there is a measure of treatment or intervention strength, relate the strength or intensity of the intervention aspects, such as size or strength of change.

In designing an experiment, the researcher needs ingenuity to obtain data that are relevant to the hypothesis. It is advisable to draft a thorough plan before the experiment is conducted. The different steps in planning of an experiment as suggested by McGuigan (1983)⁽⁷⁾ are:-

1. Labelling the experiment;
2. Survey of the literature;
3. Statement of the problem;
4. Statement of the hypothesis;
5. Definition of the variables;
6. Use of apparatus;
7. Controlling the variables;
8. Selecting a design;
9. Selection and assignment of participants to groups;
10. Specification of the experimental procedure;
11. Evaluation of the data;
12. Evidence report;
13. Inference from the evidence report to the hypothesis; and
14. Generalization of the findings.

Labelling the experiment

Clear cut specific title, the time and the location of the experiment are to be given.

Survey of the literature

Before setting the experiment, the previous work done in the field has to be surveyed. This helps in many ways, like: formulation of the problem; and clearer picture of the subject to the researcher. Researcher thus knows if the experiment being contemplated by him has not been done by earlier workers and even

if it has to be repeated what new information he intends to obtain. Also one knows the other studies already made in the same or allied areas.

Statement of the problem

Any experiment is being conducted because of the lack of knowledge about something. This lack of knowledge is clearly spelt out in detail, through a series of steps. However, the actual statement regarding the experimental questions should be very concise.

Statement of the hypothesis

The different variables identified in the statement of the problem are given in the hypothesis. Hypothesis, for example may be "Smoking is harmful for physical and mental health".

Definition of the variables

The variables both independent and dependent specified in the statement of the problem should be operationally defined. This is a critical phase, because in the absence of this, the hypothesis is untestable. Thus clear cut distinctions between independent and dependent variables are important in an experiment. In the above example, smoking will be independent variable as experimenter's aim would be to find out the effect of its presence and absence.

Use of apparatus

Normally every experiment involves two things: (i) an independent variable which has to be manipulated and (ii) the dependent variable, the resulting value of which has to be recorded. In psychology the most common independent variable is presentation of certain values of a stimulus and in every experiment the response is recorded. This could be done better manually or through mechanical or electrical assistance. In case of latter two cases of specialized apparatuses are used.

Controlling the variables

In this case the scientists must consider all the variables which may act in such a way that either invalidate the experiment or the results obtained may be questionable. Such variables must be controlled.

Selecting a design

Many a times experimental results of the two group design are compared to those for a control group. However, it is more advantageous to use several groups which are called multigroup design. Factorial design is another more efficient design which is commonly used in recent days. "A design is factorial when it uses all the possible combinations or degree of different independent variables which have been selected" (Piaget and others, 1968)⁽⁸⁾. For example, if two values of two independent variables A_1 and A_2 and B_1 and B_2 have been divided to study, then four

possible combinations would be possible. If one desires to study the effect of anticipation on reaction time along with two variant lengths of period in anticipation - that is 20 seconds (A_1) and 60 seconds (A_2) and two conditions which would be treated as indifferent anticipation (B_1) (ordinary simple reaction time) and fearful anticipation (B_2) (interacting the subject administers which may be shock to himself). In this case four equivalent groups I-IV will be taken. Therefore group I will undergo $A_1 B_1$; Group III will undergo $A_2 B_2$; $A_2 B_1$ will go with Group II; $A_1 B_2$ Group IV will undergo.

Selection and assignment of participants to groups

Experiments are performed to conclude something about behavior and for this purpose certain participants are selected. The obtained participants from the chosen one's are generalized. Thus the participants are drawn from large mass - that is population and the few selected participants are the sample. The population need not refer only to people but may be of any type of organism.

It is very important to specify the population under study. Also the characterisation of the population relevant to its definition must be specified - that is the age, sex, education, socio-economic status and race etc.

Specification of the experimental procedure

The data collection phase of the experiment and its procedure should be given in detail. The treatment of the participants should be carefully planned and the instruction should be written out. Also it is important that the consent of the participants should be obtained.

Evaluation of the data

The data collected during the experiment are subjected to statistical analysis. Statistical techniques can be used to determine whether a small difference between the mean dependent variables scores of two groups is reliable. The types of statistical tools to be used depends upon the nature of the data collected.

Evidence report

The summary statement of the findings of the experiments is given clearly. Evidence report is a statement of whether the antecedent conditions of the hypothesis obtained and the consequent conditions specified of the hypothesis were found to occur.

Inference from the evidence report to the hypothesis

Evidence report in this phase is related to the hypothesis. It is tested whether the hypothesis is true or false. In case the evidence is positive, the hypothesis is confirmed and in case it is negative the hypothesis is not confirmed.

Generalization of the findings

The extent to which the results can be generalized depends mainly on the magnitude to which the population with which the experiment is concerned have been specified to the extent to which these populations have been represented in the experiment by random sampling.

Edward (1971)⁽⁹⁾ pointed out the following basic principles of experimental designs. They are:-

1. Experiment;
2. The question of interest;
3. Sample space and probability;
4. Stimulation of the experiment;
5. Permutations;
6. Combinations;
7. Random sample;
8. Probabilities of possible outcomes;
9. Sample space for the experiment;
10. Testing a null hypothesis;
11. Type I and type II error;
12. Experimental controls;
13. The importance of randomization; and
14. A variation in design.

3.222 Variables

A variable is any fact or event that does not always have the same quality or quantity. Thus height, weight, intelligence, age, shape and size of letters, hours of work and everything else that one may use in an experiment is a variable.

In an experiment one tries to find out relationship between two or more variables. The relationship between the variables such as: intensity of light and perception of colour, increase in temperature and sensation of heat, amount of difference between two values of a stimulus and perception of the difference, amount of noise and loss of concentration, amount of learning mastered and speed of learning, are tried to find out. Experiment is also done to ascertain a relation that is already discovered.

Since observations are an integral part of research, the things that are observed are called variables. A particular observation recorded in an experiment is called a value of the variables. The value of variable indicates the class to which an observation is to be assigned. By a variable, we assume anything that can be observed and it is of such a nature that each single observation can be classified into one and only one of a number of mutually exclusive classes. Ellen L. Edwards (1968)⁽¹⁰⁾ has classified the variables into five different types. They are: (a) Behavioral variables; (b) Stimulus

variables; (c) Organismic variables; (d) Discrete and continuous variables; and (e) Quantitative and qualitative variables.

(a) Behavioral variables

Behavioral variables deal with any variable that refers to some action of an organism. Such action in extreme cases may consist of relatively simple responses such as, finger flexions, eye blinks, pressing a key when light is flashed, making true or false for an item on a test etc. In psychological research such type of variable is the time required for some action or response to occur.

(b) Stimulus variable

Behavior does not occur in isolation but always in a particular setting or environment. The things which we generally observe relate to environment, situation or conditions of stimulation and they are named as stimulus variable. In other words, we can say that the independent variable may be an object of the environment for example, light or sound of a given intensity, noise etc. Each is called a stimulus variable. It is because each one is quality of an external object or event when it stimulates the sense organs. In psychological research, stimulus variable may comprise of relatively simple thing such as electric shock, light, sound, or pressure. They may be measured by physical intensity of the stimulus. Some other stimulus variables may consist of problem solving situation,

motor conflict situation, social situation etc, which are relatively more difficult to quantify.

(c) Organismic variables

Organismic variables arise from the ways in which the organism may be classified. The independent variable may also be a characteristic of the organism, for example, subject - rich or poor home, his race or caste, his age, his intelligence, his sex, his being married, his learning capacity, his skills and habits, his level of education and so on. These all are called organismic variables. These are more or less permanent characteristics of a person. They depend upon the observation and measurement of physical, physiological and psychological features of the organism. For example, heights or weights of a group of individuals may be measured. These observations do not correspond to response variables or stimulus variables, but they may be described as organismic variables.

(d) Discrete and Continuous variables

Discrete and continuous variables are normally used in a discrimination experiment where a variable of interest may be number of correct discriminations made by a subject in a set of ten trials. The possible values of this variable are 0,1,2,...10, and this variable is called as discrete value of a discrete variable are always exact.

On the other hand, if the time required for a subject to match a discrimination is measured, such variable is termed as continuous and the value of such variable is never exact.

(e) Quantitative and Qualitative variables

Quantitative and qualitative variables for which the possible values represent differences in degree along a single dimension are called as quantitative variables. All continuous variables are quantitative variables because the differences between the possible values of such variables are matters of degree. Quantitative variables are also known as ordered variables. Unordered variables are those where differences in the possible values are matters of kind rather than degree, such variables are also called quantitative variables.

Extraneous Variables

Some of the independent variables are not manipulated in the experiment. These also influence the dependent variables, for example, amount of speed of learning and learning material. There will be other independent variable too. These are: the kind of material - whether it is meaningful or nonsense, the manner of perception of the material - visual or auditory, size of the print - whether the letters comprising the words are larger or small, the time for which each item is presented, and so on. Each one has its own influence on the time taken in

learning the list. Such independent variables are called extraneous or additional variables. The independent variable, which the researcher manipulates is called the experimental variable.

Manipulation of Variables

In an experiment, one first does something with the independent variable and then observe what happens to the dependent variable. Doing something with the independent variable is called manipulations. There are two way of this: (1) to make it appear in one situation and disappear in another situation and observe how this affects the dependent variable. For example, if one tries to find the effect of noise on the solving of complex arithmetical problems, the subject will be allowed to work on the problem in absence of noise and the time taken is noted. Then he is allowed to work under noise and again the limitation noted down. If the subject-takes more time in second case, it is due to the distortion from the noise. The situation in which the independent variable is introduced is called the experimental condition. The situation from where it is withdrawn is called the control condition.

The other way to manipulate the independent variable is to change its value - increase or decrease its amount.

Dependent Variable

Besides these independent variables, there may be dependent variables also in the experiment. For example, subject's speed of

performance or learning, his errors in perception, the amount of quality of work, and so on, are other dependent variables which are called response variables.

Experimental method is thus, the method which has the credit of bringing Psychology to the level of an exact science. Modern Psychology lays emphasis on experimental method.

3.23 Observation Method

By observation is meant seeing or perceiving things with a purpose. One might even call it regulated perception. It is the procedure of gathering knowledge by the use of sense organs, and the collecting of facts which are in the direct knowledge of the investigators.

Sensation, attention and perception are the three components of observation. The sense organs give rise to sensation and the power of the sensory organs, for example, eyes, ears, nose etc., greatly contribute to the accuracy of observations. Attention is the capacity of a person to concentrate on the subject of study. Perception helps the mind to recognize facts by identifying sensations and falling back on experience and introspection.

3.231 Observational Method - Advantages

Observation plays an important role in sciences and in new problems. In psychology much research still depends simply on systematic observation. The systematic observation can be

extended from the case study of an individual to the study of entire group. If the researcher intentionally does nothing to affect the group being observed, this technique usually is known as naturalistic observation. It is a systematic method of observing, recording and analysing the human or animal behavior and events which naturally occur in the real world. The researcher, with the help of this method, attempts to study the behavior of the subject when he is acting naturally. The method is used under those situations where artificial manipulations might destroy some or all of the basic features of the phenomena to be studied. Observation methods are also used in those situations where there is no other way of making a more controlled observation. On many occasions, various important psychological phenomena are difficult to bring into a laboratory. Psychologists often take systematic steps to ensure the accuracy of naturalistic observation due to the fact that casual observations of behavior can be distorted by expectations, bias and limitations of commonsense.

In systematic method which is also known as naturalistic observation, groups or species of animals are carefully observed in their natural habitat. These types of observations are generally repeated many a time for which investigators spend a good amount of time. Data collected in such studies provide information about the behavior of the organisms and also the responses they are capable of making. Jean Piaget made several

interesting observations regarding developmental changes in cognitive abilities. Interestingly enough, most of his studies were based on the observation of the behavior of his own three children.

Psychologists use observation methods in occasional circumstances also. Such observations are known as occasional observations. This may be applied in every day life, either upon himself or on those around him. Occasional observation obeys no rules and such studies can easily be conducted on day to day behavior of individuals, more particularly in the course of professional activity. The results of such studies are more interesting. Fere, during 1888, made a discovery simply by occasional observations. He attached some importance to the remark of a patient who had abnormally dry skin. The patient reported that he felt a prickling of the hair and skin in cold dry weather. Fere picked up the clue and measured the static charge of the skin after frictions and established that this charge disappeared under the effect of certain stimulations and thus was made the great discovery of Psychogalvanic Reflex. Similarly, Pavlov discovered conditioned reflexes in the course of experiment on the physiology of digestion, by observing secretion which could not be explained by biochemical actions.

Observational methods are also used for the measurement of personality traits. In this case individuals are asked to describe others rather than themselves. However, such observations

are generally more subjective and the validity of the measurement basically depends upon the observer.

Observations are basically of two types, eg. controlled and uncontrolled. In the former type, no mechanical aid is used and data collection work is done without standardising method. The researcher thinks that he knows more than what actually he observes. This type of observation is not very reliable and to avoid the ill-effect of this type of observation, psychologists depend upon the controlled observation, in which mechanical instruments are used. This type of observation also used standardised method and tries to use representative samples.

Observations may be participant and non-participant also. In case of participant observation, the observer participates personally into the activities of the group to observe the behavior of the group under study. Social life in this way is exposed in more detail which otherwise may not be possible through other methods like interview or field study. For the reliability and accuracy of observation psychologist follow various steps. They are: (1) formulation of the problem precisely and clearly; (2) study of each item separately at a time; (3) relation of observed facts with the problem at hand; (4) study of the relevant facts; and (5) "How, When, Who, What, Why and Where" should be in the mind of the observer to answer while making observations.

Reliability of this method depends on techniques and tools used, observed situation, and the quality of the observer.

3.24 Field Study Method

Field studies opened a new VISTAS to the development of psychology. They are, particularly useful in the area of social psychology. Such studies also help in understanding the complex problem of human relationships. There are two important aspects of field studies. Firstly, the increase in the scientific knowledge through direct study in field, secondly, the inclusion of social and group variables in experimentations.

Field studies are not similar to the field survey. Field surveys are conducted on representative sample of larger population and the field studies are more concerned with the detailed study of smaller areas or groups. In a field-study the investigation is made on a single community or a group, wherein observations of social interactions are made in detail which provide a natural picture of the social interactions.

Types of Field Studies

Daniel Katz (1970)⁽¹¹⁾ broadly classified field-study into two: (1) the exploratory; and (2) the hypothesis testing. In the first type, the investigator tries to find out what exactly is happening rather than to predict the relation. Three main purpose of explanatory studies are: (1) to find out significant variables in the field; (2) to explore relations; and (3) the third purpose is to lay the ground to explore the relations among variables.

It represents the earlier stage of a science. In hypothesis testing, more definite proof of such relationships between the variables are obtained.

In conducting a field study, following steps are followed: (1) preliminary planning; (2) the scouting expeditions; (3) the formulation of research design; (4) the presenting of research instruments and procedures; (5) the full-scale field operation; and (6) the analysis of materials.

Preliminary planning is a necessary part of the field study. At this stage tentative decisions are made regarding the scope, general objective and the time-schedule of the study.

In 'scouting expedition', the field worker in an informal way makes a thorough investigation of the important factors of the situation. The workers mix up freely with the group proposed to be studied. This is done either by staying with them or making frequent visit to the group. As such induction is to find out the major variables in the situations and also to explore the types of instruments which may subsequently be required for the study finally.

Once the basic information is obtained through 'scouting exploration', the research-design for final study is worked out more precisely. However, it is more convenient and advantageous to develop the design along with scouting. This helps ^{to} establish an interactions between the theoretical objectives and the exact

realities of the fields. In certain cases, however, final decisions are made about 14 research objectives and procedures for full-scale study. In such cases a detailed consideration is accountable from the 'scouting expedition'.

Specifications of the measure required are necessary to be ascertained for elaboration of the research design. Such measures are: instruments (eg. as interview schedules), questionnaires, behavioral scales, and formats for collection of information. Normally, instruments standardized through other studies should be used. Also, new instruments are developed to suit the objectives of the study wherever needed. It is however, necessary to test the instrument before they are actually put to use in field study. It is observed that in many surveys and field studies, the pretesting is not properly undertaken, neither enough time and attention are given. While the pretesting is planned, it is advisable to do this exercise on a population similar to those which will finally be used in the larger study or extracted from the sample proposed to be studied.

For full scale field operation, it is ideal to solve all the related research problems. This normally is, however, not always possible. The scales developed during pretesting, many a times, do not fit well in field where larger population is under study. Also the skills and personnel in case of field operation may vary for a large scale survey. The task of field worker is always more difficult. For a field worker, it is important to

develop good rapport with the population and also to get in touch with leaders and other social workers at his own level and in his own way. The time taken during field studies is generally longer. Controls should be set up to ensure comparability of the information obtained during different periods of the study. It is generally possible that people interviewed at later period may be influenced by those already interviewed and also by the information published on earlier interviews.

For smooth and efficient field study, it is advisable to take the following into account: (1) to contact the top people of the structure to obtain the co-operation of the lower staff; (2) to make findings available to all groups and individuals; (3) the information regarding the study and its basic purposes should be made available to the people of the community, as well as to the readers; (4) to preserve the ethical standard and protect the identity of the respondent; and (5) identification of the specific individual should never be disclosed publically.

In exploratory study, the importance is given to most plausible information which can never be definite. The normal procedure is to develop a relationship or to check on its genuineness by holding factors constant through the use of triple breaks. This methodology is well exemplified by Kendall

and Lazarsfeld (1950) in Continuities in social research.

In this case three types of elaboration are given which help the analysts in making a framework for thinking about the relationships in the data. The first type of elaboration is to control for genuine factors where the relationship between two variables are discovered. The second type of the elaboration is that where the factor can be pinned down in time to some actual variable that has intervened. The third type of elaboration is specification where the conditions under which the relationships exist are determined. By adopting the above three types of elaborations, the analysts may analyse his data most meaningfully⁽¹²⁾.

However, the field study is a scientific weak cousin of laboratory and field experiments. Most serious weakness is the ex-post-facto character. Generally the statements of casual relations are much weaker than that they are in experimental research. The field situations invariably has a multitude of variables and variance. Such variables in an experimental study may be controlled which is not usually possible in field study. Similarly, the methodology is also weak in field study and they lack precision in the measurements of the variables.

3.25 Interviewing Method

Interview method is more or less direct method for data collection. This may be done either by direct questioning or interviewing a person or by indirect method i.e. giving some one ambiguous stimulus i.e. like a blurred picture, a blot of ink or a vague question and then asking him about his impression. In the case of latter, the needed information is acquired indirectly without the knowledge of the person concerned. However, in case of psychological researches mostly the data collection is done through direct method.

Interview is one of the oldest method for obtaining information. Direct interview though widely used in research, sometimes is not that useful. This is because in certain circumstances like information regarding income, sexual relation, minority groups and attitude towards religion are subjective issues and the person may not like to give straight-forward and correct replies. In case of children also who generally may not understand the questions posed to them, direct interview device may not prove very useful.

Interviews are usually conducted to gather what is known as facts. Interview may be used for three main purposes:

(1) As an exploratory device to identify variables and relations which help in developing hypotheses useful in later stages of

the research; (2) as a main instrument of the research; and (3) as a supplement to other methods used in research study. Psychologists using interview method as a base of personality rely that the best way to find out something about the person is to ask him.

There are two broad types of interview: structured and unstructured, also known as standardized and unstandardized. In case of structured interview, the questions, their sequence and their wordings are fixed. In such cases the interviewer has not much option and he is to follow the schedule. However, in some cases, he may take some liberty to deviate from predetermined sequences which are generally specified in advance. Such pretested questions are carefully prepared in advance. This preparation helps in obtaining information pertinent to the research problems. In case of unstructured interviews, the situation is different and they are flexible and much more open. Generally no fixed schedule is used. However, it does not mean that this type of interview is casual. The interviewer is of course to a great extent free in his own way to put the questions to the interviewee but they must be intended towards obtaining the requisite informations for research.

Interviewing a person is an art. Planning and writing of an interview schedule is an equally important art. Interviewer must be well trained and questions to be asked should be pretested and revised to eliminate ambiguities and inadequate wordings.

Questions should also be tested for unknown biases - and all these are not so easy.

Parton (1950) has mentioned three types of schedule information which are included in most schedules: (1) face sheet (identification) informations; (2) census type (or sociological) information; and (3) problem information. Many sociological information like sex, marital status, education, income and religions preferences etc. are gathered in surveys and these are known as factual information. The data entered on a "face sheet" are known as "face sheet informations".⁽¹³⁾ Such informations are obtained at the beginning of the interview. Most of such informations are neutral and they help the interviewer in developing good contact with the respondent.

Generally two types of schedules, i.e. fixed alternative (or closed) and open end (open) are widely used. Sometimes a third type, that is - fixed alternative is also used.

In case of fixed alternative, the respondent gets a choice between two or more alternatives. The most common fixed alternative item is dichotomous that is - it relates mainly for yes - no, agree - disagree and other two - alternative answers. Sometimes, however, a third alternative like don't know or undecided is also added. This device is convenient and advantageous in the sense that researcher gets straight reply which is easily coded. However, there is a risk of superficiality.

The respondent does not get enough time and choice to answer the interview. May be sometimes, the interviewer may like to force the respondent to give the reply which is just casual.

Open end items are extremely important technique of interviewing. In this case a frame of reference is supplied to the respondent and not much restraint is put for expression. Also there is no imposition on the respondent for the manner of his answers. Opened questions are flexible and have possibilities of depth. Further, they enable the interviewer to clear misunderstanding and ascertain a respondent's lack of knowledge.

Criteria for questions-writing have been developed through experience and research. Many a times, brief comments are appended to the questions. Some of the norms used for question writing to be followed are:

1. Is the question related to the research problem and the research objective? The purpose of each question should be to obtain direct information which may be used to test the hypothesis of the research.
2. Is the question of right type and appropriate one?
3. Is the item clear and unambiguous?
4. Is the question a leading question?
5. Does the question demand knowledge and information that the respondent does not have?

6. Does the question demand personal or delicate material that the respondent may resist?
7. Is the question loaded with social desirability?

The interview in most cases if properly planned with adequate schedule of pretested worth is very important and useful tool with which the interview should be composed. Sometimes, however, the questionnaire are not much useful because the question may be answered differently by different set of people. This discrepancy is avoided by interviewer where the respondent is face to face with the interviewer and any lacunae may be sorted out on face.

Interview device, though superior to other methods for the collection of research data, has some shortcomings. One of the limitations is the involvement of the individual, in the data one is reporting, which may lead to bias. It is quite possible that the respondent may not be honest to reveal the fact. He may either withhold them or distort them. In such situation, the personal information collected by interviewers are generally not very reliable. Another limitation is inability of the respondent to provide certain type of information. In such cases, different mode of data collection is advisable or alternatively the interview should be so structured that the respondent may provide raw information and the expert interviewer may then interpret them to derive information specified by the research objectives.

In general, however, it may be summarised that by and large the interview device is one of the most useful and purposeful device for conducting research. Past experience and future behavior of individual are not obtained by other means. Some other traits like perception, attitudes, opinions etc. cannot be judged by observation and it is only interview which may help in such matters. The skills and techniques of the interviewers may overcome many problems and difficulties which are faced by adopting this device (Kerlinger, 1964) ⁽¹⁴⁾.

3.26 Psychological Testing Method

Generally speaking, a psychological test can be said to be a standardized procedure used for assessing any specific type of behavior. In the words of Anastasi (1976) "A psychological test is essentially an objective and standardized measure of a sample of behaviour" ⁽¹⁵⁾. Like tests in any other sciences, psychological tests are used for making observation of an individual behavior, but on a small and carefully chosen sample. The standardization of the test is the formulation of uniform procedures for the administration and scoring of the test.

The functions of psychological tests are to measure the point of differences between various individuals or between the manner of reaction of the same individual on different occasions. The development of psychological tests was initially to identify the mentally retarded person. Certain types of psychological

tests are still being used for the detection of intellectual deficiencies. Psychological tests are also used extensively by clinical psychologists to examine the emotionally disturbed, the delinquent, and other types of behavioral deviants. At the moment, the largest test users are the schools. Testing forms are important part of the entire personnel programme. Application of psychological testing in this area, for the first time, started in World War I for the selection and classification of military personnel which further underwent a phenomenal increase in World War II. Tests are increasingly being used to enhance self understanding and personal development. Thus psychological tests are being utilized for solving a wide range of practical problems. Testing procedures as a method of collecting data are required in almost all the problems of differential psychology such as: individual difference, identification of psychological traits, the measurement of group differences, and the investigation of biological and cultural factors.

During nineteenth century the psychologists in general, were concerned with the formulation of generalized description of human behavior. They were not interested in measuring the individual differences. It was mainly Sir Francis Galton who was responsible for starting the testing movement. Galton's main interest was in human heredity. He believed that person's intellect could be measured by administering the test of sensory discriminations. Galton (1883) wrote "The only informations

that reaches us concerning outward events appears to pass through the avenue of our sense; and the more perceptive the senses are of difference, the larger is the field upon which our judgement and intelligence can act".⁽¹⁶⁾

Another American Psychologists James McKeen Cattell, had an equally important position in the development of psychological testing. During the last decade of the nineteenth century, Cattell developed the mental tests. In 1890, for the first time he used the term "mental test".⁽¹⁷⁾

Kraepelin (1895)⁽¹⁸⁾ became interested basically in the clinical examination of psychiatric patients. He prepared a long series of tests to measure the basic factors in the characterization of an individual. Such type of tests mainly consisted of arithmetic operations to measure practice effect, memory, distractions and susceptibility to fatigue.

Subsequently, Oehn (1889)⁽¹⁹⁾ employed tests of perception, memory, association and motor function to investigate the interrelations of psychological functions.

Ebbinghaus (1897)⁽²⁰⁾ performed tests of arithmetic computation, memory span and sentence completion to school children. Similarly, Guicciardi and Ferrari (1896)⁽²¹⁾ devised tests for pathological uses.

Binet and his associates took active interest in devising the method for measuring intelligence during the year 1905-1912.

Even prior to World War I, various special Aptitude tests were devised for vocational counselling and in selections and classification of industrial and military personnel.

Further developments during 1960s took place in formulating standardized tests. Tests can be designed to administer either on individuals or to groups of people. Individually administered tests, however, need more use of administer's time. Such tests are more expensive to administer. Group tests, like SAT are less expensive to use but usually do not permit the test administer to analyse carefully attitude of the test-taking individuals.

The interpretation of scores consists of norm-referenced, criterion-referenced and ipsative scoring. In case of norm-referenced comparing, person's score with the score of norm group is done on a relative analysis. The second approach relates an individuals performance to absolute criteria. Ipsative scoring compares an individuals scores with each other.

The contemporary scenerio of the psychological testing represents a wide spread over variety of psychological tests covering different areas of specialization and applied branches of psychology. It would be a marathon task to cover all the tests and their associated materials and methods. However, for the present requirement of the dissertation, a tentative classification of psychological testing is adopted. They are as

follows: (1) Educational testing; (2) Ability testing; and (3) Tests for assessment of personality.

Educational Testing

Almost every type of available tests are utilized in schools. Teachers and administrators of educational institutions very often have to take decisions on the basis of the results obtained by various kinds of tests. Certain tests, however, are mainly constructed and developed for the use of educational purposes only, predominantly for elementary and high school level. Tests for educational purposes, however, broadly may be divided into four main categories. They are: (1) achievement tests; (2) aptitude tests; (3) scholastic measurements; and (5) various interest inventions.

Achievement tests - Achievement tests measure the effect of specific programme of instructions or training on students, that is - the effect of learning that occurs under conditions which are partially controlled and known. It assesses the amount of informations an individual has learned from previous experiences. "A test is referred to as an achievement test when it is used primarily to examine the person's success in past study" (Cronback, 1970) ⁽²²⁾.

It was initiated by the Boston public schools in 1845 when the written examinations were replaced by oral questioning of students by examiners.

The first standardized tests for measuring the results of instructions in schools appeared at the beginning of this century. This was headed by E.L. Thorndike and the tests used principles of measurement which were developed in the psychological laboratory. Examples are: scales for rating the quality of handwriting, computations, spelling, arithmetic computation and arithmetic reasoning. In 1923, the first edition of the Stanford Achievement Test was published and the authors were Truman L. Kelley, Giles M. Ruch and Louis M. Terman. By 1930 standardized achievement tests were accepted in favour of the essay tests. In the same decade, test scoring machines were introduced and for this the new objective tests could be easily used.

In the later part of the 1940s, the testing functions of various educational boards were merged together to form educational testing service which conducts tests on behalf of number of universities, professional schools, government agencies etc.

In the late 1950s American College Testing Programme was established to select highly talented students for scholarship.

Anne Anastasi (1982)⁽²³⁾, writing in favour of standardized academic achievement tests, says that their objectivity and uniformity help in evaluation. These tests identify students with educational disabilities and measure progress in studies. They help to choose the suitable method of teaching

according to the needs of an individual. They help in evaluating educational progress and improvement of teaching.

Since most psychologists trained in psychometrics are participating in the construction of standardized achievement tests, the technical parts of these tests have started resembling intelligence and aptitude tests.

Achievement tests provide a measure for applying instruction to individual needs. For effective teaching, it is important to know that an individual is able to do and what he already knows. It also helps in planning the teaching programmes. These tests may also be used as an aid in evaluation and improvement of teaching and ^{making} decision about the basic aims of education.

For measuring general educational achievements, several batteries are also available, which may be used from the primary to the adult level grades. These batteries provide profiles of scores in major academic areas of an individual. These tests mainly give emphasis on educational skills such as reading, arithmetic, spelling and language usage and work study skills - for example, map reading, reading graph and use of references etc. One example of such experiments may be mentioned as Stanford Achievement Test which was first published in 1923. The latest edition of this appeared in 1973.

Several standardized tests have also been prepared for almost every subject. Such instructions are enumerated in Gorbrich et.al. book published in 1962⁽²⁴⁾.

Aptitude Tests - Aptitude tests are usually used to predict one's success in future endeavours. Broadly an aptitude test is used to predict what an individual is "apt" to do. It may be any type of psychometric instruments. Such type of tests are generally used to measure achievement, special abilities, interests, personality traits or any other characteristic of human behavior. In a very specific sense, however, aptitude test is employed to single tests or batteries of tests of special abilities, which measure the ability to learn. With the help of such tests, training in specific skills or in an occupational area are provided.

Historically, aptitude testing emerged for personnel selection and classification in business, industry and military. At early stage, emphasis was more on the development of test related to psychomotor abilities and mechanical and clerical aptitude. During 1920s and 1930s, however, tests of musical and art were also constructed. Among the various aptitude test batteries, Differential Aptitude Tests are used extensively in academic counselling which help in vocational counselling.

In vocational counselling as well as in the selection and classification of industrial and military personnel, differential aptitude testing is also provided. Examples are the early developments of specialized tests in clerical, mechanical and other vocational areas. A similar development is also represented by assembling of test batteries for selection of applicants for admission to schools of medicine, law, engineering, dentistry and other professional fields. Such developments are in progress since many years. A theoretical basis for the construction of multiple aptitude batteries are presently provided by applying factor analysis. Application of factor analysis helps mainly to study the trait organisations. Through factor analytic techniques, the different abilities loosely grouped under "intelligence" may be identified, grouped and defined in a more systematic manner. As early as 1901, Spearman pointed out such type of analysis. During 1904 and 1927, he further developed the modern factor analysis. A much more advanced and comprehensive description is found in Harman (1967) (25).

Scholastic Aptitude Tests (SAT) - The SAT is a multiple-choice test which is conducted for three hours. It measures verbal and mathematical abilities which is important for college success. The administrations of such tests are conducted at approved centres. A typical example of SAT test consists of 85 verbal items (oppositions, analogies, sentence completion and reading comprehension) in two 30 minutes sections and 60 mathematics

items into two 30 minutes sections. A thirty minutes section is also provided for written English to try out new items for future use (College Entrance Examination Board, 1982) (26).

The various forms used for this test from 1926-41 were constructed by Princeton University Psychologist - Carl Brigham.

Interest Inventories - Interest inventories are closely related to the aptitude tests. Such inventories are basically used in vocational and educational guidance. An interest questionnaire is the "self report" technique, where individuals describe his own characteristics. It may be treated as written interview.

Interest inventories are used entirely in academic and vocational counselling. Such inventories give clues regarding adjustment and personality. Liberty, Bumstein and Moulton (1966) (27) view that persons with a strong sense of mastery of their own fate tend to choose professions in which high competence is needed (eg. Chemist) rather than high prestige occupations (eg. Banker) which they see needing less competence. Among the interest inventories recently in use are: California Occupational Preference Survey; Minnesota Vocational Interest Inventory; Occupational Interest Survey; Strong Vocational Interest - Blank for Men and Strong Vocational for Women.

Ability Testing

Ability testing generally refers to the evaluation of general and specific mental ability of those who are exposed to ability measuring tools. These tools are widely known as Intelligence Tests which are of varied types. They are usually verbal tests and performance scales. Also some of the projective tests were earlier used for the assessment of ability.

The historical perspective of ability testing is evident from the writings of Cicero and a number of other authors in the following two thousand years. A systematic empirical enquiry, however, appeared only about middle of the 19th century and was put to practical use during early 20th century, when Charles Spearman and Alfred Binet developed measures for approximating individual differences. This incidently was recognized by the then French Government and was further utilized for the gross assessment of school-going children. Further Binet along with other associates, Simon and Terman shaped the testing method in one format and named it as an Intelligent Test. Binet was concerned with the question of the mental tasks that children of a certain age could actually perform, regarding what they were supposed to be able to do. His investigation proved that children considered to be mentally deficient were actually simply retarded and could be benefited by remedial educations. This approach gained immense popularity and in USA higher statistical methods were evolved and intelligence

tests were assigned to objective statistical values. With this development, factor analysis formed a basis for the development of two factor theory of Spearman who attempted to answer the questions of how intelligence could be defined in operational and behavioral terms. For this purpose he utilized extensively the statistical techniques of correlation and went on to develop the method of factor analysis. He broadly classified human abilities in two categories, the 'g' factor and the 's' factor. In 1950's two main advances were made in the technique of factor analysis. The first owing to the advent of electronic computers, was the formulations of objective methods of rotation. The second development was to bring factor analysis into line with more traditional methods of statistical reasoning. During 1970's the most significant work has been that of J.P. Guilford. His aim was to draw up a logically convincing systems of classification and thereby construct tests for each cell in the system. During 1971 Cattell put together a book "Abilities : their structure, growth and action"⁽²⁸⁾ which outlines 30-40 years thinking on intelligence, specific abilities, their relationships and development through human life.

Usually ability tests measure a person's capability of performance as the test represents problems and items related to individual's direct experience. It is able to distinguish or discriminate individual's ability concerning them. As such, the basic objectives of the test administration is to approximate

individual's optimum performance. This requires an explicit set of directions as to how to perform over a given test.

The most widely used scale for measuring intelligence contemporarily are Weschler's scales, they are WAIS, WISC, WAIS - short form, WISC - short form. This group of scales comprises of two category of scales: (1) Verbal scales; and (2) Performance Scales.

There are some culture free tests which have gained enormous popularity. The Raven's coloured performance matrices are also widely used for the assessment of the intellectual ability of adults and children's responses.

In India, there a number of tests of general nature in different Indian and English language, developed and standardized by Prof. S. Jalota and his students (Joshi, Pallai, Tandon and Pandey etc.). A batteries of tests known as Bhatia Battery has also been popularly used in measuring IQ of school going population in Indian setting. The Indian adaptation of WAIS and WISC are also available.

Methods for Assessment of Personality

Different psychologists have used the term personality in different ways. The term may include intelligence, physique, skills, interests, attitudes and emotional and social qualities. The study of personality is related with individual differences mainly for understanding and predicting behavior. The basic aim

of certain personality tests are to measure and identify "traits" such as: sociability, anxiety, impulsiveness, honesty etc. Others are related with "types" that is group of traits which happen to occur together. Personality test usually measure typical performance of individuals.

Sheldon (1954)⁽²⁹⁾ defines personality as the dynamic organization of cognitive, affective, conative, physiological and morphological aspects of the individual. Various procedures including interviews, self rating, specially developed questionnaires, direct observation of behavior, physiological variables, perceptual judgement variables, mixed bag of 'other' approaches and projective techniques are adopted to know the characteristics or traits of personality. The projection techniques involve the use of abstract pictures or semi abstract pictures. The individuals are asked to describe these pictures assuming that these pictures will project their personality. Vane and Guarnaccia (1989)⁽³⁰⁾ have broadly categorized these tests into broad categories: (1) direct method; and (2) indirect methods. Direct methods include personality scales, personal interviews, observation of behavior and information from other significant sources. The personality inventories consist of questions to be answered by individuals and are called self report measures. They are also objective since the method of marking is standardized and the answers are limited, such as, yes, no, true or false. These test are generally in paper and pencil format. The interview method whether structured or unstructured also rely upon self report.

Besides interviews, psychologists also use observational method both naturalistic and systematic to get more information. Scales, depending upon the direct methods, are very large in number. Each one varies both in the mode of development and design for assessing the various aspects of personality. Some of the important direct methods are known as: (1) MMPI; (2) CPI; (3) EPPS; (4) 16PF; and (5) EPS etc. Out of these one of the most popular direct method is MMPI.

Minnesota Multiphasic Personality Inventory (MMPI)

By far the most widely used self inventory is MMPI, it was developed for the first time during 1930 (Hathaway and Mckinley, 1967). In its most usual form, it has 550 items and 16 duplicate items having 10 scales which describe personality and 4 validity scales. Using the latter, one can find out whether the answers are false, impudable or defensive. The remaining 10 scales known as clinical scales help to differentiate people with personality disorders. A great amount of research has been carried out on the MMPI.

To investigate special type of personality problems, more than 400 subscales which utilize various combinations of MMPI items and other items have been developed. The MMPI has been criticized because of the fact that standardization sample was a patient population. Various changes have been made by The Diagnostic and Statistical Manual of Mental Disorders (1980) (31). However, while discussing the MMPI, Widiger and Frances (1987) state that "the scales may not provide the optional set of dimen-

sions with which to identify and differentiate among the DSM-III personality disorders" (32).

California Psychological Inventory (CPI) :

This was published in 1957 by Gough and solved a number of problems faced by the MMPI. The CPI attempts to focus on the normal behavior of people and not the abnormal as in the MMPI. It measures 18 traits of character which arise from interpersonal life. They are: dominance, capacity for status, sociability, social presence, self acceptance, sense of well being, responsibility, socialization, self control, tolerance, good impression, communality, achievement via conformance, achievement via independence, intellectual efficiency, psychological mindedness, flexibility and femininity (Gough and Sandhu, 1964).⁽³³⁾

Edwards Personal Preference Schedule (EPPS)

This measures 15 traits and is based on Murray's need structure theory of personality. It was developed in 1957. In this, individuals choose paired items (from a list of 210 paired items) which best describe them. The traits which it measure are: achievement, deference, order, exhibition, autonomy, affiliation, intraception, succorance, dominance, abasement, naturance changes, endurance, heterosex validity, and aggression.

Sixteen Personality Factor Questionnaires (16PF)

This scale was developed in 1970 by Cattell, Eber and Tat Swoka. The traits measured are lettered and not numbered and are bipolar. This scale is the only one to include traits like intelligence and social attitudes. Madsen (1977) mentions that, Cattell treats personality "in an exacting and systematic manner. From the beginning this theory has been developed to integrate motivation and learning in mathematical form" (34).

Eysenck Personality Scale

Developed in 1968 by Eysenck and Eysenck, this scale is widely used in England. In this scale too, intellect is included as one of the traits.

Other scales dealing with certain aspects of personality only are Beck Depression Inventory (Beck and Beamesderfer 1974), (35) Spielberger State and Trait Anxiety Scale (Spielberger, Gorsuch and Lushene, 1970) (36). Behavior assessment is measured by the Fear Survey Schedule (Wolpe and Lang, 1964) (37), Reinforcement Survey Schedule (Cautela and Kastenbaum, 1967) (38), Rathus Self Assertiveness Schedule (Rathus, 1973), (39) Social Avoidance and Distress Scale, and Fear of Negative Evaluation Scale (Watson and Friend, 1969) (40). These measure a state rather than traits of behavior and are supported by tests measuring traits.

A scale using observation to assess behavior is the location - Activity Inventory (Hunter, Schooler and Spohn, 1962) (41). A taste test procedure (Miller and Hensen, 1972) (42) measures alcohol consumption of subjects.

Indirect Methods - Indirect methods of personality tests include: (1) The Rorschach; (2) The Thematic Apperception Test; and (3) Sentence Completion Test. Such tests usually use unstructured instruments with relatively ambiguous stimuli.

The Rorschach

It is one of the most popular projective techniques developed by Herman Rorschach which was first published in his monograph "Psychodiagnostic"⁽⁴³⁾ in 1921. The Rorschach uses 10 cards. Each card is printed with a bilaterally symmetrical ink blot. Five of the blots are executed in grey and black shades; two have additional touches of bright red and the other three contain several pastel shades. Initially Rorschach's basic aim was not to assess personality but to develop method to differentiate schizophrenia.

The most common scoring and interpreting system of Rorschach include location, determinants and content. Location indicates the part of the blot - the whole blot, a common detail, an unusual detail, white space or some certain combination of these areas. The second category of coding system include form, colour, shading and movement etc. The treatment of content varies from one scoring system to the other. However, mainly among these are human figures, animal figures, details of animals etc. Certain responses for each 10 cards are scored as popular because they are common in nature.

The relative number of responses of the various categories, certain ratios and interrelations among different categories form the basis of further analysis of Rorschach response. Commonly used qualitative interpretations include the association of "whole" responses with conceptual thinking, of "colour" responses with emotionality and of "human movement" with imagination. "Global description" and of the individual forms the major basis of Rorschach applications and for this purposes the emphasis is given to information derived from outside sources, like tests, interviews, case history, records etc.

Theoretical model of personality was although not the themes of Rorschach work, it was accepted by many clinicians involved in psychoanalytically oriented researches. In these case, the central idea was that the unconscious forces were the most important sources of motivation in human behavior.

Exner (1968) ⁽⁴⁴⁾ established Rorschach Research Foundations to evaluate the five systems developed by S. Beck (1937), regarding the empirical sturdiness and also his effort was to see if one of the five systems could be successfully used for clinical utility. In 1974, he observed that "the intersystem differences in procedure produced five relatively different kinds of records.. each system included some scores, scoring, criteria and interpretive postulates for which no empirical support existed or for which negative findings have been discovered... each of the system did include many empirically sturdy elements". ⁽⁴⁵⁾

Recently research finding regarding Rorschach have opened many new encouraging trends which have^{been} systematically presented in a handbook by Goldfried, Stricker and Weiner (1971).

A computerized scoring interpreting system for Rorschach protocol became available known as Piotrowski's Automated Rorschach (PAR) which is in operation since 1974.

After Rorschach, the Holtzman test was designed to remove the technical problems of the earlier instruments. The technique is known as the Holtzman Inkblot Techniques (HIT). Scoring system and administration of the HIT are properly standardized and clearly narrated.

The Thematic Apperception Test (TAT)

This test was for the first time introduced by Morgan and Murry in 1935 to measure the personality which would give more information about emotions, motivations and values of an individual than the other techniques available at that time. In contrast to inkblot techniques, the Thematic Apperception Test (TAT) presents more highly structured stimuli. This needs more organized and meaningful responses. It has also served as a model for the development of several other techniques. The TAT materials consist of 19 cards. The stories narrated in these cards reveal the states, needs, interests and emotions of the person. Bellak (1986)⁽⁴⁶⁾ has reviewed the scoring and interpretation systems for this technique. Bellak gave emphasis on the inspection technique which can be interpreted with the help of psychoanalytic theory. TAT is also available for children

between the ages of 3 and 10 years. The test is known as Children's Apperception Test (CAT).

Sentence Completion Tests

Sentence completion tests initially were used in 1897 by Ebbinghaus , Payne (1928)⁽⁴⁷⁾ and Tendler (1930)⁽⁴⁸⁾ to assess the personality. This method consists of a series of sentence parts or stems in pencil- and paper format and a subject is expected to complete each part. The test is conducted either individually or on groups. The subject is instructed to answer the first thought that comes to mind. Sentence completion method is a combination of both direct and indirect methods.

The major categories of personality traits which are measured by these tests are: social traits, motives, personal conceptions, adjustment versus maladjustment, personality dynamics etc.

Other methods for assessing personality traits are known as: Products of ability tests, Biographical inventories, Verbal behavior, and Waste basket approaches.

3.27 Clinical Method

Clinical methods in psychology are usually applied to the assessment of individual towards psydiagnostic purposes. It has been assumed that the diagnostic evaluation of individual cases are to aid therapeutic (psychotherapeutic) procedures in the fields, such as: Psychological medicine, Psychiatry, behavioral medicine and Psychological therapies. Historically such methods have been

developed to help clients resolve their emotional, vocational, social or any personal problems. In this regard, the psychologist collects the necessary data about the person from birth onwards. The methods employed to meet this purpose are the intensive interviews, perusing records, administering psychological tests, questioning other people about the individual, obtaining biographical questionnaires, studying written works of the person. The resulting information forms the basis for the psychologists attempt to determine the root cause of the person's problem. Once the person is acquainted with the problem and its cause, the psychologist can try to help the individual free himself from the irritant and to adjust better to the circumstances. Clinical method aims to solve practical problems, not to advance science and is hence used in an applied rather than basic sense.

The Psychologists applied free-association method as propounded by Sigmund Freund who came to the conclusion that dreams often reflect strong desires which the people are not conscious of. This method was later substituted and aided by clinical interviews, psychodiagnostic testing (projective testing) and behavioral assessment. With the advent of objective models of diagnosis in therapy in the field of clinical psychology, the clinical method started including the following measures of assessment: They are - (1) Assessment of intellectual functioning; (2) Assessment of personality adjustment and problems; (3) Behavior assessment and observation of behavior; (4) Neuropsychological assessment; and (5) psycho-physiological assessment.

The assessment of intellectual functioning traditionally consist of evaluation of cognitive functionality, thinking and many process and estimate of gross intelligence. A number of tests for reasoning intelligence have been in use depending upon its availability and applicability. In the clinical setting non-verbal tests have been prepared. At the same time battery of tests are also in use. The most widely used tests for assessing intellectual problems contemporarily are various in number. One of them is Benton Visual Retention Test.

Benton Visual Retention Test

The test uses 10 cards, each one of which contains one or more simple geometric figures. Each card is exposed for 10 seconds and the subject is asked to draw what was on the card just after its removal. The test requires spatial perception, immediate recall and visu-motor reproduction of drawings. Performance is noted in terms of number of cards correctly reproduced and total number of errors made. The tests may also be administered with certain procedural variation. The tests scores when fall much below the expected level of an individual, are considered useful for clinical purposes. The other such type of test is known as Bender-Gestalt Test. Goldstein and his associates have also developed a series of five tests, which are extensively used by clinicians. They are: (1) Goldstein-Scheerer Cube Test; (2) Weigl-Goldstein-Scheerer Color-Form Sorting Test (3) Goldstein-Scheerer-Stick Test; (4) Gelb-Goldstein Colour Sorting Test; and (5) Goldstein-Scherer Object Sorting Test.

Other tests used for such purposes include WAIS; WISC; RCPM; and RPM etc.

To identify the learning disabilities and its remedies among the school children, psychologists use a wide variety of tests and observational procedures. Among the various techniques are 'Slingerland's Screening Test' to identify children with specific Language Disability, an eight test group battery yielding 21 scores; and Myblebust's Pupil Rating Scale, a behavioral rating scale based on day-by-day classroom observations. Various achievement tests may also be conducted by teachers. Tests may be administered either individually or to group. One such example on individual test is 'Peabody Individual Achievement Test'. Besides these standard instruments various new tests have also been prepared and are in use. (Anastasi, 1976)⁽⁴⁹⁾

The assessment of personality adjustment and problems contribute a lot in the diagnostic process. The most widely used personality tests of clinical value can be broadly classified in two: (1) Projective Tests (Rorschach, TAT, CAT, WAT, SAT, etc.); (2) Verbal tests for measuring personality, that is, inventories and scales (MMPI, PSI, EPI etc.).

A number of behavioral rating scales have been used in clinical evaluations. They are generally rating scales and are designed across the symptoms of specific behavior disorders. The important characteristics of such scales are to help make easy and instant evaluations of clinical cases within a short duration of time and also whenever required, such scales are

named as Psychotic Behavioral Measures Scales, Neurotic Behavioral Scales. Also adjustment problem checklist (psychological and medical) are in use (Mooney problem checklist and health questionnaires).

Neurological assessment has now become a part of clinical assessment Bender Gestalt Test is one of the most widely used test of neuropsychological functionality. Also there are battery of tests devoted to this dimension of evaluation.

The psychophysiological assessment is the most objective of the clinical evaluation. This embodies the latest advancements both to the diagnostic procedures as well as other contributions to the therapeutic processes. The commonly used psychophysical measures are: EEC; ECG; EMG; GSR; and Pulse rate etc.

3.28 Psychometric Method

Psychometric is the area of psychological research which deals with the application of quantitative approaches of human responses obtained through 'testing' as well as experimentations. The applications of principles of psychometric have been achieved wider recognition in various area of psychology. The Encyclopedic Dictionary of Psychology has highlighted the term Psychometric in terms of "the application of mathematical and statistical concepts and empirical measurements of psychological data, particularly mental testing and experimental results" (1983) (50).

The basic objective of this branch of measurement involves considerations of the test data from a point of view of quantitative analysis. Two broad divisions of Psychometrics are iden-

tified. They are, firstly, the theoretical enumerations and secondly, its applied aspects. Usually psychologists and those who associate with the psychometric theories come across mathematical models and statistical procedures to explain psychological phenomena in the treatment and analysis of responses obtained over administration of psychological tests in variety of its representations.

Contemporary psychometrics consist of quantitative procedures for the analysis of psychological data. The area of psychometrics includes: (1) norming and equating; (2) reliability; (3) validity; and (4) item analysis. Also, there are specialized quantitative measures and tests for their applications to specific evaluations. The formal procedure of development, constructions and standardizations of psychological tool (tests) is generally exposed to psychometrics process and thereby is subject to its psychometric status.

3.281 Norming and Equating

Norming and equating refers to the development of test scores representing systems. Norming tests are a part of test standardization. Regarding test scores, generally two scoring models are used in norming. They are linear and nonlinear transformations. The basic objective of linear transformation is to provide test results in scales. A linear transformation is effected by means of a linear equation. Common scales with their means and standard deviations are 'Z' scores, 't' scores, 'I' scores, and the College Entrance Examination scale.

Nonlinear transformations refer to normalization transformations, percentile equivalents and developmental norms.

Different forms of the same test are sometimes equated. This is done to bring all forms of the same scale. Generally four basic methods are followed for this purpose. In the first place, each test form is administered to an equivalent (randomly sampled) group of examinees. To get equal percentile ranks for equal scores, these scores on the various forms are adjusted. In the second method, all forms of tests are administered and equations are used to measure the equivalent scores in various forms. In case of the third method, generally a common test or a part of the test is administered to all the examinees. A final model of equating is called latent traits model. An elaborate explanation of such methods are discussed in Angott (1971)⁽⁵¹⁾, Write and Stone (1979)⁽⁵²⁾, Lord (1980)⁽⁵³⁾, and Thorndike (1982)⁽⁵⁴⁾.

3.282 Reliability

Reliability refers to the generalizations of test scores. It deals with the reliability of the inferences which are taken from the test scores. It is related with the consistency of measurement. There are generally three standard procedures which are broadly known as: 'Split-half', 'Alternate forms', and 'Test-retest' method. In case of split half method, the Spearman-Brown formula has generally been applied to judge the reliability of the test of full length, from the obtained estimate of correlation of a test of half length.

The other formulas which are used to test the reliability are: the odd-even method; the Rylon formula; the Flanagan formula; the Kuder-Richardson formula. Horst (1949)⁽⁵⁵⁾ provides a generalized formula for RTT which applies when several measures of the same person, by means of comparable test parts, are available.

The alternate-forms method has similarity to both the internal-consistency approach and the retest approach. The alternate-forms method indicates both equivalence of content and stability of performance.

To get the maximum reliability the 'test-retest' method is usually adopted and similarity among the scores of two sets are compared. In other case, two parallel measures are conducted to a sample of examinees. In both the cases the reliability is judged with the help of correlation of coefficient. (Nunnally,⁽⁵⁶⁾ 1981).

3.283 Validity

Broadly, validity is concerned with the relationship between a test and what it is purported to measure or predict. It has to do with the quality of the inferences. A score is considered valid for predicting anything with which it correlates. When two sets show an interrelation greater than zero, the "what" that one of them measures is identical (at least in parts) with "what" that the other measures. The basis of validity is than in the common factor variance. A test may have a validity (factor loading) of .50 for measuring the factor of

numerical facility and a validity of .60 for measuring reasoning. Validity of the test may be measured by different ways, such as, validity by assumption; intrinsic validity; relevant validity; and face validity etc.

Validity by Assumption - There are certain measures, such as, achievement test scores, whose validity is taken for granted. In such cases it is assumed that the scores measure exactly what we want them to measure. The validity of some nonachievement tests is also often taken for granted.

Intrinsic Validity - Intrinsic validity is related with the degree to which a test measures and what it measures. This type of validity is revealed with the help of square root of proportion of true variance. This type of validity is also called index validity.

Relevant Validity - Relevant validity is concerned with the degree to which a test measures factors which are common to other measures. This is almost parallel to the intrinsic validity. The difference being that specific variance is used for the estimations of intrinsic validity where as it is not the same case for relevant validity.

Face Validity - The term face validity has got different meaning. It is restricted to the fact that the test look valid mainly to those which are not very sophisticated in test practices.

3.284 Item Analysis

Most of the item analysis procedure either checks the correct or incorrect answers of the examinee or correlates individual items with other types of variables. The typical item analysis of a test of ability provides two types of information: It gives an index of item difficulty and an index of validity. The index of validity indicates how well the item measures in agreement with the remaining test. It also predicts some external criterion. The basic objective of an item analysis is to obtain objective information regarding the items one writes for the test.

The most common use of the item analysis data is the selection of best items to compose the final test form.

Mathematical ideas and techniques have been in use since Gustav Fechner's Element of Psychology in 1860. However, true mathematical modelling appears to have begun with Thurstone's (1919)⁽⁵⁷⁾ work in the field of learning and later in psychophysics in 1927. Thurstone's Comparative Judgement Model and his model of pairwise judgement⁽⁵⁸⁾ illustrates some of the concepts of mathematical modelling. He has mentioned about two assumptions of models. The first being the effect of each stimulus on the experimental subject and the second assumption is related with the decision rule that the subject follows when presented with two stimuli and is asked to choose between them with respect to some specified attribute.

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CHAPTER IV

STUDIES OF SOME INDICATORS OF GROWTH PATTERN

STUDIES OF SOME INDICATORS OF GROWTH PATTERN

4.0 INTRODUCTION

The growth of knowledge does not follow an uniform pattern. At any given time certain fields may be advancing rapidly, others growing slowly but surely, while yet others stagnate or decline. An area of research may go through different phases during the courses of its life. It may make a slow start, then a sudden breakthrough followed by a total exploitation of the theoretical advances, eventually slowing its pace as if depleted only to start afresh with renewed vigour.

Patrick Wilson (1980) has very appropriately remarked that "the growth of knowledge is uneven. At a given time, a few fields may be showing rapid progress, while others are growing slowly but steadily, and other stagnate or decline. A particular line of enquiry may go through many stages in its life time; a slow start, an exciting breakthrough, then steady exploitation of major theoretical advances, finally slowing down as if exhausted perhaps to come to life suddenly with a new spurt of fast growth. There is no uniform pattern. A field may have no exciting phase of rapid growth; a field may appear to enter a phase of brisk progress, only to collapse without producing anything of lasting value; a field may simply be abandoned even though far from exhausted. And some fields of

research may never progress at all; they may be cultivated, but without bearing fruit".⁽¹⁾

Thus, we can say that the universe of knowledge is multi-dimensional, multidirectional, continuum, ever changing, giving rise to new disciplines and new areas of study.

We have seen that while on the one hand the subject psychology shows interdisciplinary relations with a number of subjects, on the other hand the sudden increase in publications such as books, periodicals, periodical articles, manpower, dissertations show significant growth and development of the subjects. In the present study an attempt has been made to measure the growth of psychology on the basis of the above mentioned indicators namely:

- | | |
|----------------|------------------------|
| 1. Books | 3. Periodical Articles |
| 2. Periodicals | 4. Dissertations |
| 5. Manpower | |

4.1 GROWTH OF DOCUMENTS IN PSYCHOLOGY

Data regarding the growth of documents in different branches in the field of psychology between the two decades are presented in Table No 4.1. The source of information for the growth in number of books has been taken from annual volume of British

National Bibliography⁽²⁾ for the years 1965 and 1985. The data are grouped according to the sequence as provided in the DDC 19th edition.

Table 4.1 - Growth of Documents in Different Branches in the Field of Psychology for the year 1965 and 1985

Name of the Branch	Document		Percentage increase between 1965 & 1985
	1965	1985	
1	2	3	4
<u>General Psychology</u>	35 (16.4)	29 (5.9)	-17.1
Psychoanalysis	19 (8.9)	25 (5.2)	31.6
Behaviourism	- (-)	2 (0.4)	200
<u>Psychological Test, Methods and Measurement</u>	7 (3.3)	11 (2.3)	57.1
<u>Experimental Psychology</u>	- (-)	4 (0.8)	400
<u>Physiological Psychology</u>	3 (1.4)	2 (0.4)	-33.3
Sensory Perception	9 (4.2)	6 (1.2)	-33.3
Movements and Motor Functions	- (-)	7 (1.4)	700
Emotions and Feelings	6 (2.8)	12 (2.5)	100
<u>Psychology of Mental Processes</u>	5 (2.3)	9 (1.9)	80

Table continued...

Table 4.1 continued

1	2	3	4
Memory and Learning	- (-)	2 (0.4)	200
Memory	1 (.5)	8 (1.6)	700
Learning	5 (2.3)	5 (1.0)	000
<u>Psychology of Imagination and Imagery</u>	1 (.5)	5 (1.0)	400
Cognition	4 (1.9)	18 (3.7)	350
Communication	1 (.5)	3 (.6)	200
Perceptual Processes	3 (1.4)	6 (1.2)	100
Volition	- (-)	2 (.4)	200
<u>Intelligence and Aptitudes</u>	1 (.5)	4 (.8)	300
<u>Motivation</u>	1 (.5)	12 (2.5)	1100
<u>Psychology of Subconscious</u>	- (-)	15 (3.1)	1500
Dreams	3 (1.4)	9 (1.9)	200
Hypnotism	6 (2.8)	4 (.8)	-33.3
<u>Developmental Psychology</u>	6 (2.8)	13 (2.7)	116.7

Table continued...

Table 4.1 continued

	1	2	3	4
<u>Psychology of Personality</u>	10 (4.5)	29 (5.9)	190	
Agression	- (-)	12 (2.5)	1200	
<u>Sex Psychology</u>	18 (8.5)	11 (2.3)	-38.8	
<u>Child Psychology</u>	26 (12.2)	63 (12.9)	142.3	
Cognitive Development	3 (1.4)	9 (1.9)	200	
Learning	- (-)	9 (1.9)	900	
Personality Development	1 (0.5)	16 (3.3)	1500	
Handicapped Children	6 (2.8)	3 (0.6)	-50	
Gifted Children	1 (0.5)	5 (1.0)	400	
<u>Psychology of Adolescents</u>	3 (1.4)	1 (0.2)	-200	
<u>Psychology of Adults</u>	- (-)	7 (1.4)	700	
<u>Evolutional Psychology</u>	- (-)	2 (0.4)	200	
<u>Ethno Psychology and National Psychology</u>	1 (.5)	3 (0.6)	200	
<u>Environmental Psychology</u>	- (-)	26 (5.4)	2600	

Table 4.1 continued

1	2	3	4
<u>Comparative Psychology</u>	- (-)	2 (0.4)	200
<u>Animal Psychology</u>	- (-)	3 (0.6)	300
<u>Abnormal Psychology</u>	2 (0.9)	5 (1.0)	150
<u>Clinical Psychology</u>	26 (12.2)	6 (1.2)	-76.9
<u>Applied Psychology</u>	- (-)	46 (9.5)	4600
<u>Counselling Psychology</u>	- (-)	4 (0.8)	400
<u>Industrial Psychology</u>	-	10 (2.1)	1000
<u>Grand Total</u>	213	485	

Note : Data in parenthesis indicates percentage

An analysis of Table 4.1 reveals that the most developed fields in the year 1965 are General Psychology (16.4%), closely followed by Child Psychology and Clinical Psychology (12.2%). On the other hand, following areas had no publications at all: Behaviorism, Experimental Psychology, Movement and Motor Functions, Memory and Learning, Volition, Psychology of Subconscious Agression, Learning, Psychology of Adults, Evolutional Psycho-

logy, Environmental Psychology, Comparative Psychology, Animal Psychology, Applied Psychology, Counselling Psychology and Industrial Psychology. Thus, we can infer that upto 1965 the field of Psychology was not much developed. Many new areas developed after that.

On analysing the data for the year 1985, the most developed areas were noted as: Child Psychology (12.9%) closely followed by Applied Psychology (9.5%), Psychology of Personality, General Psychology (an average of 5.9% each), Environmental Psychology (5.4%) and Psychoanalysis (5.2%). The less developed areas had publications less than one percent. These are: Psychology of Adolescent (.2%), Physiological Psychology, Behaviorism, Memory and Learning, Evolutional Psychology, Ethnic and National Psychology, Animal Psychology each with an average of .6%. Areas such as: Experimental, Intelligence and Aptitude, Hypnotism and Counselling Psychology each with an average of 0.8%.

The data were further analysed using the principle of decreasing and increasing literary warrant. An analysis of the data shows that throughout the period, the phenomena of upward and downward movement is visible. The following branches moved upward in 1985 as compared to 1965: Applied Psychology (4600%), Environmental Psychology (2600%), Psychology of Subconscious and Personality (1500%), Agression (1200%), Motivation (1100%), Industrial Psychology (1000%), Learning (900%). Psychology of Memory, Movement and Motor Functions (700% each), Psychology of

Imaginary and Imagination, Gifted Children and Counselling Psychology (400% each), Cognition (350%), Intelligence and Aptitude (300%), Evolutional, Ethno and National and Comparative Psychology (200% each), Psychology of Personality (190%), Abnormal Psychology (150%), Child Psychology (142.3%), Developmental Psychology (116.7%), Emotional and Feeling and Perceptual Processes (100% each), Psychology of Mental Processes (80%), Psychological Tests, Methods and Measurement (57.1%) and Psychoanalysis (31.6%).

The following branches moved downwards in 1985 as compared to 1965. They are Psychology of Adolescents (-200%), Clinical Psychology (-76.9%), Handicapped Children (-50%), Sex Psychology (-38.8%), Physiological Psychology, Sensory Perception and Hypnotism (-33.3%), and General Psychology (-17.1%).

From the above trend, it is generalized that within the period of two decades, certain branches are developing fast, some are static and some are showing a downward trend.

To see the growth of the books on major branches in the field of psychology, the data of table 4.1 were further grouped by merging various headings which has been shown in Table 4.2, and shown in Chart 4.1.

Chart 4.1 : Number of Publications in the field of
Psychology : Books

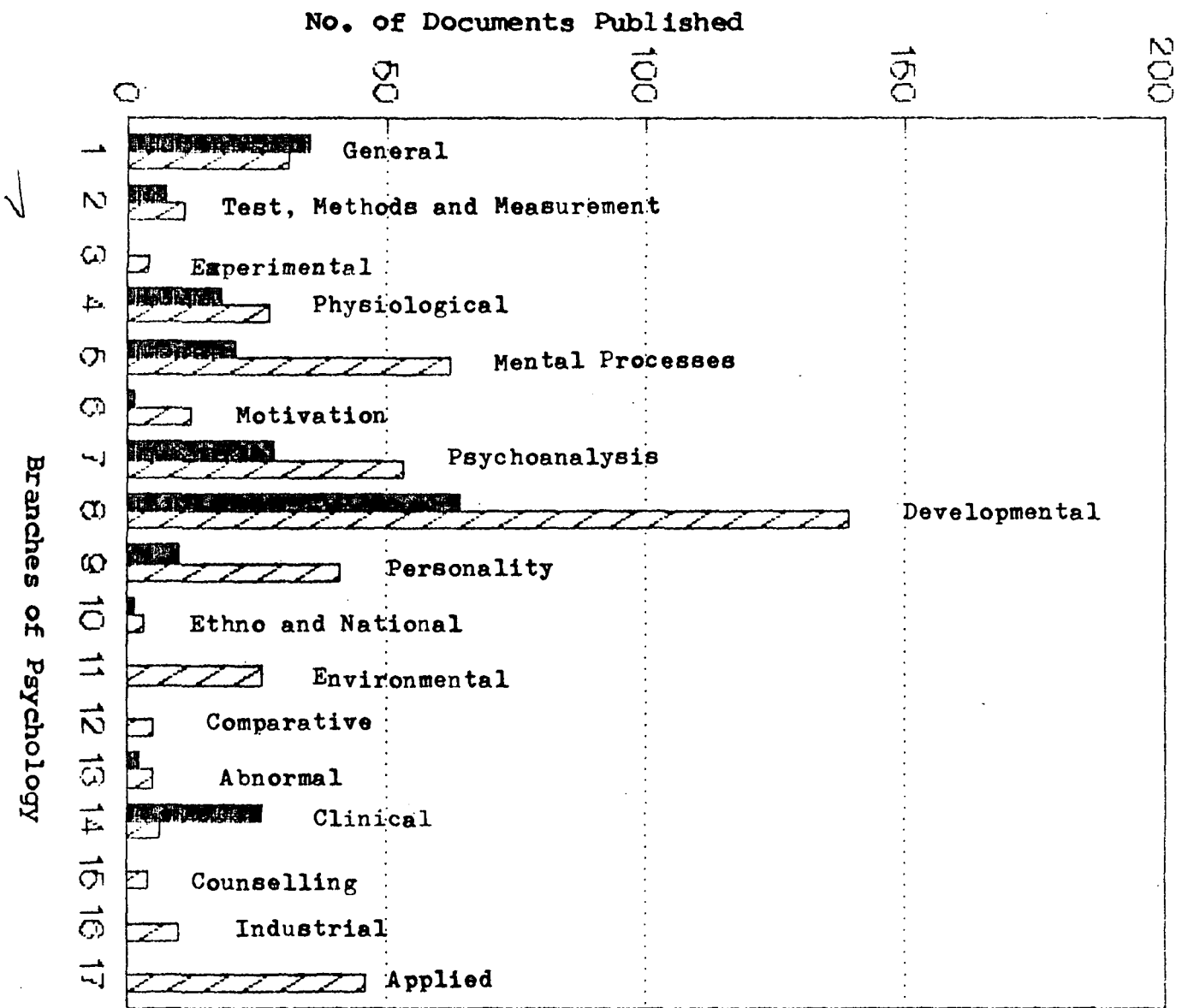


Table 4.2 : Distribution of Documents by Major Branches
in the Field of Psychology for the year 1965
and 1985

Name of the Branch	Document		Percentage increase between 1965 & 1985
	1965	1985	
1	2	3	4
General Psychology	35 (16.4)	31 (6.4)	-11.4
Psychological Test, Methods and Measurement	7 (3.3)	11 (2.3)	57.1
Experimental Psychology	-	4 (0.8)	400
Physiological Psychology	18 (8.5)	27 (5.6)	50
Psychology of Mental Processes	21 (9.9)	62 (12.8)	95.2
Motivation	1 (0.5)	12 (2.5)	1100
Psychoanalysis	28 (13.1)	53 (10.9)	89.3
Developmental Psychology	64 (30.0)	139 (28.7)	117.2
Personality	10 (4.7)	41 (8.5)	310
Ethno and National Psychology	1 (0.5)	3 (0.6)	200
Environmental Psychology	-	26 (5.4)	2600

Table 4.2 continued..

Table 4.2 continued

1	2	3	4
Comparative Psychology	- (-)	5 (1.0)	500
Abnormal Psychology	2 (0.9)	5 (1.0)	150
Clinical Psychology	26 (12.2)	6 (1.2)	-76.9
Counselling Psychology	- (-)	4 (0.8)	400
Industrial Psychology	- (-)	10 (2.1)	1000
Applied Psychology	- (-)	46 (9.5)	4600
Grand Total	213	485	

Note : Data in parenthesis indicates percentage

✓ The study of the above table shows that by 1985, the subject had developed so much that certain new branches emerged. This trend of growth is in various specialized fields than that of in General Psychology. These branches deal with applied aspects of the subject. The branches which developed fast and indicated fairly good incidence in 1985 are mainly: Psychology of Personality (310%), Cultural Psychology (200%), Abnormal Psychology (150%), Developmental Psychology (117.2%); Psychology of Mental Processes (95.2%), Psychoanalysis (89.3%). Trend of

growth in General Psychology has gone down and thus shows a decline in 1985 as compared with 1965.

4.2 GROWTH IN NUMBER OF PERIODICAL PUBLICATIONS

The growth of a subject can also be assessed by observing the continuous increase in the number of periodicals. In the present study, the periodicals and serials taken into account are chiefly newsletters, journals, reviewing periodicals, bulletins, abstracting and indexing periodicals, and also some periodicals showing interdisciplinary approach with other subjects. The data for the analysis of the growth patterns have been taken from Ulrich's International Periodical Directory 1987-88 26th Ed.⁽³⁾ To ascertain the growth trend of periodical publications, the title of the serials are listed in a chronological order. The total number of periodicals published during the period was five hundred and thirty six (536). In case of five periodicals, the years of publication could not be specified. The grouping of data has been done in block till 1908 and subsequently at ten years interval. A decade-wise growth in number of periodicals (531) in the field of psychology is presented in Table 4.3, and represented in Chart 4.2.

Chart 4.2 : Number of Periodical Publications in the Field of Psychology

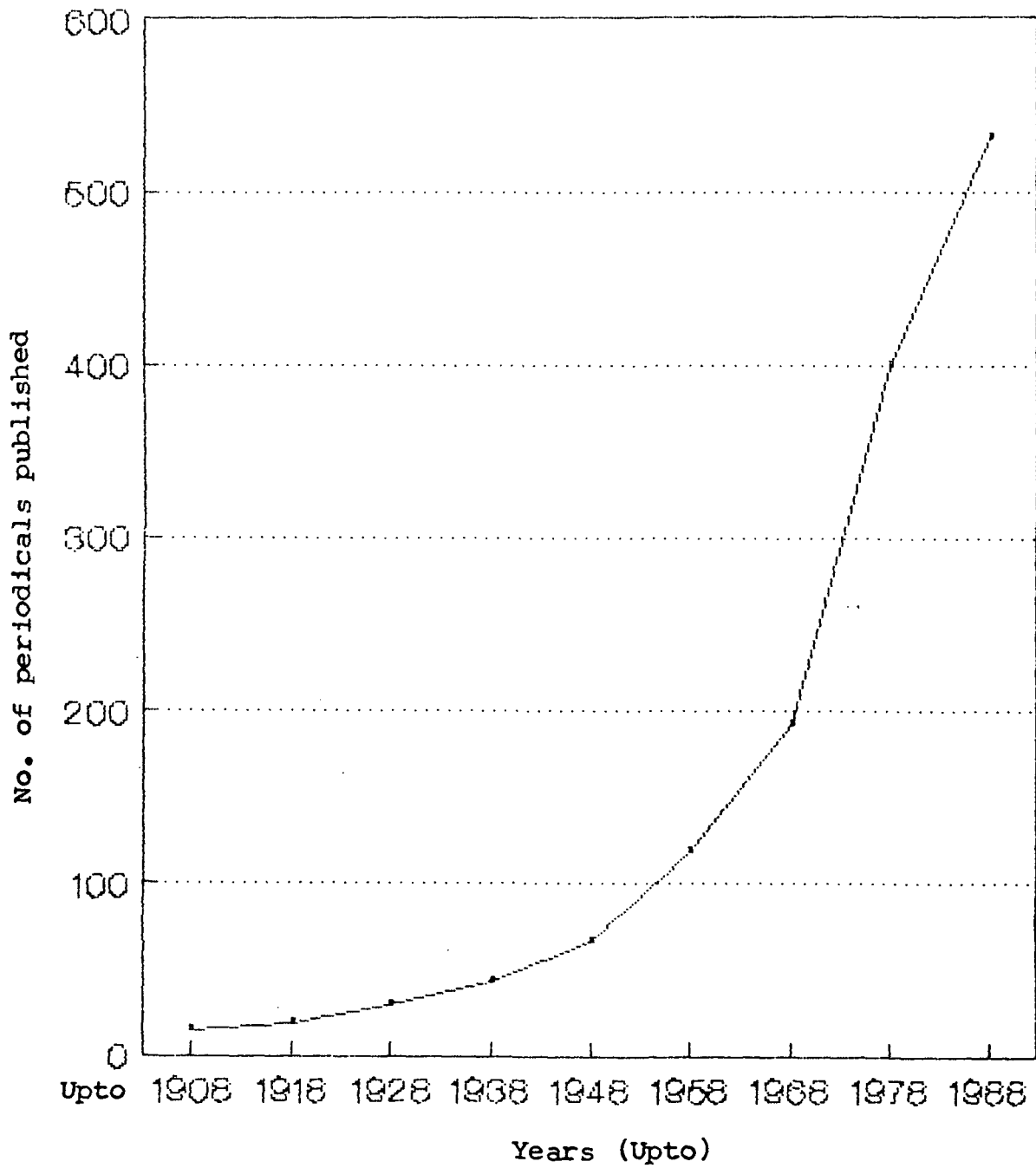


Table 4.3 - Decade-Wise Growth in the Number of Periodicals

Year	Number of Periodicals	Percentage	Growth rate	Cumulative Growth	Percentage	Growth rate
Upto 1908	15	2.8	0	15	2.8	0
1909-1918	3	0.6	-80	18	3.4	20
1919-1928	12	2.3	300	30	5.6	67
1929-1938	13	2.4	8.33	43	8.1	43
1939-1948	23	4.3	76.92	66	12.4	53
1949-1958	53	9.9	130.43	119	22.4	80
1959-1968	73	13.7	37.74	192	36.2	61
1969-1978	208	39.2	184.93	400	75.3	108
1979-1988	131	24.7	-37.02	531	100	33
Grand Total	<u>531</u>					

Source: Ulrich's International Periodical Directory
1987-88

A view of the above table reveals a continuous growth of periodical publications from 1908-1988. However the rate of growth varies from decade to decade. The percentage growth of periodicals increased to an extent of 20 percent from 1908 to 1918. This increasing trend continued sharply in the subsequent decade and reached 67 percent. Between 1929-1938, there was a fall in the growth and it reached 43 percent. Thereafter, there was a growing trend but an increase was noted only between 1938-1948 (53%). During the next decade, the rate of growth was 80 percent. 1959-1968 was marked by a decrease in trend with the percentage growth having gone down to 61 percent. Remar-

kable growth was noted between 1969-1978 and the growth rate touched the maximum figure of 108 percent and was followed by an abrupt fall in the following decade. The rate of growth during this period dropped down to 33 percent which shows a declining trend. Thus it is apparent that the maximum growth was between 1969-1978 (108%) and minimum in 1909-1918 (20%).

Thus no definite pattern in the rate of growth could be noted in the different decades. The curve showed up and down trend in many cases. However, on the whole till 1978 the increasing tendency was observed. The decline trend in the last decade may probably be on account of stabilization of growth as regards the development of subject is concerned.

4.21 Periodicals According to Place of Publication

In another study, the growth in the number of periodical publications according to the country of origin has been taken into account. The analysis has been presented in Table 4.4.

Table 4.4 - Periodicals according to the Country of Publication

Country of origin	Upto 1918	1919 to 1928	1929 to 1938	1939 to 1948	1949 to 1958	1959 to 1968	1969 to 1978	1979 to 1988	Total
1	2	3	4	5	6	7	8	9	10
<u>Developed Countries</u>									
U.S.A.	9	4	10	11	13	45	114	88	294
U.K.	1	3	1	3	2	3	14	18	45

Table 4.4 contd....

Table 4.4 continued

	1	2	3	4	5	6	7	8	9	10
Germany		1			1	8		12	4	26
France		2	1	1		3	1	10	2	20
Italy		1				3	1	8	2	15
Switzerland		1			2	1	2	3	5	14
Netherland						2	2	2	3	9
Australia						1	5	1	2	9
Japan			1		1	4	1	2		9
Canada					1		2	3	1	7
Poland						2		1	1	4
S. Africa		1						2	1	4
Belgium				1		2		0	0	3
Romania							1	1		2
Others		1	3		2	4	7	12		28
Total		17	12	13	21	46	69	184	127	489
=====										
<u>Developing Countries</u>										
India					1	5	2	11		19 ✓
Argentina		1			1		1		2	5
Brazil						2			1	3
Columbia								2		2
Mexico								2		2
Spain								2		2
Others							1	7	1	9
Total		1			2	7	4	24	4	42
Grand Total		18	12	13	23	53	73	208	131	531

It shows that nearly more than fifty percent (55.4%) of the total periodicals (531) are being published from the United States only. Twenty eight periodicals are published in 12 other developed countries, with an average of 2.2 (approx 2) periodicals per country.

While using the same parameter in case of developing countries, the table reveals that eleven (11) developing countries are publishing altogether nine (9) periodicals, which shows an average of about .8 (approx 1) periodicals per country. Among the developing countries, except in India, where there is an increasing tendency in case of other countries, the growth trend is not very encouraging.

Among developed countries, significant growth has been observed in case of United States, United Kingdom, Germany, France, Italy and Switzerland. The total number of periodical publications comes altogether 414. In case of developing countries, India's contribution is 19, Argentina 5 and of Brazil 3 only. Thus 27 periodicals from these three developing countries.

On the basis of the above data it may be inferred that in developed countries, the growth of the subject is much more faster than the developing countries. A graphic representation of the total number of periodicals according to the origin of country is shown in Chart No. 4.3.

Number of Periodicals

(Values in \log_{10})

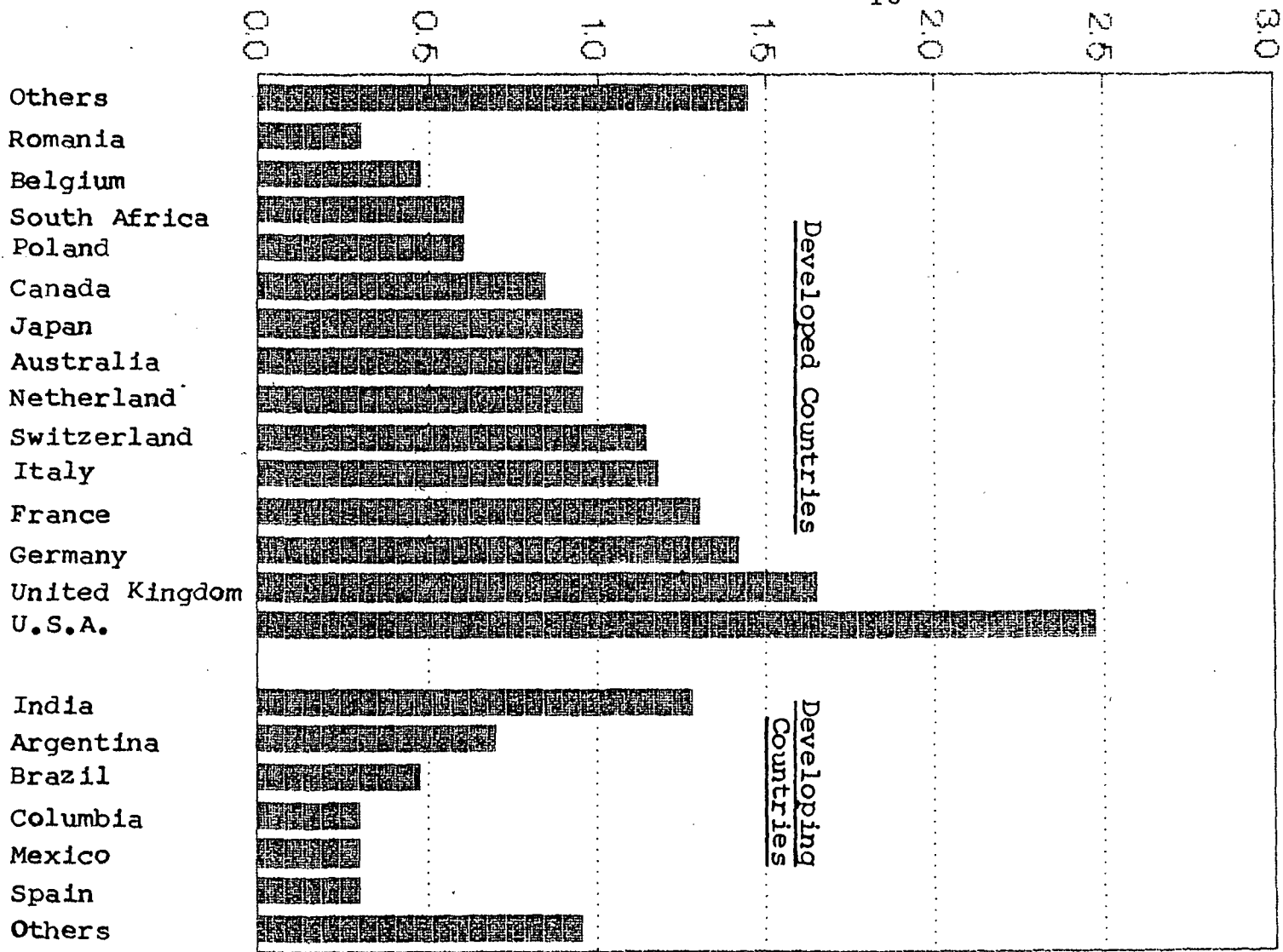


Chart 4.3 : Number of Periodicals Published from some Countries

4.22 Publication of Periodicals from Developed and Developing Countries

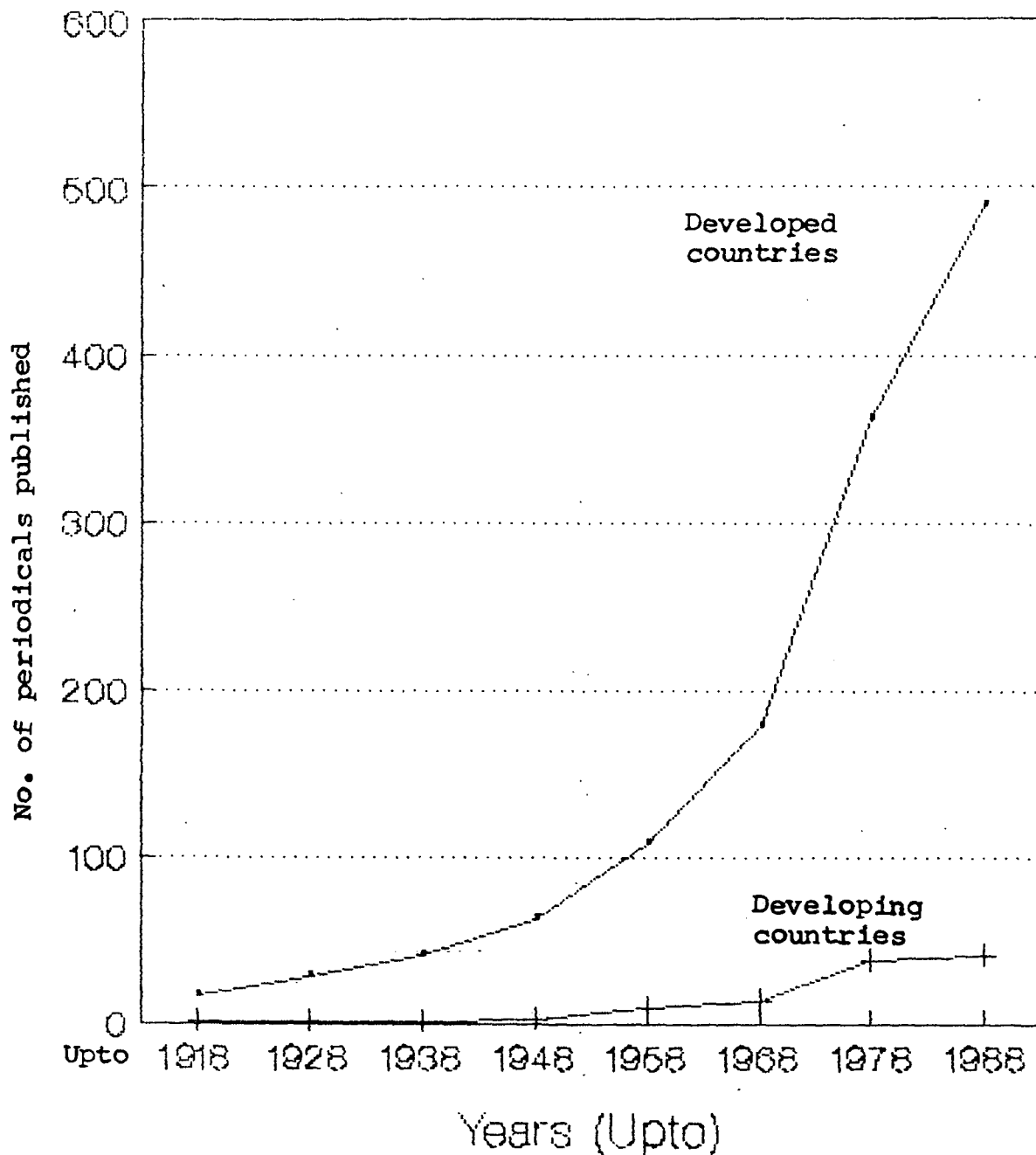
The growth of periodicals has also been assessed by grouping them according to their origin from developed and developing countries. The data has been presented in Table 4.5, and shown in Chart 4.4.

Table 4.5 - Publications of Periodicals from Developed and Developing Countries

Decades	Developed		Developing	
	Number	Percentage	Number	Percentage
Upto 1918	17	3.4	1	2.4
1919 to 1928	12	2.5	0	-
1929 to 1938	13	2.6	0	-
1939 to 1948	21	4.4	2	4.8
1949 to 1958	46	9.4	7	16.7
1959 to 1968	69	14.1	4	9.5
1969 to 1978	184	37.6	24	57.1
1979 to 1988	127	26.0	4	9.5
Total	489	100	42	100

Table 4.5 reveals that there is a continuous growth of periodical publications in developed countries. The maximum number of periodicals (184) were published during 1969-1978 which is 37.6 percent of the total number of periodicals published in the developed countries. This is followed by 127 perio-

Chart 4.4 : Publication of Periodicals from
Developed and Developing Countries



dicals (26%) during 1979-1988. Altogether 69 (14%) periodicals were published in 1959-1968. It is thus inferred that the major growth of periodical publications started from 1949 onwards. It is the same case with developing countries too. However, maximum growth has been observed during the period of 1969-1978, when altogether 24 (57.1%) periodicals were published in developing countries. Upto 1918 only one periodical was published. Between 1919-1938, there was no growth at all.

4.23 Growth of Periodicals in Major Branches in the Field of Psychology

The figures as indicated in Table 4.6 reveal that maximum periodicals were published in General Psychology, followed by Clinical, Psychoanalysis and Applied Psychology. Other branches where upward tendency is noted are: Medical Psychology, Physiological Psychology, Developmental Psychology, Intelligence, Cognitive and Memory, Educational Psychology, Experimental Psychology and Social Psychology. In General Psychology, the trend of growth is continuous. However, some ups and down were marginally observed. In other branches the growth of periodical publications has not been very significant.

In general the periodical publications showed an increasing trend in different branches from 1966 onwards. In some branches like Criminal, Parapsychology, Humanistic, the number of publications were only a few. These areas have been developed in 1960s, 1970s and 1980s.

Table 4.6 - Growth of Periodicals in Major Branches in the Field of Psychology

Name of the Branch	Upto	1946	1951	1956	1961	1966	1971	1976	1981	1986	Total
	1945	to 1950	to 1955	to 1960	to 1965	to 1970	to 1975	to 1980	to 1985	to 1990	
General Psychology	26	15	18	19	13	40	34	55	30	3	253
Physiological Psychology	1	1	0	0	0	5	4	3	4	-	18
Counselling Psychology	-	-	1	-	-	1	1	1	-	-	4
Medical Psychology	1	-	2	3	1	-	4	6	3	-	20
Psychoanalysis	10	-	2	1	1	3	5	3	6	-	31
Experimental Psychology	1	1	1	1	2	-	4	1	1	-	12
Abnormal Psychology	1	-	-	-	-	1	2	2	1	-	7
Educational Psychology	3	-	1	-	4	1	2	2	2	-	15
Social Psychology	2	-	-	-	-	1	5	2	1	-	11
Applied Psychology	1	-	1	-	2	4	8	10	2	3	31
Developmental Psychology	2	1	-	2	-	1	2	4	5	1	18
Clinical Psychology	1	3	2	-	6	9	12	12	20	21	67
Psychometrics	-	1	-	-	1	-	-	1	-	-	3
Differential and Genetic Psychology	2	1	-	-	2	1	-	2	1	-	9
Intelligence, Cognitive and Memory	-	-	-	-	-	1	2	4	9	2	18
Criminal Psychology	-	-	-	-	1	-	-	-	-	-	1
Cross Cultural Psychology	-	-	-	-	-	3	1	-	-	-	4
Comparative Psychology	-	1	-	-	-	-	1	-	-	1	3
Phenomenology	-	-	-	-	-	1	3	-	-	-	4
Humanistic	-	-	-	-	-	1	-	-	-	-	1
Parapsychology	-	-	-	-	-	-	-	1	-	-	1
Total	51	24	28	26	33	73	90	29	85	12	531

Table 4.7 - Growth of Other Serials in the Field of Psychology

Name of the Serial	Upto 1945	1946 to 1950	1951 to 1955	1956 to 1960	1961 to 1965	1966 to 1970	1971 to 1975	1976 to 1980	1981 to 1985	1986 to 1990	Total
Newsletter	3	1	1		1	5	4	14	3	3	35
Review	3	1	4	1	2	2	2	1	6		22
Bulletin	1	1			3	4	4	3	2		18
Abstract	1						1		2		4
Digest							1	1	1		3
Index				1		1					2
Magazine						1		1			2
Report							1				1
Total	8	3	5	2	6	13	13	20	14	3	87

The total number of Newsletters, Reviews, Bulletins, Abstracts, Digests, Indexes, Magazines and Reports have been altogether 87. A year-wise growth of such publications are shown in Table 4.7.

4.3 GROWTH AS INDICATED BY PERIODICAL ARTICLES

The growth of articles by major branches in the field of Psychology for the year 1966 and 1986 are presented in Table 4.8. To see the growth pattern between the two decades data have been taken from the Psychological Abstracts ⁽⁴⁾ for the year 1966 and 1986 only. The grouping of data have been done according to the sequence provided for the arrangement of articles in the Psychological Abstract.

Table 4.8 - Growth as Indicated by Periodical Articles
During 1966 and 1986

Name of the Branch	Document		Percentage increase between 1966 & 1986
	1966	1986	
1	2	3	4
<u>General Psychology</u>	257 (2.3)	42 (8.2)	-83.7
Parapsychology	44 (0.4)	62 (0.2)	41.0
History and Philosophies and Theories	179 (1.6)	436 (1.4)	143.6

Table 4.8 continued

Table 4.8 continued

1	2	3	4
Research Methods and Apparatus and Computer Applications	206 (1.8)	488 (1.6)	137.0
<u>Psychometrics</u>	74 (0.7)	158 (0.6)	113.6
Test Construction and Validation	289 (2.5)	763 (2.5)	164
Statistics and Mathe- matics	143 (1.3)	306 (1.0)	114.0
<u>Experimental Psychology</u> (Human)	55 (0.5)	31 (0.1)	-43.7
Perception and Motor Processes	397 (3.5)	179 (0.6)	-55
Visual Perceptual	343 (3.0)	457 (1.5)	33.2
Auditory and Speech Perception	106 (1.0)	141 (0.5)	33
Cognitive Processes	183 (1.6)	377 (1.3)	106
Learning and Memory	706 (6.2)	366 (1.2)	-48.2
Motivation and Emotion	161 (1.4)	88 (0.3)	-45.3
Attention and Conscio- ness States	99 (0.9)	82 (0.3)	-17.2
<u>Experimental Psychology</u> (Animal)	115 (1.0)	59 (0.2)	-48.7
Learning and Motivation	547 (4.8)	393 (1.3)	-28.2
Social & Instinctive Behavior	156 (1.4)	642 (2.1)	311.5

Table continued

Table 4.8 continued

1	2	3	4
<u>Physiological Psychology</u>	61 (0.6)	109 (0.4)	78.7
Neurology and Electro- physiology	169 (1.5)	569 (1.9)	236.7
Physiological Processes	164 (1.4)	163 (0.5)	-0.6
Psychophysiology	141 (1.2)	195 (0.6)	38.3
<u>Physiological Intervention</u>	- (-)	435 (1.4)	(-)
Electrical Stimulation	100 (0.9)	112 (0.4)	12.0
Lesions	129 (1.4)	239 (0.8)	85.3
Drug Stimulation and Psychopharmacology	250 (2.2)	1457 (4.7)	482.8
<u>Communication Systems</u>	65 (0.6)	53 (0.2)	-18.5
Language and Speech	127 (1.1)	156 (0.5)	22.8
Literature and Art	22 (0.2)	176 (0.6)	700
<u>Developmental Psychology</u>	496 (4.3)	356 (1.1)	-28.2
Cognitive and Perceptual Development	71 (0.6)	804 (2.6)	1032.4
Psychosocial and Perso- nality Development	184 (1.6)	769 (2.5)	318

Table 4.8 continued..

Table 4.8 continued

1	2	3	4
<u>Social Processes and</u>	71	140	97.2
<u>Social Issues</u>	(0.6)	(0.4)	
Social Structure and Social Roles	28 (0.3)	75 (0.3)	167.9
Culture and Ethnology and Religion	171 (1.5)	227 (0.7)	32.8
Marriage and Family	- (-)	432 (1.4)	(-)
Political and Legal Processes	- (-)	581 (1.8)	(-)
Psychosexual Behavior and Sex Roles	62 (0.5)	271 (0.9)	337.1
Drug and Alcohol Usage	- (-)	118 (0.4)	(-)
<u>Experimental Social Psychology</u>		36 (0.11)	(-)
Group and Interpersonal Processes	259 (2.3)	335 (1.0)	29.3
Social Perception and Motivation	171 (1.5)	289 (1.0)	64.0
<u>Personality</u>	629 (5.5)	637 (2.0)	1.3
<u>Physical and Psycholo- gical Disorders</u>	- (-)	333 (1.7)	(-)
Mental Disorders	157 (1.4)	1593 (5.1)	914.7
Behavior Disorders and Antisocial Behavior	753 (6.6)	810 (2.6)	7.6

Table continued..

Table 4.8 continued

1	2	3	4
Learning Disorders and Mental Retardation	285 (2.5)	356 (1.2)	24.9
Speech and Language Disorders	67 (0.6)	116 (0.4)	73.1
Physical and Psycho- somatic Disorders	460 (4.1)	1781 (5.7)	287.1
<u>Treatment and Prevention</u>	135 (1.2)	611 (2.0)	352.6
Psychotherapy and Psycho- therapeutic Counselling	285 (2.5)	978 (3.1)	243.1
Group and Family Therapy	83 (0.7)	519 (1.7)	525.3
Encounter Group and Sensitivity and Human Relations Training	- (-)	65 (0.2)	(-)
Behavior Therapy and Behavior Modification	- (-)	481 (1.5)	(-)
Drug Therapy	112 (1.0)	997 (3.2)	790.2
Hypnotherapy	112 (1.0)	68 (0.2)	-39.3
Speech Therapy	- (-)	56 (0.2)	(-)
Health Care Services	144 (1.3)	511 (1.6)	254.9
Community Services and Mental Health Programs	- (-)	421 (1.3)	(-)
Counselling and Social Casework		270 (0.9)	
Hospital Programs and Institutionalization	144 (1.3)	607 (2.0)	321.6

Table 4.8 continued..

Table 4.8 continued

1	2	3	4
Rehabilitation and Penology	- (-)	350 (1.1)	(-)
Drug and Alcohol Rehabilitation	- (-)	343 (1.1)	(-)
<u>Professional Personnel and Professional Issues</u>	- (-)	1024 (3.3)	(-)
<u>Educational Psychology</u>	167 (1.5)	131 (0.5)	-21.5
Educational Administration and Personnel and Training	75 (0.7)	373 (1.2)	397.33
Curriculum and Programs and Teaching Methods	84 (0.7)	742 (2.4)	783.3
Academic Learning and Achievement	- (-)	313 (1.0)	(-)
Class room Dynamics and Student Adjustment and Attitudes	129 (1.1)	363 (1.2)	181.4
Special and Remedial Education	81 (0.7)	630 (2.0)	677.8
Counselling and Measurement	163 (1.4)	630 (2.0)	286.5
<u>Applied Psychology</u>	90 (0.8)	121 (0.4)	34.4
Occupational Attitudes and Interest Guidance	56 (0.5)	139 (0.4)	148.2
Personnel Selection and Training	65 (0.6)	146 (0.5)	124.7
Personnel Evaluation and Performance	38 (0.3)	108 (0.3)	184.2
Management and Management Training	76 (0.7)	318 (1.1)	318.4

Table 4.8 continued

1	2	3	4
Organizational Behavior and Job Satisfaction	108 (0.9)	520 (1.7)	381.5
Human Factors Engineering	68 (0.6)	159 (0.5)	133.9
Environmental Psychology and Environmental Issues	22 (0.2)	131 (0.4)	495.4
Marketing and Advertising	24 (0.2)	172 (0.6)	616.7
Grand Total	11,413	31,090	

Note : Data in parenthesis indicates percentage

An analysis of the data applying the principle of decreasing and increasing literary warrant shows the phenomena of upward and downward movement spread throughout the table. The following branches in 1986 move upward as compared with 1966. Fields showing more than 500 percent increase (approx.) are:

- (i) Cognitive and perceptual development
- (ii) Mental disorder
- (iii) Drug Therapy
- (iv) Literature and art in communication systems
- (v) Special and remedial education
- (vi) Marketing advertising
- (vii) Group and family therapy
- (viii) Environmental psychology

The branches following next in the series show an increase between 300 and 500 percent. They are:

- (i) Drug stimulation and psychopharmacology
- (ii) Education, administration and personnel and training
- (iii) Organizational behavior and job satisfaction
- (iv) Treatment and prevention
- (v) Hospital programs and institutionalization
- (vi) Psychosexual behavior and sex roles
- (vii) Psychosocial and personality development
- (viii) Management and management training.

In the third category where the percent increase falls between 100 to 300 are:

- (i) Counselling and measurement
- (ii) Health care service
- (iii) Neurology and electrophysiology
- (iv) Physical and psychomatic disorder
- (v) Psychotherapy and psychotherapeutic counselling
- (vi) History, philosophies and theories
- (vii) Research method, applied and computer application
- (viii) Psychometrics
- (ix) Test construction and validation
- (x) Statistics and mathematics
- (xi) Cognitive processes
- (xii) Social structure and social roles
- (xiii) Classroom dynamics and student adjustment attitudes
- (xiv) Occupational attitudes and interest guidance
- (xv) Personnel selections and training
- (xvi) Personnel evaluation and performance
- (xvii) Human factors engineering.

In some other cases the upward trend though noticed, the percentage increase is less than 100. Such areas are:

- (i) Visual perception
- (ii) Auditing and speech perception
- (iii) Physiological psychology
- (iv) Psychophysiology
- (v) Electrical stimulation
- (vi) Lesions
- (vii) Language and speech
- (viii) Social processes and social issues
- (ix) Culture and ethnology and religion
- (x) Group and interpersonal processes
- (xi) Social perception and motivation
- (xii) Personality
- (xiii) Behavior disorder and autosocial behavior
- (xiv) Learning disorder and mental disorder
- (xv) Speech, learning mental disorder
- (xvi) Applied psychology.

The following branches move downward in 1986 as compared with 1966. In such cases there is no growth rather the number of articles has declined. This category includes:

- (i) General psychology (-84%)
- (ii) Perception and motor processes (-55%)
- (iii) Attention and consciousness states (-49%)
- (iv) Learning and memory (-48%)
- (v) Motivation and emotion (-45%)
- (vi) Experimental psychology (Human) (-44%)
- (vii) Hypnotherapy (-39.3%)
- (viii) Developmental psychology (-28%)
- (ix) Learning and motivation (-28%)
- (x) Educational psychology (-21.5%)

- (xi) Communication systems (-18%)
- (xii) Experimental psychology (Animal) (-17%)
- (xiii) Physiological processes (-0.6%)

The last grouping may be made of such cases where the articles are available only for the second decade, i.e. 1986.

They include:

- (i) Physiological intervention
- (ii) Marriage and family
- (iii) Drug and alcohol uses
- (iv) Experimental social psychology
- (v) Physical and physiological disorders
- (vi) Encounter group, sensitivity and human relations training
- (vii) Behaviour therapy and behaviour modification
- (viii) Speech therapy
- (ix) Community services and mental health
- (x) Counselling and social casework
- (xi) Rehabilitation and penology
- (xii) Drug and alcohol rehabilitation
- (xiii) Academic learning and achievement
- (xiv) Professional personnel and professional issues

The above mentioned fourteen branches, thus, may be said of recent origin and the contributions in them though not much significant, have bright scope for future development.

Further, the overall growth of periodical articles has been at the rate of 172.4 percent between 1966 and 1986.

From upward and downward trend of growth, it may be generalized that: (i) the field psychology is growing fast at micro

level of documents; and (2) this trend of growth indicates that continuous research work is going on in the various branches of psychology.

4.31 Growth Indicated by Periodical Articles in Major Branches of Psychology

The growth of periodical articles by major branches in the field of psychology is presented in Table 4.9, and shown in Chart 4.5.

Table 4.9 : Growth as Indicated of Periodical Articles in Major Branches of Psychology During 1966 and 1986

Name of the Branch	1966	1986	Increase (%)
1	2	3	4
General Psychology	686 (6.0)	1028 (3.3)	50.0
Psychometrics	506 (4.4)	1227 (3.9)	143.0
Experimental psychology (Human)	2050 (18.0)	1721 (5.5)	-16.0
Experimental psychology (Animal)	818 (7.2)	1094 (3.5)	34.0
Physiological psychology	535 (4.7)	1036 (3.3)	94.0
Physiological intervention	479 (4.2)	2243 (7.2)	368.3
Communication system	214 (1.9)	385 (1.2)	80.0
Developmental psychology	751 (6.6)	1929 (6.2)	157.0
Social processes and social issues	332 (2.9)	1844 (5.9)	455.4

Table 4.9 continued

Table 4.9 continued

	1	2	3	4
Experimental social psychology		430 (3.8)	660 (2.1)	54.0
Personality		629 (5.5)	637 (2.0)	1.3
Physical and physiological disorders		1722 (15.1)	4989 (16.0)	190.0
Treatment and prevention		1015 (8.9)	6277 (2.02)	518.4
Professional personnel and professional issues		- (-)	1024 (3.3)	*
Educational psychology		699 (6.1)	3182 (10.2)	355.2
Applied psychology		547 (4.8)	1814 (5.8)	232.0
Grand Total		11413	31090	172

Note : Data in parenthesis indicate percentage

* Appeared in 1986 only

The study of Table 4.9 shows that the most developed area in 1966 has been Experimental Psychology (Human), where altogether 2050 (18.0%) articles have been published, followed by Experimental Psychology (Animal) where the total number of articles were 818 (7.2%). The third position was obtained by Developmental Psychology with 751 articles (6.6%).

Similarly, when the growth pattern was observed in case of 1986, it was obvious that treatment and prevention occupied

the top position with 6277 (20.2%) articles, followed by Physical and Psychological Disorder, in which, 4989 (16.0%) articles were available. Third position has been occupied by educational psychology where 3182 (10.2%) articles were published.

However, a comparative analysis of the growth of articles in 1966 and in 1986, i.e., after a time interval of 20 years from 1966, reveals that the growth of articles increased more than five times in the following fields:

- (i) Physiological disorder
- (ii) Social processes and social issues
- (iii) Treatment and preventions
- (iv) Educational psychology

In the following branches two to three total increase was noted:

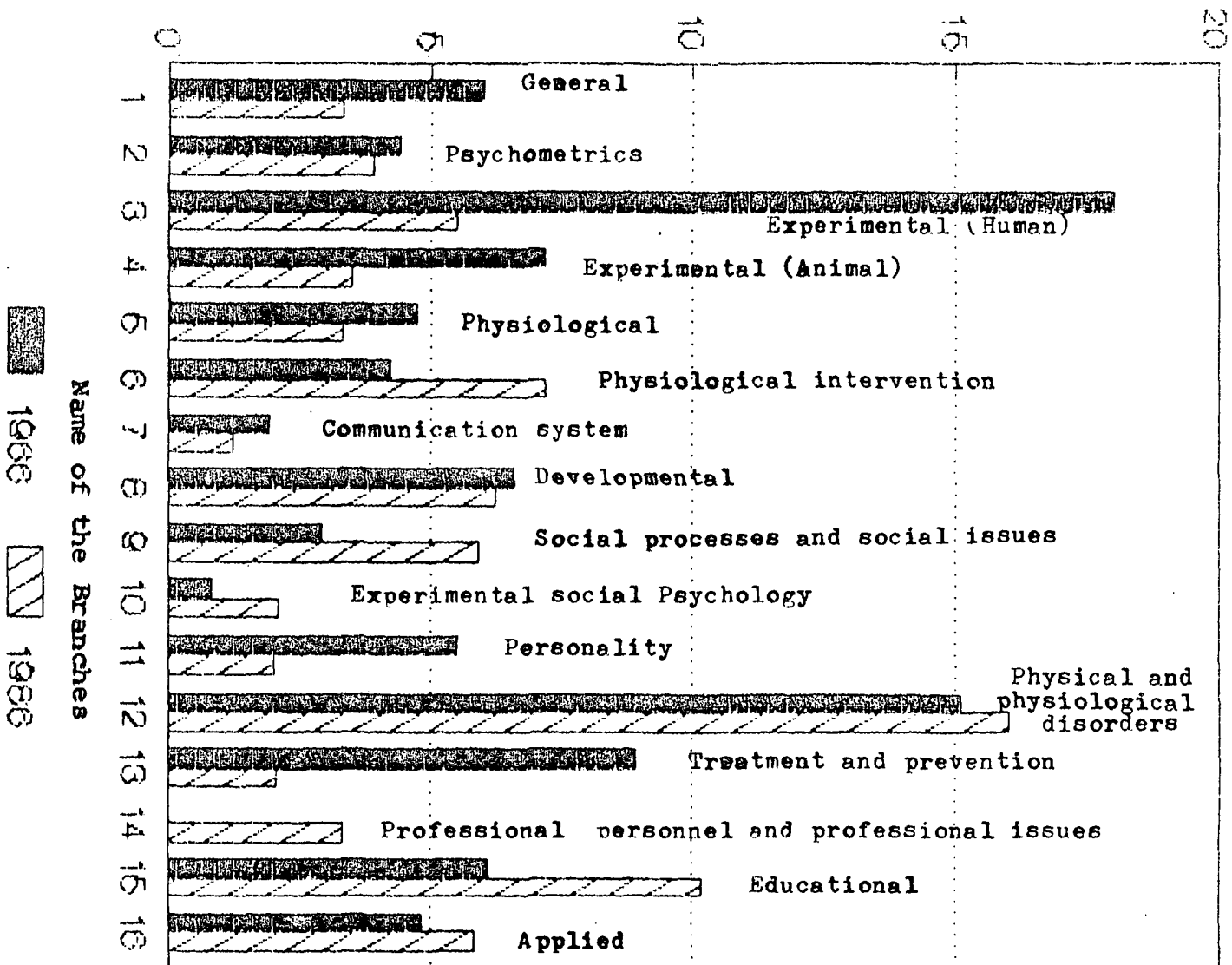
- (i) General psychology
- (ii) Psychometrics
- (iii) Physiological psychology
- (iv) Developmental psychology
- (v) Physical and physiological disorders
- (vi) Applied psychology

A marginal growth, i.e. less than two fold has been noted in the following areas:

- (i) Experimental psychology (animal)
- (ii) Communications systems
- (iii) Experimental social psychology.

No. of periodical articles (in percentage)

Chart 4.5 : Number of Publications in the field of Psychology & Articles



Name of the Branches

1966 1986

Almost no growth has been observed in case of personality. The growth in this case has been constant and figures during the two decades under consideration were almost the same (629 and 637).

There has been a decreasing tendency in the areas such as Experimental psychology (human) where in 1966 the total number of articles were 2050 (18.0%) and 1721 (5.5%) in 1986.

4.4 GROWTH IN NUMBER OF DOCTORAL DISSERTATIONS IN INDIAN UNIVERSITIES UPTO 1985

The growth of Psychology can also be ascertained by growth in number of Doctoral Dissertations approved by the Indian Universities. To study the growth in the number of Doctoral Dissertations accepted by Indian Universities, the data has been taken from the Bibliography of Doctoral Dissertations in Social Sciences and Humanities⁽⁵⁾ from 1857 upto the year 1985. The data is presented in Table 4.10.

Table 4.10^a - Growth in Number of Doctoral Dissertations in Psychology in Indian Universities 1857-1985

Year	Number	Percentage	Rate of growth in percentage
1	2	3	4
Upto 1950	6	0.54	-
1951-1955	12	1.16	100

Table continued

Table 4.10 continued

1	2	3	4
1956-1960	23	2.23	91.7
1961-1965	60	5.81	160.9
1966-1970	110	10.66	83.0
1971-1975	186	18.04	69.0
1976-1980	251	24.34	34.9
1981-1985	383	37.14	52.6
Total	1031		

A perusal of the above table indicates that apparently there is a continuous growth in number of psychological dissertations as shown by the growth in number of dissertations submitted to Indian Universities from 1950 to 1985. Maximum dissertations were accepted during the period 1981-85 (383, 37.14%). The data presented (condensed in a group of five years interval), when examined carefully, gives a different picture when viewed from the point of view of relative growth in terms of percentage. The rate of the growth varies from one period to the other. Initially during 1951-1955, there is 100 percent growth over the preceding years, which dropped down marginally in 1956-1960. The highest growth was noticed during 1961-1965 (160.9%) over the previous five years. In subsequent years, there is more or less continuous decreasing trend except during 1981-1985 block year when an increase was observed. It

appears that though the subject, i.e. Psychology when evaluated in terms of Ph.D. dissertations, has developed, the research activities in Psychology became more popular from 1950 onwards, which resulted into remarkable increase in the number of Ph.D. theses subsequently submitted in the field.

The cumulative growth of number of dissertations in Indian universities are shown in Chart No. 4.6.

4.41 University and Yearwise Distribution of Doctoral Dissertations Submitted in Indian Universities

To see the growth pattern of doctoral dissertations in terms of the contributions made by individual universities, the data have been further analysed and grouped at an interval of ten years beginning from 1920. The data revealing the university wise distribution of doctoral dissertations accepted by various universities has, for convenience, been arranged in an alphabetical order and shown in Table 4.11, and shown in Chart 4.7.

Table 4.11 - University and Yearwise Distribution of Doctoral Dissertations submitted in Indian Universities

University/Insti- tute	Upto	1921	1931	1941	1951	1961	1971	1981	Total
	1920	-30	-40	-50	-60	-70	-80	-85	
A	1	2	3	4	5	6	7	8	9
Agra						19	40	23	83
Aligarh						11	8	13	32
Allahabad			1	6	4	15	5		31

Table 4.11 continued..

Table 4.11 continued

A	1	2	3	4	5	6	7	8	9
Andhra							3	10	13
Awadh							1	6	7
Banares					5	13	18	9	45
Bangalore							19	12	31
Baroda					2	10	17	7	36
Bhagalpur						2	10	3	15
Bihar					1	2	9	2	14
Bombay							8	6	19
Calcutta		1	2		9	31	17	18	78
Delhi						6	25	17	48
Gauhati						1	3	2	6
Gorakhpur						2	4	12	18
Gujarat					2	5	11	21	39
Guru Nanak							7	4	11
I.I.T. Delhi							2	9	11
I.I.T. Kanpur							3	2	5
Jabalpur						2	2	3	7
Jodhpur							5	11	16
Kanpur							15	13	28
Karnataka							2	3	5
Kashi Vidyapeeth						1	5	5	11
Kurukshetra							1	9	10
Kumaun							1	10	11
Kerala						7	13	2	22
Lucknow				1	5	7	4	1	18
Madras					2	7	9	16	34
Magadh						1	10	6	17
Marathwada							1	5	6

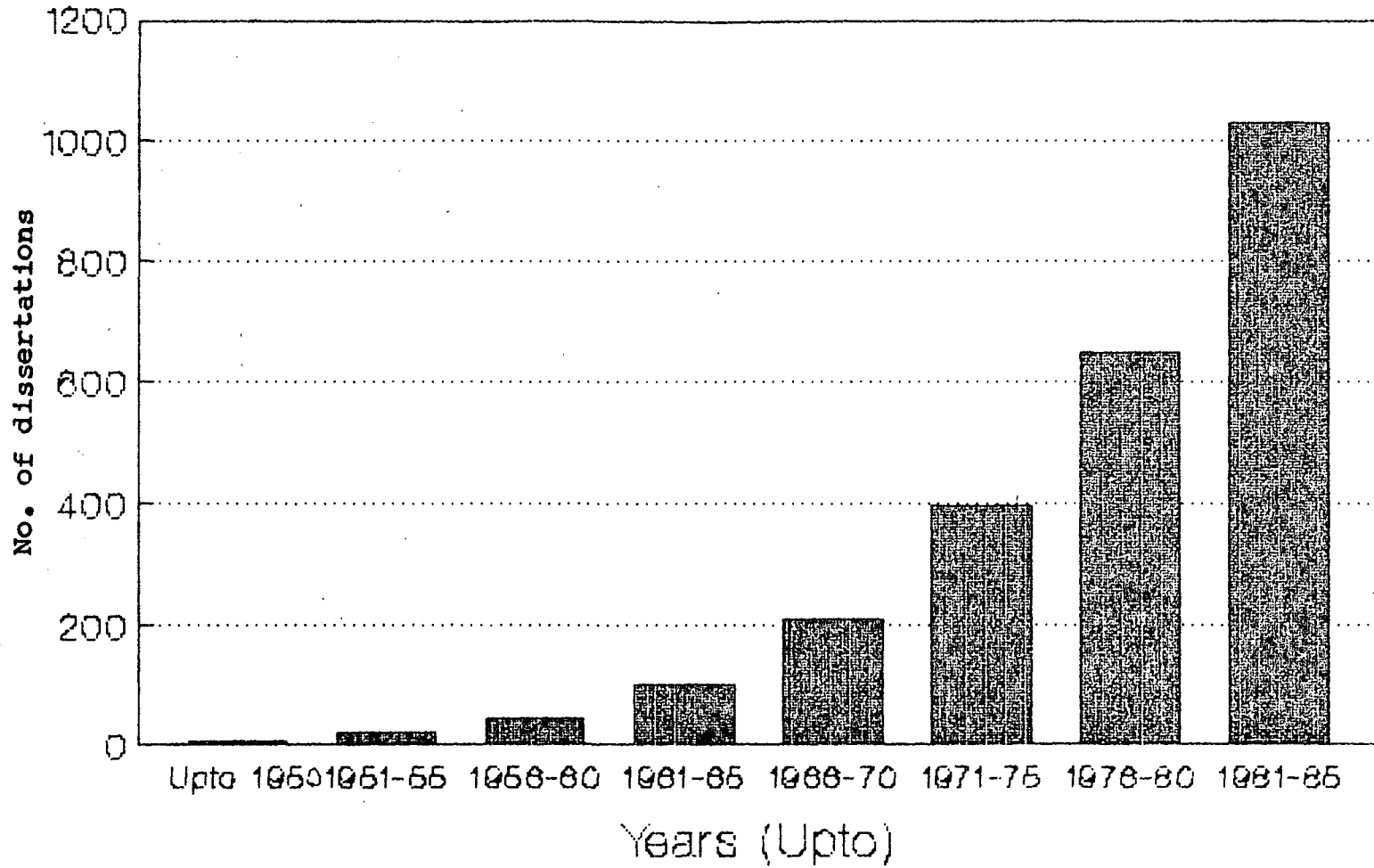
Table continued...

Table 4.11 continued

	1	1	2	3	4	5	6	7	8	9
Meerut								5	14	19
Mysore					1	1	5	6	3	16
Nagpur								8	6	14
Osmania							2	6	6	14
Punjab							4	16	21	41
Patna						1	2	30		33
Poona						1	2	9	1	13
Rajasthan							1	7	12	20
Ranchi							4	8		12
Ravishankar							1	8	5	15
Rohilkhand									7	7
Saugar						1	5	11	5	22
Udaipur								5		5
Utkal								4	9	13
Venketeswara							2	12	6	20
Others							2	15	24	41
Total			1	2	3	36	169	437	383	1031

The analysis of the table reveals that the pioneer university to start research work is the Calcutta University, where first dissertation was submitted during 1921-30. The same University followed the trend during the next decade, i.e. 1931-40 also. During 1940-50 too, the progress was not satisfactory and only three dissertations were submitted in different universities and the Calcutta University was not amongst them. The actual progress in research work started during the fifties

Chart 4.6 : Growth in the Number of Doctoral Dissertations



when 36 dissertations were submitted in 12 different universities: Calcutta (9), Allahabad (6), Banares (5), and Lucknow (5) were the main centres during the decade 1961-70, the work was extensively conducted in about 30 universities and as many as 169 dissertations were submitted during the decade: Calcutta (31), Agra (19), Banares (13), Aligarh (11) were some of the leading universities. Maximum growth was recorded during 1971-80 when 437 theses were submitted to nearly 50 universities. In addition to the universities mentioned in the preceding decade, some new universities like Allahabad, Bangalore, Baroda, Delhi, Gujrat, Kanpur, Kerala, Magadh, Madras, Punjab, Patna, Poona, Saugar and Venketeswara got involved in active research work. The data for the present decade has been presented for five years only, that is - 1981-85. The data, however, show some indication about the growth patterns. Altogether 383 dissertations have been submitted during this period. Most of the universities active in the preceding decade were equally active during the present decade except Patna, where no dissertation was submitted. Further, Andhra, Jodhpur, Meerut, Rajasthan and Utkal were also quite active. A total of 383 dissertations are available during the period. However, the scenario may change when the data for the whole decade will be available.

It may, therefore, be concluded that the growth in research work has been remarkable from 1961 - onwards and some

No. of dissertation accepted

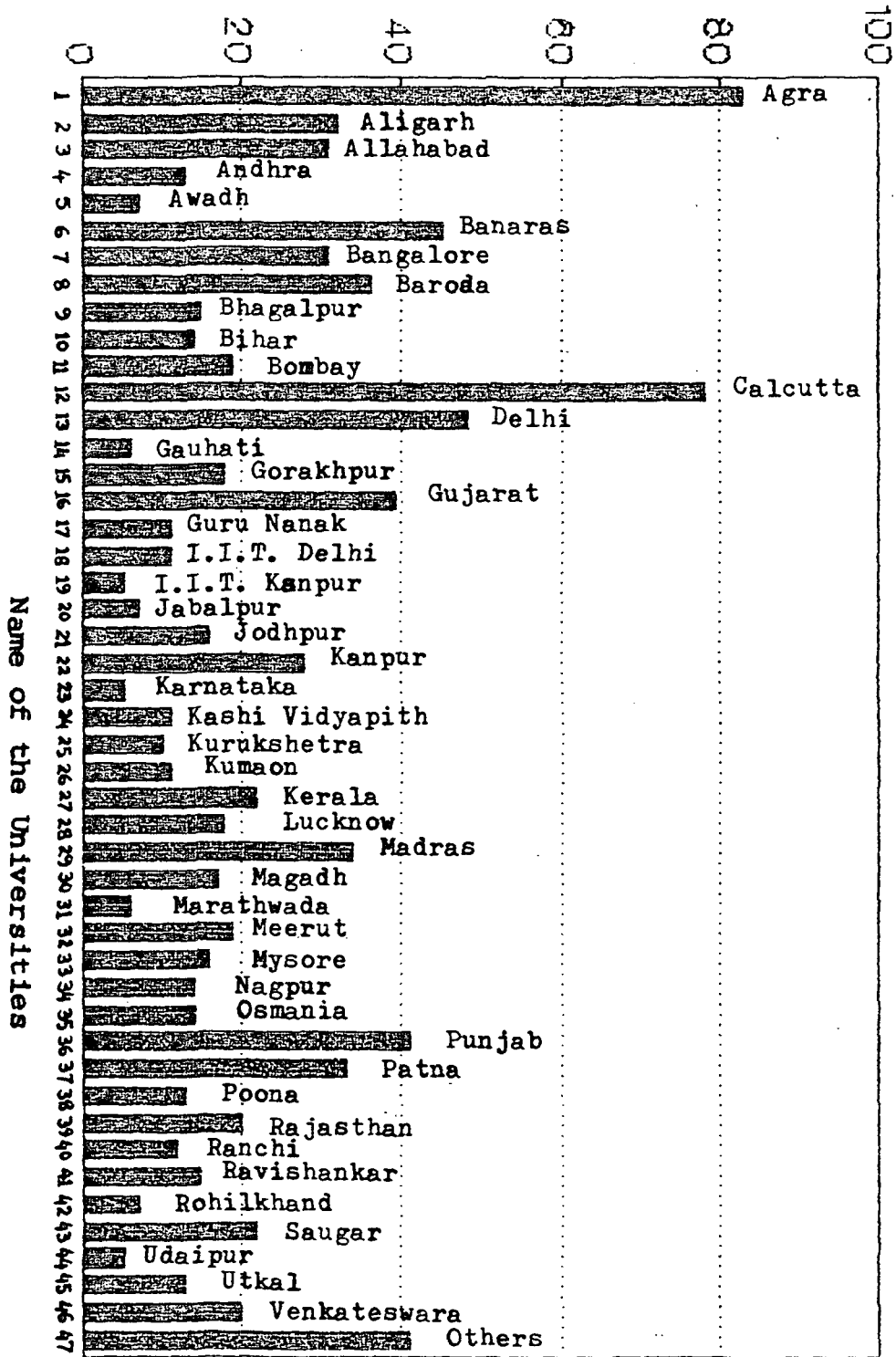


Chart 4.7 : Growth in the Number of Dissertations Accepted by Different Universities

universities like Agra (83), Calcutta (78), Delhi (48), Banares (45), Aligarh (32), Allahabad (31), Bangalore (31), Baroda (36), Gujrat (39), Kanpur (28), Madras (34), Kerala (22), Patna (83), Rajasthan (20), Saugar (22), and Venketeswara (20) may be categorised as the major research centres, of these Agra has the credit of awarding 83 doctorates.

4.5 GROWTH OF MANPOWER IN PSYCHOLOGY IN INDIAN UNIVERSITIES

The growth pattern of a subject can be also ascertained with the help of the growth in manpower as well. To study the growth in manpower in the two decades, 1969 and 1989, data have been taken from the Universities Handbook⁽⁶⁾ for the years 1969 and 1989. The growth of manpower in the field of psychology is provided in Table 4.12.

Table 4.12 - Growth of Manpower in Psychology in Indian Universities

Name of the University	1969	1989
1	2	3
Aligarh Muslim University	11 (6.7)	17 (4.0)
Allahabad University	2 (1.2)	15 (3.6)
Andhra University	0 (0)	12 (2.8)

Table 4.12 continued..

Table 4.12 continued

1	2	3
Annamali University	5 (3.0)	7 (1.7)
Awadhesh Pratap Singh University	- (-)	3 (0.7)
Banaras Hindu University	9 (5.5)	22 (5.2)
Bangalore University	- (-)	5 (1.2)
Baroda University	8 (4.9)	10 (2.4)
Bhagalpur University	4 (2.4)	8 (1.9)
Bharathiar University	- (-)	3 (0.7)
Bhopal Vishwavidyalaya	- (-)	3 (0.7)
Bihar University	11 (6.7)	9 (2.1)
Bombay University	2 (1.2)	3 (0.7)
Calcutta University	9 (5.5)	26 (6.2)
Calicut University	- (-)	7 (1.7)
Dayal Bagh Educational Institute	- (-)	5 (1.2)
Delhi University	6 (3.7)	13 (3.1)
Dr. Hari Singh Gour Vishwa Vidyalaya	- (-)	7 (1.7)
Garhwal University	- (-)	1 (0.2)
Gauhati University	- (-)	4 (0.9)

Table continued

Table 4.12 continued

1	2	3
Gujrat University	4 (2.4)	4 (0.9)
Gorakhpur University	7 (4.3)	12 (2.8)
Gurukul Kangri Vishwa Vidyalaya	3 (1.8)	5 (1.2)
Guru Nanak Dev University	- (-)	6 (1.4)
Himachal Pradesh University	- (-)	6 (1.4)
Jodhpur University	9 (5.5)	12 (2.8)
Karnataka University	- (-)	6 (1.4)
Kasi Vidyapith University	3 (1.8)	6 (1.4)
Kerala University	5 (3.0)	11 (2.6)
Kurukshetra University	- (-)	5 (1.2)
Lalit Narayan Mithila University	- (-)	5 (1.2)
Lucknow University	10 (6.1)	8 (1.9)
Madras University	4 (2.4)	7 (1.7)
Magadh University	- (-)	8 (1.9)
Maharshi Dayanand University	- (-)	8 (1.9)
Meerut University	- (-)	4 (0.9)
Mohanlal Sukhadia University	- (-)	6 (1.4)
Mysore University	5 (3.0)	5 (1.2)

Table continued...

Table 4.12 continued

1	2	3
North-Eastern Hill University	- (-)	3 (0.5)
Osmania University	6 (3.7)	8 (1.9)
Patna University	2 (1.2)	7 (1.7)
Poona University	- (-)	7 (1.7)
Punjab University	4 (2.4)	9 (2.1)
Rajasthan University	- (-)	11 (2.6)
Rajendra Agricultural University	- (-)	4 (0.9)
Ranchi University	7 (4.3)	12 (2.8)
Ravi Shankar University	3 (1.8)	6 (1.4)
Sardar Patel University	4 (2.4)	4 (0.9)
Smt. Nathibai University Damodar Thackersey Women's University	5 (3.0)	5 (1.2)
Saugar University	4 (2.4)	- (-)
Sri, Venkateswera University	6 (3.7)	11 (2.6)
Utkal University	5 (3.0)	18 (4.3)
Tata Institute of Social Science	1 (0.6)	5 (1.2)
University of Agricultural Sciences, Bangalore	- (-)	7 (1.7)
University of Agricultural Sciences	- (-) (100)	2 (0.5) (100)

Note : Data in parenthesis indicates percentage

(-) shows no growth in manpower

An analysis of the table shows an exorbitant increase in manpower in Psychology between 1969 and 1989. The table also reveals that this phenomenal increase is due to the fact that a good number of universities started department of psychology during 1969-1989. Total number of universities imparting teaching in 1969 were only 30 in numbers. Within the period of two decades it has gone up from 33 to 54 which is about 63.6 percent increase.

Initially the growth of manpower in India was slow. In 1969, the total number was 164 only whereas in 1989, it increased upto 422.

In order to know the decreasing and increasing trend of the manpower, the analysis of the table depicts that Aligarh Muslim University, Allahabad University, Andhra University, Banaras Hindu University, Bhagalpur University, Calcutta University, Delhi University, Kerala University, Punjab University, Patna University, Ranchi University, Tata Institute of Social Sciences, Utkal University and Sri. Venkateswara University have shown rapid growth in manpower between the two decades. Some of the universities, however, show a decreasing trend. They are: Bihar University, Lucknow University, Kasi Vidyapith, Ravi Shankar University and Saugar University. On the other hand universities like: Anamali, Baroda, Bombay, Gurukul Kangri, Jodhpur, Osmania and S.N.D.T. Women's University are showing

slow but steady increase between the two decades. Total number of manpower has been constant in Gujrat University, Mysore University and Sardar Patel University.

Utkal University has the maximum number of manpower, that is, 18 followed by Aligarh Muslim University 17, Allahabad 15, Andhra, Gujrat and Ranchi 12 each.

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CHAPTER V

STRUCTURAL PATTERN OF COMPOUND AND COMPLEX SUBJECTS IN PSYCHOLOGY

STRUCTURAL PATTERN OF
COMPOUND AND COMPLEX SUBJECTS IN PSYCHOLOGY

5.0 INTRODUCTION

When a subject grows and develops, it gives rise, during the course of its developments, to various structures. This structural change is mainly due to the interaction with other subjects. As has been seen in the earlier discussions, Psychology being a developing subject draws from and is affected by the developments in a large number of other fields ranging from Natural Sciences at one end, through Philosophy among the Humanities; to Education; Economics; Sociology; and Law among Social Sciences, at the other. The change in structure is also brought about by new relationships among its own components; concepts; and ideas. The structure thus, refers to the complex system of relationships. Encyclopedia of Psychology (1970) defines structure as "The relationship between components that make of some complex stimulus. These relationships are independent of the nature of the component parts".⁽¹⁾

M.A. Gopinath (1969) has identified the following attributes relating to the structure of the subject. They are:

(1) Kinds of phases and their pattern of combinations in the formation of complex subjects; (2) Kinds of facets and their pattern of combinations in the formation of compound subjects;

and (3) Kind of isolate ideas and the order of arrays forming the focus in each facet of a subject" (2).

In view of the above background, structural pattern of compound and complex subjects have been analysed in the following Sections.

Section I

5.1 FACET ANALYSIS OF COMPOUND SUBJECTS IN PSYCHOLOGY

To assess the structural pattern of compound subjects, a study applying quantitative techniques has been made in the field of psychology. Quantitative data on the facet analysis of compound subjects are presented in Table 5.2.

5.11 Methodology

The data have been drawn from British National Bibliography Annual Volume for the year 1965 and 1985. All the entries from both the years were listed on separate slips. The total number of entries so collected were 698. Out of these 698 documents, 213 were published in 1965 and 485 documents in 1985. They are as shown below:

<u>1965</u>	<u>1985</u>	<u>Total</u>
213	485	698

The subject of each entry was identified by the title of the documents and with the help of subject heading related with each entry. The postunational approach to classification as proposed by Dr. S.R. Ranganathan was applied for facet analysis to the identified-subjects. The procedure is explained in the following entry.

Main Entry

Child development and personality.-
6th ed./Paul Henry Mussen..[et al].-
New York; London: Harper & Row, c1984.-
xv,590p: ill; 25 cm.
Previous ed:/Paul Henry Mussen, Jonh
Janeway Conger, Jerome Kagan -
Includes bibliographies and index

Raw Title : Child.Development.Personality

Expressive Title : Children.Personality.Development

Analysed Subject : Children (P) Personality (M)
Development (E)

Subject was thus analysed into its component ideas, the degree of their mutual filiation was decided and then the components were arranged according to the sequence among facets to represent the subject co-extensively. With the help of this facet analysis, the isolate ideas which form the component of subjects are selected and grouped into different facets, that is - Personality; Matter; Energy; Space; and Time. The ideas falling in each of the categories are, then arranged in a sequence.

5.12 Grouping of Data

The analysed subjects were consolidated into following order:

- (i) Branch-wise distribution of documents in Psychology;
- (ii) Distribution of documents according to number of facets; and
- (iii) Distribution of documents by fundamental categories of facets.

5.13 Branch-wise Distribution of Documents

To have an idea about the scatter of subjects in various branches in the field of psychology, the data were grouped according to the first order of subdivision of psychology provided in Dewey Decimal Classification 20th edition. Table 5.1 reveals structural change of psychology according to its major branches

Table 5.1 - Document Scatter According to Branches of Psychology

Class No	Branches	Number of Documents			
		1965	%	1985	%
1	2	3	4	5	6
150	Psychology	62	29.1	98	20.2
152	Sensory perception ... drives	18	8.5	32	6.7

Table 5.1 continued...

Table 5.1 continued

1	2	3	4	5	6
153	Conscious mental processes and intelligence	22	10.3	78	16.0
154	Subconscious and altered states and processes	8	3.7	15	3.1
155	Differential and developmental psychology	75	35.2	193	39.8
156	Comparative psychology	-	(-)	3	0.6
157	Abnormal and Clinical Psychology	28	13.2	5	1.0
158	Applied Psychology	-	(-)	61	12.6
		213	100	485	100

An analysis of Table 5.1 reveals that in both the years the trend in scatter of documents follows the similar pattern. Differential and developmental psychology which includes documents on Individual Psychology, Sex Psychology, Child Psychology, Psychology of Young and Adults, Evolutional Psychology, Ethno and National Psychology and Environmental Psychology has occupied the highest position in 1965 as well as 1985. In 1965 it is 35.2%, and in 1985 it is 39.8%. Documents on general nature show second highest position in both the years, i.e. 29.0% and 20.2% respectively. Third in order comes abnormal and clinical psychology in case of 1965 (13.2%) and conscious mental processes in 1985 (16.0%) which include documents on memory and learning, concept formation, imagination, cognition, communication, perceptual processes, volition and intelligence.

An overall analysis reveals that incidence of documents has increased in 1985 as compared to 1965 except in case of normal and clinical psychology where a declining tendency has been observed. It is quite possible that documents on these branches may have been merged with applied psychology during 1985.

5.14 Distribution of Documents According to Number of Facets

The study of facet analysis of compound subjects in the field of psychology reveals that there are documents of various depths, that is, single faceted to five faceted subjects. To have a closer analysis of quantum of incidences of subjects showing different facets dimension, data have been grouped on the basis of the number of facets in different compound subjects in psychology. The data have been presented in Table 5.2.

Table 5.2 - Distribution of Documents According to Number of Facets

Facets	Number of Documents			
	1965	Percentage	1985	Percentage
1	2	3	4	5
One	23	10.8	60	12.4
Two	125	58.7	290	59.8
Three	51	24.0	109	22.5

Table 5.2 continued..

	1	2	3	4	5
Four		6	2.8	21	4.3
Five		5	2.3	3	0.6
Six		3	1.4	2	0.4
		213	100.0	485	100.0

Note : Total number of documents analysed were 698
Anteriorising isolates were also taken as facet.

The percentage scatter of documents between one to three facets is fairly significant in both the years 1965 and 1985. However, percentage of documents in case of four to five faceted subjects shows declining tendency in both the years. This decline is more in 1985 than in 1965. The largest incidence of documents is in the case of two faceted subjects in both the years 1965 and 1985. During 1985, the total percentage of such documents comes to 59.8 percent, whereas in 1965 it is 58.7 percent. The range of subjects lying between one to three faceted dimension has the highest cluster of documents. This shows that in the field of psychology the optimum depth of compound subjects as per facet dimension lies between one to two faceted subjects.

5.15 Distribution of Documents by Fundamental Categories

According to postulational approach of Dr. S.R. Ranganathan, each and every isolate idea may be considered as the

manifestation of one of five and only five fundamental categories i.e. Personality, Matter, Energy, Space and Time. It is obvious from the previous Table that in the field of psychology, a variety of facets are incident in the compound subjects. To assess the frequency of these facets in compound subjects, an effort was made to analyse them in context of Five Fundamental Categories. The quantitative scatter of their incidence between the period of two decade i.e. 1965 and 1985 is presented in Table 5.3.

Table 5.3 - Document scatter by Fundamental Categories

Fundamental Categories	Number of Scatter			
	1965		1985	
	Number	Percentage	Number	Percentage
Personality	212	45.4	430	54.6
Matter	130	27.8	240	30.5
Energy	124	26.6	104	13.2
Space	-	(-)	11	1.4
Time	1	0.2	2	0.3
Total	467	100.0	787	100.0

Manifestation of fundamental categories may occur in a compound subject more than once. Due to this reason Table 5.3 shows the larger number of incidences than the total number of documents studied, i.e. 213 in 1965 and 485 in 1985.

It is obvious from the above table that manifestation of personality facet is the highest incidence among the compound subjects in the field of psychology. It is 45.4 percent approximately of the total incidence, i.e. 467 in the year 1965. In 1985, the total number of incidence just doubled and in terms of percentage it reached upto 54.6%, out of the total number of incidences i.e. 787. The Matter facet comes next in order. However, percentage of incidence is higher in 1985 than that of 1965 i.e. 27.9 percent and 30.5 percent respectively. The occurrence of Energy facet is also fairly high. But this incidence is more in 1965 (26.61%) than in 1985 (13.2%). The incidence of Space and Time facet appears to be insignificant in both the years. However, incidence of Space facet in 1985 seems to be higher than 1965.

Conclusion

An overall analysis of the quantitative data on facet analysis obtained for the year 1965 and 1985 reveals that there is greater concentration of studies on Personality ideas in both the years. This reflects upon the growing specialisations in the field of psychology.

Section II

5.2 STUDY OF COMPLEX SUBJECT IN PSYCHOLOGY

5.21 Introduction

Complex subjects have been recognized as one of the important characteristics in the structure and development of universe of subjects. They arise out of the mode of formation of loose assemblage. The resulting relations is called Phase Relation. A subject may be studied in relation to the other subjects also. The provision of books, such as, Mathematics used in Psychology, Psychology for Sociologists, and so on, are the subjects which represent the 'phase relation'. In this case two different subjects are studied in mutual relation to each other. There are variety of such relations: General, Bias, Comparison, Difference, Application, Influence and Tool. In this section an analysis of quantitative data on the incidence of phase relations associated with the subject psychology is presented.

5.22 Methodology

The annual volume of British National Bibliography for the years 1965 and 1985 were scanned. The entries showing phase relations with psychology were recorded on seperate slips.

5.23 Subjects Involved in the Phase Relations

The entries so collected reveal a fairly wide range of subjects showing phase relation with psychology. Quantitative

data on incidence of various subjects having phase relations with psychology are presented in Table 5.4.

Table 5.4 - Subjects having Phase Relation with Psychology

Subject	1965	%	1985	%	Total	%
Biology	14	18.4	14	10.8	28	13.6
Communication	1	1.3	2	1.5	3	1.5
Creative arts	1	1.3	2	1.5	3	1.5
Computer Science	1	1.3	6	4.6	7	3.4
Economics	2	2.6	4	3.1	6	3.0
Education	6	7.9	10	7.7	16	7.8
Environment	1	1.3	4	3.1	5	2.4
History	1	1.3	1	0.8	2	1.0
Language	2	2.6	8	6.2	10	4.9
Literature	1	1.3	1	0.8	2	1.0
Logic	2	2.6	4	3.1	6	3.0
Management	6	7.9	7	5.4	13	6.3
Mathematics	3	3.9	5	3.8	8	3.9
Medicine	5	6.5	21	16.3	26	12.7
Philosophy	10	13.2	13	10.1	23	11.2
Research Method	2	2.6	6	4.6	8	3.9
Religion	6	7.9	1	0.8	7	3.4
Sociology	8	10.5	12	9.3	20	9.8
Sports	1	1.3	3	2.3	4	1.9
Statistics	3	3.9	5	3.9	8	3.9
Total	76	100.0	129	100.0	205	100.0

It is evident from the Table 5.4 that out of the total incidences of phase relation (205) for both the years (1965 & 1985), Biology has the highest incidents of relation with psychology. Total number of such incidences are 28 (13.6%); followed

by Philosophy 23 (11.2%); Sociology 20 (9.8%); Education 16 (7.8%); and Management 13 (6.3%) in descending order. Subjects like Communication, Creative Arts does not show significant phase relations. The incidences of phase relation in case of History and Literature has been two each only. The table reveals that between the period of 20 years, incidences of phase relation have nearly doubled in most of the cases. It may be inferred that psychology has wider range of interrelations with other disciplines. In all 20 basic subjects have been associated with psychology in the formation of complex subjects.

Similar study was conducted by Gopinath et.al. (1983)⁽³⁾ which revealed that basic subjects such as Philosophy, Psychology Religion, Sociology, Environmental Sciences, Anthropology, Statistics, Economics, Education, Language, Science (General), Mathematics, Physics, Biosciences, Medicine, Computer Sciences, and Management Sciences have been associated with Psychology in the formation of complex subjects.

5.24 Data Analysis by Types of Phase Relations

The types of relation identified in the subjects selected for the study are General, Bias, relation, Difference, Influence and Applications. Incidence of comparison phase relations was found only in biology. Dominant phase relations were General Bias and Influence. The detailed analysis of each type of relations has been presented in Table 5.5.

Table 5.5 - Types of Phase Relation in Psychology

Subjects	General		Bias		Influence		Application		Total
	1965	1985	1965	1985	1965	1985	1965	1985	
Biology	2	2	2	2	5	2	5	8	28
Communication	-	-	1	2	-	-	-	-	3
Creative Arts	1	2	-	-	-	-	-	-	3
Computer Sc.	-	-	-	-	-	-	1	6	7
Economics	-	-	2	1	-	-	-	-	3
Education	4	6	2	4	-	1	-	2	19
Environment	1	1	-	-	-	3	-	-	5
History	1	1	-	-	-	-	-	-	2
Language	2	6	-	-	-	2	-	-	10
Literature	1	1	-	-	-	-	-	-	2
Logic	1	1	-	-	1	3	-	-	6
Management	5	1	1	3	-	3	-	-	13
Mathematics	-	-	3	5	-	-	-	-	8
Medicine	4	8	-	5	1	8	-	-	26
Philosophy	7	9	2	3	1	1	-	-	23
Research Method	-	-	-	-	-	-	2	6	8
Religion	2	-	-	-	4	1	-	-	7
Sociology	2	6	4	1	2	5	-	-	20
Sports	-	-	-	-	1	3	-	-	4
Statistics	-	-	-	-	-	-	3	5	8
Total	33	44	17	26	15	32	11	27	205

5.241 General Phase Relation

'General Phase Relation' denotes a more or less all comprehensive relation between the phases - that is, not merely

any one of the other relations⁽⁴⁾ such as, Bias, Comparison, Influence, and Application. Table 5.6 shows the quantitative data of incidence of subjects having General Phase Relations with Psychology.

Table 5.6 - Complex Subjects having General Phase Relation with Psychology

Subjects	1965	Percentage	1985	Percentage
Biology	2	6.0	2	4.5
Creative Arts	1	3.0	2	4.5
Education	4	12.2	6	13.7
Environment	1	3.1	1	2.3
History	1	3.1	1	2.3
Language	2	6.1	6	13.7
Literature	1	3.1	1	2.3
Logic	1	3.1	1	2.3
Management	5	15.2	1	2.3
Medicine	4	12.2	8	18.2
Philosophy	7	21.2	9	20.5
Religion	2	6.0	-	-
Sociology	2	6.0	6	13.7
Total	33	100.0	44	100.0

Table 5.6 shows that the general phase relation is having the maximum number of incidences that is 76 out of 205 complex subjects analysed. During 1985 philosophy is showing the highest incidence (20.5%), followed by Medicine (18.2%). Education, Language and Sociology may be ranked next in the

hierarchy, each having 6 (13.6%). While analysing the incidence of 1965 it is noted that philosophy and management are having fairly high incidences i.e. 7 (21.2%), and 5 (15.2%) respectively. Medicine and education occupies the third position, each having 4 incidences i.e. 12.1 percent. Furthermore, the incidences in 1985 have increased more than double in comparison to 1965.

5.242 Bias Phase Relation

Bias phase relation seems to be one of the commonest incidences of phase relation, the first phase is biased towards second phase, indicating that 'the exposition is specially attained either by the selection or the arrangement of topics, or the emphasis or the standard or the examples, or other means to the needs of a specialist in phase 2"⁽⁵⁾. The data on the bias phase relation have been presented in Table 5.7.

Table 5.7 - Complex Subjects having Bias Phase Relation
with Psychology

Subjects	1965	Percentage	1985	Percentage
Biology	2	11.8	2	7.7
Communication	1	5.9	2	7.7
Economics	2	11.8	1	3.9
Education	2	11.8	4	15.3
Management	1	5.9	3	11.5
Mathematics	3	17.6	5	19.2
Medicine	-	-	5	19.2
Philosophy	2	11.8	3	11.5
Sociology	4	23.5	1	3.9
Total	17	100.0	26	100.0

Table 5.7 reveals that in 1965 the maximum number of bias phase relations has been noted with Sociology (23.5%) followed by Mathematics (17.6%). During 1985 the maximum bias relation has been shown by subjects, namely, Mathematics and Medicine (19.2%) followed by Education (15.4%). Other subjects have less incidence of bias phase relation.

5.243 Influence Phase Relation

The term 'Influence Phase Relation' implies the influence of one subject on another subject. For example, influence of environment on Psychology of Children.⁽⁶⁾ Table 5.8 shows the details about the incidences of influence phase relation of complex subjects related with Psychology.

Table 5.8 - Complex Subjects having Influence Phase Relation

Subjects	1965	Percentage	1985	Percentage
Biology	5	33.4	2	6.3
Education	-	-	1	3.1
Environment	-	-	3	9.4
Language	-	-	2	6.3
Logic	1	6.7	3	9.8
Management	-	-	3	9.8
Medicine	1	6.7	8	25.0
Philosophy	1	6.7	1	3.1
Religion	4	26.7	1	3.1
Sociology	2	13.3	5	15.6
Statistics	1	6.7	3	9.8
Total	15	100.0	32	100.0

The data indicate that influence phase relation has got significant incidence among the complex subjects. The data of 1985 reveal that Medicine and Sociology are showing fairly large number of incidences (25%) and (15.6%) respectively. During 1965, Biology, Religion and Sociology are showing influence phase relation. Between the period of two decades the number of incidences have almost doubled.

5.244 Application Phase Relation

Psychology shows incidences of application phase relation also. Table 5.9 shows the quantitative data on the subject having application phase relation with Psychology.

Table 5.9 - Complex Subjects having Application Phase Relation with Psychology

Subjects	1965	Percentage	1985	Percentage
Biology	-	45.5	8	29.6
Computer Science	1	9.0	6	22.2
Education	-	-	2	7.4
Research Method	2	18.2	6	22.2
Statistics	3	27.3	5	18.6
Total	11	100.0	27	100.0

Table 5.9 reveals fairly good percentage of incidences of Application Phase Relation during the year 1985. Total number of such incidences are 27. Biology is showing highest

percentage of incidence that is (29.6%) followed by Computer Science and Research Methods (22.2%) each. During 1965 total number of incidents of phase relation is six only. Subjects showing this type of phase relation are Biology, Computer Science, Education, Research Method and Statistics. Here also, Biology is showing the highest incidence of Application Phase Relation (45.5%) followed by Statistics (27.3%).

5.245 Types of Phase Relation with Psychology

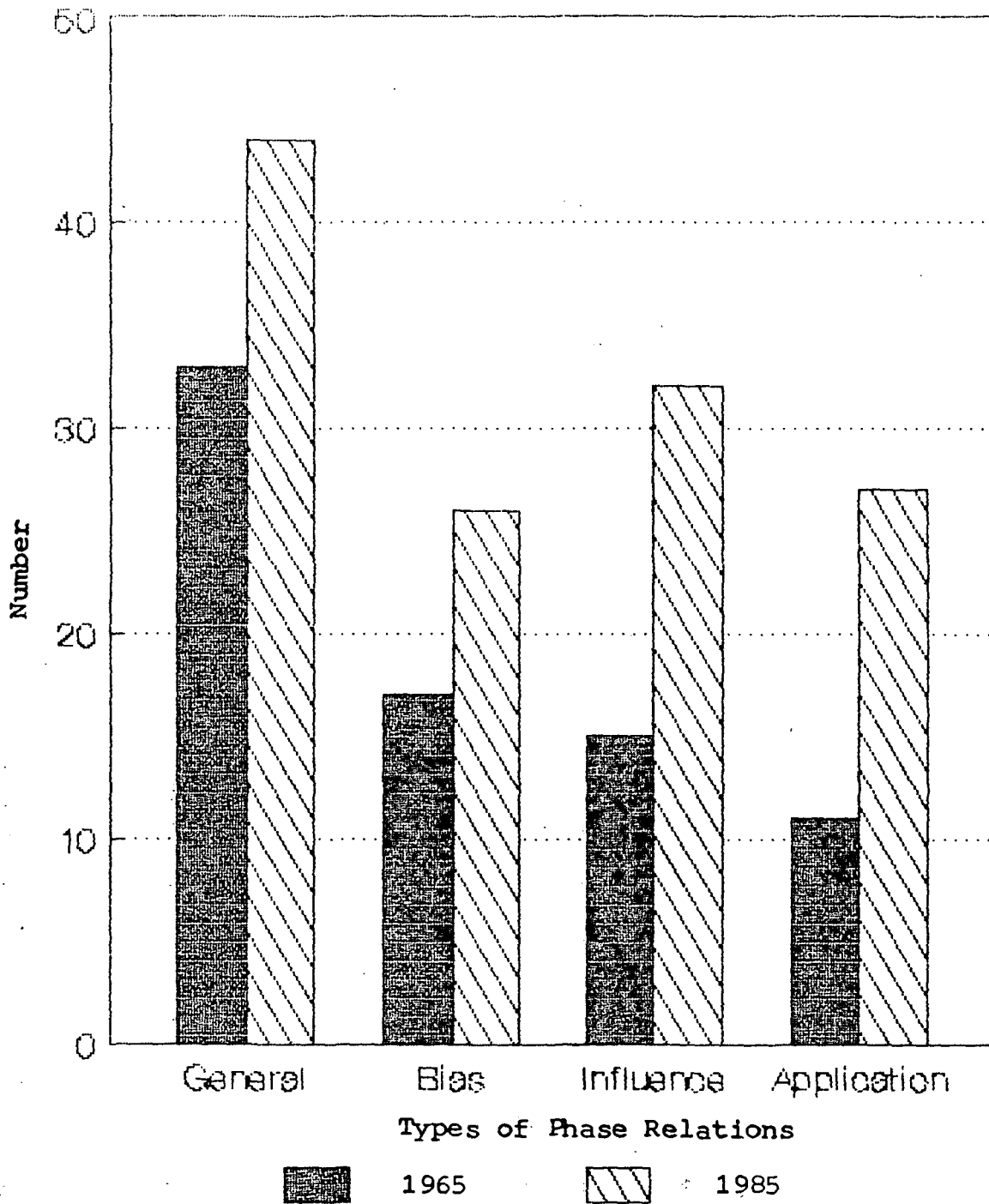
The following table presents types of phase relations with Psychology.

Table 5.10 - Types of Phase Relation with Psychology

Phase Relation	1965	1985	Total	Percentage
General Phase Relation	33	44	77	37.5
Bias Phase Relation	17	26	43	21.0
Influence Phase Relation	15	32	47	23.0
Application Phase Relation	11	27	38	18.5
Total	76	129	205	100.0

Table 5.10 reveals that total number of documents having different phase relations comes to 205 for the year 1965 and 1985. It is obvious from the above table that General Phase Relation is having the dominant position followed by Bias and Influence Phase Relation. Graphic representations of various phase relations with Psychology is shown in Chart 1 .

Chart 5.1 : Psychology and its Phase Relations with
other Subjects



5.246 Overall Analysis

An overall analysis of the study of the structural pattern of compound subjects in Psychology according to its major branches indicates that differential and developmental psychology occupied the highest position in 1965 as well as 1985. Documents of general nature show second highest position. It is noted that number of documents have increased in 1985 except in case of clinical psychology which has shown decline tendency. The study of distribution of documents according to number of facets reveals that documents between one to three facets are fairly significant in both the years 1965 and 1985. Thus, range of subjects lying between one to three faceted dimensions has the highest cluster of documents. The quantitative scatter of the incidence of five fundamental categories between 1965 and 1985 reveals that manifestation of personality facet has the highest incidence among the compound subjects in the field of psychology. The occurrence of Energy Facet is fairly high in 1965. The incidence of Space and Time facet appears to be insignificant in both the years.

An overall analysis of all the complex subjects associated with psychology, ^{indicates that} biological sciences has a reasonably good incidence of phase relation followed by medicine and philosophy. It is also noted that these inter relations with various subjects have been on the increasing side during 1985 except in case of religion which showed a declining tendency. Phase relations, in

case of biology, history and literature, no growth was observed. Altogether 20 subjects have been associated with Psychology in the formation of complex subjects. Among the four kinds of phase relations general phase relations has the highest incidence followed by bias and influence phase relation.

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CHAPTER VI

DESIGN OF INFORMATION RETRIEVAL
IN PSYCHOLOGY

DESIGN OF INFORMATION RETRIEVAL IN PSYCHOLOGY

6.0 INTRODUCTION

Information retrieval is known as the process of locating and selecting a specific piece of information from storage, to meet a particular need or requirement of users at a given time. It was during 1940s when the concept of information storage and retrieval started taking shape. This development occurred due to an unprecedently large growth of information rendering it exceedingly difficult to gain accurate and speedy access to all the information available. Calvin Moores for the first time in 1950, introduced the term information retrieval, when a kind of explosion took place in the field of information. According to B.C. Vickery information retrieval is "essentially concerned with the structure and operation of devices to select documentary information in response to search question".⁽¹⁾

The basic objective of any retrieval system is to make available the information stored in the documents to provide current awareness service to draw the attention of users towards new developments which take place in their fields of interests. The system also provides retrospective search to a particular reader for the items of his interest.

Foskett (1963) subdivided information retrieval into four main areas. They are : (1) to identify the exact subject

of search; (2) to locate the subject in a guide which refer the searcher to one or more documents; (3) to locate the documents; and (4) to locate the required information in the document. (2)

Various systems which are used for information retrieval purpose may broadly be grouped into following four categories. They are:

- (1) Classification Systems
- (2) Indexing
- (3) Thesaurus
- (4) On-Line Retrieval Systems

6.1 CLASSIFICATION SYSTEMS

The process of bringing together the related aspects at one place is called classification. A library classification is a good tool for arranging the materials so that the reader finds exactly what he wants. Different systems of classification have been proposed from time to time. Some of the important ones are: Dewey Decimal Classification; Universal Decimal Classification; Cutter's Expansive Classification; Library of Congress System; Bliss Bibliographic Classification; and Colon Classification. An attempt has been made in this chapter to discuss Dewey Decimal Classification; Universal Decimal Classification and Colon Classification in detail as an important retrieval tools.

Previous discussions on the developmental history of psychology reveal that psychology, though, was once a part of philosophy, today the characteristics for use in the division of the subject as a whole or some of its components came from the subjects, that is Natural Sciences; Humanities; and the Social Sciences.

Though in 1880's, a number of periodicals were published on psychology, however the wide recognition of it as an independent field did not happen till a generation after. As such, various schemes of classification such as DDC; Cutter's Expansive Classification; LC etc. have placed psychology close to philosophy. Only in the Bibliographic Classification of H.E. Bliss are psychological sciences treated as a main class, close to biological, anthropological and social sciences.

6.11 Dewey Decimal Classification (DDC)

According to Ranganathan's species of classification schemes, DDC is grouped under 'almost enumerative classification'. In such schemes, mostly schedule of subjects enumerate basic subjects as well as compound subjects. Few compound subjects can be constructed with the help of auxiliary tables listed in volume one of DDC.

During the period of hundred thirteen years, the scheme has grown from an anonymous pamphlet of 44 pages to 3 volumes work due to the tremendous increase in the production of books and other communication media. It was first published in 1876 and presently in its 20th edition DDC associates psychology with philosophy by classifying this independent scientific discipline as a subdivision of philosophy.

The first publication of this schedule in 1876 marked significant new developments in the library organization. From the previous discussion of historical developments of the subject, it is obvious that in the same decade, similarly significant new developments in psychology contributed to its transformation into an independent discipline. At that time psychology was considered to be a minor branch of philosophy and not an independent area of study. In the DDC psychology was classified under "Philosophy" among such areas as occultism, witchcraft, magic and palmistry. Mind and body was given class number 130, followed by philosophic systems as 140, and then in turn by 150 for psychology.

The growing inadequacy of the Dewey Decimal Scheme for psychological collections was officially pointed out by H.C. Warren in 1930 during the Thirty-eight Annual Meeting of the American Psychological Association. Dr Warren stated that "when the psychological index was started in 1894, I examined the Dewey systems carefully with a view to adopting it. But

I found their arrangement even at that time absolutely unsuited to psychology".⁽³⁾ He said that DDC for psychology is based on Pre-Wundtian and Pre-Jamesian conceptions. He agreed that a few of the topics are treated scientifically, but most of the new sections are dealt in a fragmentary way and related topics are scattered around so there is no use for contemporary psychologists to use them. He pointed out that "it would probably have suited Thomas Aquinas and other medieval psychologists admirably".⁽⁴⁾

A special expanded classification for modern psychology appeared in the 13th edition of DDC and relative index in 1932.⁽⁵⁾ Although psychological topics still remained in the old division of 130 : Mind and Body, and 150 : Psychology, General Psychology.

In fifteen standard edition of 1951 the majority of psychological topics can again be found in subclasses of 130 and 150. Yet the scattering is substantial. Topics directly related to psychology are found in each of the major divisions, Some psychological fields are classified outside psychology with other subjects. For example, social psychology appears in the 300 class, while physiological and clinical psychology are included under the 600 class.

Since the 16th edition some of the schedules of DDC have been completely revised. One of the most relevant editions for psychology seems to be the seventeenth edition of 1965

with a completely remodeled schedule for the discipline. Some of these changes are stated by B.A. Caster, the editor.⁽⁶⁾ New schedule for the entire subject was provided. This edition brought more provisions for notes of explanation and instruction. The new schedule for the entire subject was provided by relocations means that some psychological topics were brought 'home' to the new classification in 150 : Psychology. This change included some fully justified relocations of topics from 130, as well as from 614 and 615. This new schedule for 150 : Psychology reuses sixty-five numbers and relocates twenty seven topics with new meanings assigned to many number.

Hinton, in her review of Dewey 17 considered this schedule as new and appropriate. Differential and Genetic Psychology was an improvement over the old class 136. Section 157 : Abnormal and Clinical Psychology which formerly at 132 was less successful. However, it still remained a subdivision of philosophy.

Eighteenth edition added more merit. The "divide like" provisions have been replaced by instruction "add ... to the base number"; for example, 016 : Bibliographies and Catalogues of specific disciplines and subjects have an instruction : "add 001-999 to the base number e.g. Bibliographies of Psychology 016.15". The 19th edition was published in 1979 and the 20th edition appeared in 1988. Scattering in seventeenth, eighteenth and currently used nineteenth and twentieth editions of DDC is lower than in previous edition. It is mainly due to

the provision of relocations. The 20th edition provides more summaries and class - elsewhere notes to explain the relationship between closely related subjects. 'see also' notes, informs the classifier about related subjects. Yet it is difficult to understand why the schedule of psychology does not include such a typically psychological field as social psychology which is under sociology : 301. It is also surprising that Mental Deficiency is under Medical Science (616.8588) and Performance Rating under Management (658.3125). However, it is true progress that physiological, clinical, and educational psychology are in 150 : Psychology section. The techniques such as the use of alternate analysis and the provision of "Phoenix Schedule" (where the whole division in the frame of one discipline in completely restructured) have been applied for the revision of the schedule of psychology. Seventeenth edition is an example of it.

6.12 Universal Decimal Classification (UDC)

In 1895, two Belgians, Paul Otlet and Henri Lafontain, both nonlibrarians, established the International Institute of Bibliography in Brussels. Their basic aim was to promote scientific cooperation and improvement of bibliographic methods. They planned a vast classified bibliography of the records of human thought. To arrange systematically the thought embodied in the documents, they adopted the enumerative schedule of DDC with some modification. This amounted to the grafting

of space and time facets to the DDC core. UDC felt the need for another kind of grating also.

UDC is originally based on the fifth edition of DDC. In 1961 UNESCO undertook two studies of the scheme which were highly critical. Major criticism was about its outline. The unscientific structure which UDC inherited from DDC is no doubt a handicap. ⁽⁷⁾

According to Ranganathan's categorization, UDC is grouped under 'almost faceted schemes of classification'. According to Ranganathan (1967) "An almost faceted scheme of classification consists of a large schedule enumerating most of the subjects of the past, the present, and the anticipatable future and in addition a few schedule of common isolates and also some schedules of special isolates".⁽⁸⁾ The structure of UDC consists of three main schedules e.g. (1) the general table of DC comprising mostly compound subjects with modification; (2) the common auxiliary table consisting of form, time, place, language, point of view, and race and nationality; and (3) table of special isolates which is an analytical subdivision for some of the subjects.

UDC is a pragmatic scheme of classification. It is based on the demands of pamphlet; reports; and periodical literature rather than on a framework of theory. UDC provides more emphasis on the details. Thus it is a practical system for numerical coding information. ⁽⁹⁾ The scheme has been

produced in various languages and in various versions. Different three versions are: Abridged; Medium; and Full edition. The period of 1900-1933 is known as French period; from 1934-1953 is German period; 1954-1973 as British period; and the period of 1974 onwards is known as the international period. A trilingual abridged version in English, French and German is also available. The British Standard Institution has undertaken the production of English edition of UDC. It is known as British Standard Specification 1000. 1351 1000 M: International Medium Edition - English Text appeared in 1985 and the index ie. Part II in 1988.

The system is a hybrid of two kinds of documentary classification schemes. There are two kinds of tables, e.g., Main and Auxiliary. The basic feature of UDC is synthesis of compound and complex subjects with the help of series of auxiliary tables. UDC expanded Dewey's standard subdivision to about a dozen of auxiliaries. The basic difference between DC and UDC lies on account of its synthetic power which is provided by the auxiliaries. These auxiliaries are "a set of common facets and facet indicators which help the user to synthesize freely where more restricted notation of DC does not".⁽¹⁰⁾ Besides the table of geographical and chronological subdivision it goes much further. They are recognized by the use of arbitrary signs, eg. '+' (plus); '/' (stroke); '□' (square); '00' (double zero); '0' (zero); and ':' (colon). To bring together the various aspects of subjects,

the most used symbol in UDC is the colon (:). It denotes the sign of relation. It can be used for joining any two or more numbers from the scheme. This sign is used for all kinds of relation including general, bias, comparison, cause and effect etc. For example : Psychology of labour (159.9:331.01); Psychology of sensory perception and lighting (159.9:628.979).

General psychology by UDC (BSI 1000M) is offered under 159.9 : Psychology. After examining the schedule it is noticed that fields that already have an enormous literature, such as clinical work, child guidance are not mentioned in the complete Tables or in Relative Index. Psychologies of religion, education, crime, language are among other relevant topics which are not mentioned. Physiologic Psychology : 159.91, which includes anatomy and physiology of the nervous systems and other parts of the organism are not mentioned. Thus modern works of physiological psychology have been ignored. Mental hygiene is included at 159.913 and is separated far away from topics most closely related, such as Abnormal Psychology : 159.97. This section of abnormal psychology is not satisfactory.

The basic problem with UDC has been the lack of rules within the scheme. To some extent, though, it has been solved with the aids of UDC guide provided by BSI. The user can use the scheme the way he wants. However, Foskett has very appropriately remarked that "no classification can work without rules; if they are not included in the scheme, they must

be added by the classifier, otherwise inconsistency will be the result". (11)

The notation of UDC is far from brief and simple. It is mainly due to the range and variety of the auxiliary devices for construction of class numbers. Thus the notation is too complicated.

6.13 Colon Classification (CC)

Due to the failure of enumerative scheme of classification a need for faceted classification was realised in 1933 when the first edition of Colon Classification appeared. The basic idea behind the development of CC was to bring a scheme which could meet the challenges of the dynamic and ever turbulent universe of knowledge to which DDC and to some extent UDC could not meet.

According to Gopinath, the Five Laws of Library Science direct that "library should serve a reader exactly, exhaustively and expeditiously with the least cost and least wastage of human resources. In order to do this, a classification should be able to represent co-extensively each and every subject. A coextensive representation of a subject requires, as a prerequisite, the:

- (1) Recognition of each of the component ideas in a subject; and
- (2) Determination of the degree of interrelation among the components" (12).

These requirement can be served and satisfied only by a faceted scheme. Ranganathan developed the theory of facet analysis and demonstrated that analysis and synthesis is applicable in every subject. CC is the only Analytico-Synthetic Scheme which is based on various postulates and principles. It does not provide a single schedule like DDC and other schemes. CC provides short unit schedules for each Basic Subject.

Another important feature of an analytico-synthetic scheme of classification is that classifier here finds the help of devices or rules for the formation of the composite subjects. In an enumerative scheme he has to wait for the decision of the compiler. CC satisfies most of the canons and principles of classification. The scheme is universally applicable to both macro thought and micro thought. The scheme is useful for book classification as well as documentation work.

The classifier selects the appropriate main class and analyses the compound subject into its facets. Then assembles the foci concerned from these facets employing PMEST as citations order.

CC is the only scheme which is entirely synthetic. The DDC and other schemes also provide some provision for number building. UDC does it with the help of colon.

However, among the general schemes of classification, CC is the only scheme which recognizes the need for breaking down of subjects into their constituent parts, the listing of these parts once and for all by the classificationist in its appropriate category, and provision of rules for combining together the various facets. The synthesis, thus, is gained through facet analysis, phase analysis, intra-facet relations and also through the use of a table of anteriorizing common isolates and of posteriorizing common isolates. (13)

Mill also states that "Synthesis is all pervasive in CC, every class is analysed into facets, not as in UDC and BC - some classes into some of their facets. In addition common facets are provided". (14) The notation in CC is extremely mixed - which is found suitable for infinite universe of knowledge. However, Ranganathan's lengthy and complex notation has been criticised by Foskett and others.

Colon classification has been revised ^{from} /time to time. The first edition appeared in 1937 and in 1950, the third edition of it appeared. Till this period CC was using only one facet indicator, e.g. ':' 'colon'. Colon classification from fourth edition (1952) to sixth edition (1963) is known as Almost Freely Faceted Classification Scheme.

Fourth edition introduced the concept of five fundamental categories, Rounds and Levels. Edition 4 to 6 brought many changes. Five kinds of indicator digits were used such

as single inverted comma; full stop; colon; semi-colon; and comma. Every basic class is given a facet formula in terms of [P] [M] and [E].

The seventh edition of colon classification appeared after twentyfour years i.e. in 1987, though expected in 1971 only. In the schedule, there are several new ideas. The arrangement has also changed. From 46 main classes of the sixth edition, it has increased upto 105, Eightytwo main classes and twentythree partially comprehensive classes.

Properties have been recognized as a manifestation of matter rather than energy. (M) is divided into two categories (M-M) Matter-Material and (M-P) Matter-Property. Systems and Specials are now regarded as a part of compound basic subjects.

CC which came into existence much later than DDC and UDC, i.e. in 1925, was able to recognize Psychology as an independent subject. CC made it a main class subject coordinate with Philosophy.

CC seventh edition shows the following structure of Psychology:

S Psychology

The scheme provides following schedules for personality and property isolates:

<u>Personality Facet</u>	<u>Property Facet</u>
1 Child	1 Nervous System
11 New Born	2 Percept
2 Adolescents	3 Characters of consciousness

<u>Personality Facet</u>	<u>Property Facet</u>
3. Adult	4 Cognition
4 Sick and infirm	5 Emotion
5 Sex	6 Conation
6 Abnormal	7 Personality
65 Criminal	8 Meta psychology
7 Family	G Psychogenetics
85 Left handed	

CC seventh edition also provides separate schedule for common energy isolate and common isolates. It also provides a separate schedule for social psychology under Sy closely associated with psychology.

6.14 Comparative Study of DDC, UDC and CC

A comparative study of all the three schemes is presented in Table 6.1.

Table 6.1 - Comparative Study of DC, UDC and CC

Subjects	DDC	UDC	CC
1	2	3	4
Psychology	150	159.9	S
Child development	305.231	159.922.7	S,1:g1
Child rearing	649.1	159.922.73	
Abnormal psychology	616.89	159.97	S,6
Social psychology	302	301.151	Sy

Table 6.1 contd..

Table 6.1 continued

1	2	3	4
Criminal psychology	364.3	343.95	S,65
Developmental psychology	155	159.92	S:g1
Personality development among children	155.25 or 155.4	159.923	S1;7:g1
Moral learning and development in children	155.4	159.922.7:170	S,1;7:g1

The above table clearly reveals that related subjects of psychology are scattered at various places in the schedule in DDC. UDC compared to DDC shows less scattering of subjects. CC has tried to bring all the aspects at one place. The table also reveals that handling of compound subjects is better in CC than that of DDC and UDC. Colon classification with its freely faceted structure and 'PMEST Formula' is able to provide coextensive class number. UDC compared to DDC is faceted classification and is comparatively in better position than DDC to provide coextensive class numbers with the help of auxiliaries. DDC mostly enumerates the compound subjects.

6.15 Provision of Complex Subjects

The table 6.2 is an illustration of the treatment of complex subjects in DDC; UDC; and CC, by taking a few examples.

Table 6.2 - Comparative Study of Complex Subjects in DDC;
UDC and CC

Subjects	DDC	UDC	CC
Psychology and religion	291.175	159.9+2	S&a&
Psychological theories and science fiction	150.1	159.9.01	S&ao,b23
Psychology for social workers	150.2436	159.9:36.08	S&byx
Perception and communi- cation	153.73	159.937: 659.3	S;2&a4
Application of psychology in political science training	320	32 :159.9	W&eS
Effect of employment and service conditions on interpersonal behavior of engineers	158.202462	658.3-051	Sy,121-u3D &e8,y5

It is obvious from the above table that colon classification with the provision of phase relation is able to provide class numbers for complex subjects coextensively. DDC has hardly any provisions for complex subjects. UDC provides the same treatment to complex and compound subjects.

An overall analysis of the above study reveals that in DDC due to the limited provision for the construction of class numbers, it is not possible to construct class numbers for compound and complex subjects. As a result, compound and complex subjects in DDC are mostly enumerative in nature. It fails to assemble all related topics at one place. Also, closely related topics are scattered. The problem before DDC

is how to maintain integrity of numbers and keep pace with growing knowledge. From the point of view of information retrieval, DDC does not provide full satisfaction. This is because, the amount of synthesis expected at any given point is limited. Thus classification can not be specific for informations retrieval purpose. DDC is hampered by the simplicity of its notation and the limited use of facet indicator. That is zero. From user's point of view also, retrieval with the help of DDC is not adequate. It does not facilitate their search and efficiency in use. A systematic grouping of books by subjects does not exist in the framework for classifying psychology. Works closely related are separated throughout the whole length of the library. For an effective bibliographic organization of psychology the library classification seems to be meaningless. UDC compared to DDC is more exhaustive. With the help of various auxiliary schedules, it has been able to bring facetedness in the scheme. Major advantages of UDC are its flexibility, the hierarchical notations, and specificity which it allows. However, specificity is achieved on account of long and complex notations.

The problem in construction of compound and complex subjects are much lesser in CC. It does not attempt to enumerate the complex and composite subjects. The provisions of phase relation has solved this problem to a great extent.

According to Austin "the basic teaching of analytico-synthetic classification is that any compound subject, however complex, can be broken into its separate components or facets, and that these can be reorganized consistently into a standard pattern by reference to a general decision-making model".⁽¹⁵⁾ This development was a reaction to the fact that a system of main classes not only considerably restricts the hospitality for new and unforeseen topics but also is not at all suitable for the design of machine retrieval system.

In psychological sciences, in relation to the constantly changing patterns in different directions the advantages of faceted classification seem to be obvious. The classification scheme that would allow the building of the notation from various components (facets) could be of great benefit to such a complex discipline with its numerous compound subjects. The combination of basic components by a faceted technique would provide more flexibility for numerous compound psychological subjects than their more enumeration in traditional scheme. Such schemes would also provide freedom for a suitable insertion of either whole new branches into the discipline or new specific subjects not enumerated in the schedule.

The revision of Colon Classification, however, is not that current. The 7th edition which was scheduled to be published in 1971, could only appear in 1987, i.e. after a

gap of 24 years. The notations also, on the other hand is complex.

It is thus, inferred that the strict hierarchy of these traditional schemes is not ready to meet new developments, especially new concepts and trends, where psychology overlaps with other fields of study. The hierarchy of predetermined order and content of main classes and subclasses in traditional schemes does not provide a sound foundation for psychology. Due to this inadequacy, the psychologists have developed their own specialized schemes and systems for Psychological Abstracts, suitable for retrieval of detailed information. Psychology as a widely differentiated discipline supports the evidence that a new general scheme with essentially new theoretical approaches and concepts is needed. This is mainly true in relation to developing a general classification system for machine storage and retrieval, CC though based on scientific principles is not used much in the libraries of India as well as outside India. It is not very suitable for library shelves due to its complicated notational system. However, it may prove classification of potentiality for indexing and abstracting services. UDC compared to DDC and CC is being used more extensively for indexing and abstracting purposes. It can successfully be used in mechanized retrieval systems. It can also be used as the indexing language in a computer based retrieval system. It has moved long way from DDC in several respects. Since

1974 FID specially FID/CR is making continuous effort for the development of UDC.

6.2 INDEXING

In addition to the schemes of classification, access to information is also approached through subject retrieval method, namely indexing. Indexing is basically a file, a system of organization which enables a reader to locate the document from a file which is likely to provide answer to his question. The fundamental objective of an indexing system is to facilitate the retrieval of smallest piece of information. Indexing, whether, it is done by human indexer or by machine, is an essential and important aspect in the design and development of retrieval processes. It makes the system useful to entire user group having the similar interests. The process of indexing involves the conceptual analysis of the content of the knowledge embodied in the documents. The analysis involves the selection of a set of words or phrases which could be relevant for retrieval purposes.

6.21 Types of Indexing Systems

Handling of compound terms has been recognized as one of the oldest problems in alphabetical subject indexing. Since the time of Cutter, designers of indexing systems have been involved in writing on this issue. Both pre and post coordinate indexing systems have tried to tackle this problem.

Some of the important indexing techniques which fall under the category of pre and post coordinate indexing are discussed in the succeeding sections.

Precoordinate Indexing

In any precoordinate indexing system, the indexer coordinates the appropriate terms at the time of indexing. After analysing the concepts, they are arranged in a particular order dictated by the structure of the language. The terms in this type ^{of} system have fixed citation order and coordination is usually done by the indexer. Among the various precoordinate indexing systems evolved ^{from} time to time for deriving subject headings to documents, the important ones are the list of subject headings such as Library of Congress Subject Heading List, Chain Procedure, PRECIS and POPSI. Lists of subject headings contain alphabetically arranged terms, cross references and notes to be used in indexing or searching the information embodied in the documents. All are meant to deal with all of man's knowledge.

Library of Congress Subject Headings - The list of Library of Congress Subject Headings is one of the traditional methods for deriving subject headings for documents. Subject heading is defined as "an access point to bibliographic record, consisting of a word or phrase which designates the subject of the work(s) contained in the bibliographic items". (16)

The list consisting of terms alongwith cross references is widely in use since 1897, presently available in its 12th edition. Changes and revisions etc. are announced through supplements. An upto date list is being brought out quarterly in the form of microfilm or microfiche. The most recent edition of current LC list includes a single word, a noun preceded by an adjective, a noun with adjectives, two nouns connected by preposition, noun connected with another by "and" and a phrase or sentence. In order to change the obsolete and outdated headings LC adds new headings every year. The list is provided in alphabetical order. Arrangement is word by word.

Chain Procedure - Chain indexing was introduced by S.R. Ranganathan as an integral part of his Colon Classification. The system was popularized by BNB between 1950 to 1970. E.J. Coates has been mainly responsible for implementing the system into practice in the subject part of BNB's index. There after it was accepted by many cataloguers as the best single way of producing a subject index economically and usefully. "The key entries in chain procedure much as possible are specific. They are hierarchically subordinate to the broader terms in the search vocabulary, the next broader terms is added for context". (17)

The basic advantages of this system are: "(a) its link with classification scheme provides intellectual economy; (b) its systematic approach; (c) it reveals the strength and

weaknesses of the classification; and (d) it alerts the classifier to the need or otherwise permutation in classified order".⁽¹⁸⁾ Major advantage of the system lies in the fact that it brings together the various aspects of the subjects which have been scattered in the scheme of classification used. Thus it collocates the distributed aspects of the subjects. Besides it also provides entries under the specific subjects as decided by the classification schemes. In a chain index following index entries will be provided for the title 'Moral Learning and Development' when classified by UDC.

Moral learning : Child psychology	159.922.7:170
Child psychology	159.922.7
Developmental psychology	159.922
Mental Development and Capacity	159.92
Psychology	159.9

However, after the involvement of BNB into MARC project, chain procedure was replaced by PRECIS.

PRECIS - PRECIS is an acronym for Preserved Context Indexing System. It is one of the most advanced and recent developments on document indexing. The system was the outcome of an investigation for an alternative solution, with the help of which computer could generate entries without any human involvement. PRECIS was developed by Derek Austin around the later part of sixties. Since 1971, the system has been adopted by a number of other bibliographies and indexes which includes: Australian National Bibliography; British

Education Index; the Canadian Film Board's Catalogue Supplement; the British Universal Film Council's Audio Visual Materials in Higher Education; and HELPIS Catalogue⁽¹⁹⁾.

One of the most important feature of a good indexing system is its ability to retrieve the document from every point of approach, that is, each component term in a heading (compound) must be able to function as an approach term for the user. Furthermore, the entries generated out of that approach term must specify the clear context of the document. PRECIS with the help of a set of 'role operators' is able to do that. A compound subject is broken down into a string of terms which summarize the subject. A book on Language development in children will receive the following subject index entries:

CHILDREN

Language Development 155.4

LANGUAGE . Children

Development 155.4

DEVELOPMENT . Language . Children 155.4

"The system is firmly based upon the concept of an open-ended vocabulary, which means that terms can be admitted into the index of any time, as soon as they have been encountered in literature. Once a term has been admitted, its relationships with other terms are handled in two different ways, distinguished as the syntactical and the semantic sides of the systems".⁽²⁰⁾

The basic aim, thus, of this system is to improve upon existing traditions of indexing. The specificity of PRECIS is an advantage over chain procedure which is quicker, though, less specific.

POPSI - Almost at the same time a new subject indexing language in India was developed by Bhattacharyya at DRTC. The system was developed as an alternative and improved system of subject indexing to chain procedure. The structuring of subject in POPSI is controlled by facet analysis based on the semantic and syntax of Colon Classification. The vocabulary structure is designed and developed on the basis of postulates and principles of the general theory of classification as proposed by Dr. S.R. Ranganathan. The constituent elements of a subject which together represent the content of a document are analysed and grouped into facets and speciators using the 'Wall Picture Principle'. The facet idea and their associated speciators are organized. The schedule of Colon classification scheme provides the guidance in identifying the different kind of speciators that go with a host isolate idea and their sequence in relation. Indexing with the help of this system at micro level is found to be effective.

Post Coordinate Indexing

Information explosion after the Second World War brought forth changes in the area of indexing. Older methods were revised and improved to a great extent. New theories came up and new techniques were introduced. The basic reason

for this and shift was the Post Coordinate searching in which a searcher and not the indexer could play more important role. It was realised that indexing terms could be restricted to 'simple' terms as opposed to compound and complex terms. Coordinate indexes comprise of a list of subject terms in a standard format. Except for cross references, each term is independent of all others. The index is designed to retrieve all the documents for which it is meant for. The system, thus, attempts to solve the problem of fixed citation order which most of the pre-coordinate indexing systems face. A number of techniques have been developed along these principles.

The simplest form of Post-Coordinate Index is the uniterm index introduced by Mortimer Taube in 1953.⁽²¹⁾ The entry in this system is prepared under each of the unit terms. It was basically a manual system, using cards with headings provided at the top and ten columns, where final digit of documents accession numbers are entered. CROSS index of BIOSIS is the example of this system. For visual search optical coincidence cards have been developed.

Automatic Indexing

An idea that arose quite early in the computer age was that of replacing human indexers by feeding the whole or part of a text into a machine which could then assign index terms automatically and in an accurate, impartial and consistent manner. The idea was conceived by Peter Luhn and

was reported in 1960.⁽²²⁾ Typically the data, generally titles are "put into machine readable form and input to a computer which has been programmed in a proper order. The program may identify a word as a string of characters between two blanks and then compare each of these words with an internally stored list of 'stop' words. 'Stop' words are those which can be preserved to have no index value such as articles, prepositions, and conjunctions".⁽²³⁾ Thus all words related to 'stop' word are not accepted, others are retained. Two such type of computer generated indexing system are Keyword in Context (KWIC) and Keyword Out of Context (KWOC). In KWIC indexing "each word of the title appears once in an alphabetical order in the center of the page with all other words to the left or right of the center word printed in the order in which they appeared in the title. When right hand margin was reached, the remaining title, if any was wrapped around" to the left hand margin and continued in word.⁽²⁴⁾ For the book on Child Development in Children, the following entries exemplifies the KWIC indexing system:

Language Development	CHILDREN	
Language	DEVELOPMENT	Children
Children	LANGUAGE	Development

Citation Indexing

A new type of control is done by citations indexing which tells where and by whom a paper has been cited in the

literature. "Citation indexing is a technique based on the presumption that a reader interested in one particular document will also be interested in all the others which cite it". (25)

Citation indexing is a very old technique and major success of which has been observed until recent years in the field of law. However, the citation indexing has now become a well stabilised part of information search. An additional advantage of this technique is that the articles and documents which can not be located in the conventional subject index search, may be revealed by using citation indexing. By going through a citation index, the relevant articles of interest can be selected and rest can be discarded. From the relevant article one can again get a set of new citations and thus the procedure can be continued to expand the search. With the help of this process a comprehensive bibliography can be prepared. The technique also helps in revealing the information use pattern of researcher in a specific subject field. Social Citation Index covers the Social Sciences including aspects of psychology. Social scientists use this index to get information if their work has been applied or criticized by others, while researchers can use it to identify social scientists and psychologists. Scientists currently working on special problems, or to tell if a subject has been reviewed.

To ascertain the information need of the users, studies on information use patterns of researcher are important in

planning and designing of information systems and services. Quite a number of such studies have been conducted in India as well as in the West. One such study to investigate the information use patterns of researches in the field of Psychology was made by S.L. Sangam⁽²⁶⁾ of Karnatak University in 1989 covering the period between 1964-1982.

6.3 THESAURUS

The rapid development of the machine readable data bases led to the development of thesauri, which may be used for search strategies. C.L. Barnier, one of the pioneers, recognised the use of thesaurus in information retrieval (IR). An IR thesaurus is basically a terminological control device for transformation of natural language expressions used by the authors, referees, publishers, indexers etc. As per definition accepted by UNESCO (1977) "Thesaurus is a controlled and dynamic vocabulary of semantically and generically related terms, which cover a specific domain of knowledge"⁽²⁷⁾. A vocabulary is dynamic, if it permits regular updating, that is, addition of terms representing new concepts.

The symbols 'RT', 'NT', and 'BT' are often used which stand for 'related terms', 'narrower terms' and 'broader terms' respectively. Example of one such search strategies is Thesaurus of Psychological Index Terms⁽²⁸⁾ which was published in 1974 by APA, presently in its 4th edition (1985). The thesaurus is intended to be the recognised and structured

set of terms related to psychological concepts. Each term in the thesaurus is listed alphabetically, cross-referenced, and displayed with its broader narrower and related terms. 'Use' references are also provided to direct the reader from terms not used as an index term in Psychological Abstract to one that are used. Sample illustrations as given below may clarify the structure of the thesaurus:

PSYCHOMOTOR DEVELOPMENT

<u>Broader</u>	Motor Development Physical Development Psychogenesis
----------------	--

INTER PERSONAL INTERACTION

<u>Narrower</u>	Bargaining Conflict Conversation Cooperation
-----------------	---

STRESS

<u>Related</u>	Anxiety Disasters Enduarance
----------------	------------------------------------

Scholastic Aptitude USE Academic Aptitude

AVOIDANCE CONDITIONING USED FOR Conditioning (Avoidance).

The thesaurus is divided into three sections:

Relationship Section; Rotated Alphabetical Terms Section; and Postable Terms and Term Code Section. The extracts from the three sections of American Psychological Association Thesaurus are provided as under:

6.31 Extract from the Relationship Section of the Thesaurus
of Psychological Index Terms

Community Welfare Services — (Continued)

Related Welfare Services (Government)

Companies

Use Business Organizations

Comparative Psychology

Broader Psychology
 Sciences
 Social Sciences

Compatibility (Interpersonal)

Use Interpersonal Compatibility

Compensation (Defense Mechanism)

Broader Defense Mechanisms

Compensatory Education

Broader Curriculum
Related Education/
 Educational Programs

Competition

Broader Social Behavior

Complex (Electra)

Use Electra Complex

Complex (Oedipal)

Use Oedipal Complex

Complexity (Cognitive)

Use Cognitive Complexity

Complexity (Stimulus)

Use Stimulus Complexity

Complexity (Task)

Use Task Complexity

Compliance

Broader Social Behavior

Comprehension

Used for Understanding
Narrower Listening Comprehension
 Number Comprehension
 Reading Comprehension
 Sentence Comprehension
Related Meaning
 Meaningfulness

Comprehension Tests

Related Measurement/

Compressed Speech

Broader Speech Processing (Mechanical)
 Verbal Communication

Compulsions

Narrower Compulsive Repetition
Related Mental Disorders/

Compulsions — (Continued)

Related Obsessions
 Obsessive Compulsive Neurosis
 Obsessive Compulsive Personality

Compulsive Neurosis

Use Obsessive Compulsive Neurosis

Compulsive Repetition

Used for Repetition (Compulsive)
Broader Compulsions

Computer Applications

Narrower Computer Assisted Diagnosis
 Computer Assisted Instruction
 Computer Simulation
Related Computers

Computer Assisted Diagnosis

Broader Computer Applications
 Diagnosis
Related Medical Diagnosis
 Psychodiagnosis

Computer Assisted Instruction

Used for Instruction (Computer Assisted)
Broader Computer Applications
 Teaching
 Teaching Methods
Related Individualized Instruction
 Programed Instruction
 Teaching Machines

Computer Programming Languages

Used for FORTRAN
 Programming Languages (Computer)
Related Computers
 Data Processing

Computer Programs

Use Computer Software

Computer Simulation

Broader Computer Applications
 Simulation
Related Simulation Games

Computer Software

Used for Computer Programs
 Programming (Computer)
Related Computers
 Data Processing
 Systems/

Computers

Broader Apparatus
Narrower Analog Computers
 Digital Computers
Related Automation

Computers — (Continued)

Related Computer Applications
 Computer Programming Languages
 Computer Software
 Cybernetics
 Data Processing
 Systems/

Concentration Camps

Used for Camps (Concentration)
Related Correctional Institutions

Concept (Self)

Use Self Concept

Concept Formation

Used for Conceptualization
Broader Cognitive Processes
Related Concepts
 Conservation (Concept)
 Egocentrism

Concept Learning

Narrower Nonverbal Shift Learning
 Reversal Learning
Related Concept Learning
 Learning/

Concepts

Used for Information (Concepts)
Related Concept Formation
 Concept Learning
 Information/

Conceptual Imagery

Used for Imagery (Conceptual)
Broader Imagery
Related Imagination

Conceptualization

Use Concept Formation

Concussion (Brain)

Use Brain Concussion

Conditioned Emotional Responses

Used for CER (Conditioning)
Broader Classical Conditioning
 Conditioned Responses
 Conditioning
 Emotional Responses
 Operant Conditioning
 Responses

Conditioned Inhibition

Use Conditioned Suppression

Conditioned Reflex

Use Conditioned Responses

Duplication between the relationship section and rotated alphabetical terms section is reduced by not including in the latter, these terms which are not to be used for indexing documents.

6.32 Extract from the Postable Terms and Term Codes
Section of the Thesaurus of Psychological Index

Terms

- | | | | | | |
|-------|---------------------------------------|-------|------------------------------------|-------|-----------------------------------|
| 09970 | Cocain | 11040 | Conceptual Imagery | 12390 | Creativity Measurement |
| 09930 | Cocaine | 11070 | Conditioned Emotional Response | 12400 | Credibility |
| 09940 | Cochlea | 11090 | Conditioned Responses | 12430 | Crimp |
| 09950 | Cochlear O Test | 11100 | Conditioned Stimulus | 12440 | Criminal Conviction |
| 09960 | Cochleaches | 11110 | Conditioned Suppressor | 12450 | Criminal Law |
| 09970 | Cocaine | 11120 | Conditioning | 12460 | Criminals |
| 10000 | Codification | 11190 | Cones (Eye) | 12470 | Criminology |
| 10040 | Cognition | 11200 | Conitulation | 12490 | Crisis |
| 10050 | Cognitive Ability | 11210 | Conference Proceedings | 12510 | Crisis Intervention |
| 10060 | Cognitive Complexity | 11220 | Confession (Religion) | 12520 | Crisis Intervention Services |
| 10070 | Cognitive Conguity | 11230 | Confidence Limits (Statistics) | 12530 | Critical Factor: Fusion Threshold |
| 10080 | Cognitive Development | 11250 | Conflict | 12540 | Criticism |
| 10090 | Cognitive Discrimination | 11270 | Conformity (Personality) | 12570 | Crocodilians |
| 10100 | Cognitive Dissonance | 11290 | Congenital Disorders | 12590 | Cross Cultural Differences |
| 10110 | Cognitive Generalization | 11300 | Congenitally Handicapped | 12610 | Crowding |
| 10120 | Cognitive Mediation | 11310 | Conjugal Therapy | 12620 | Cruelty |
| 10130 | Cognitive Processes | 11320 | Connective Tissue Cells | 12630 | Crustacea |
| 10140 | Cognitive Style | 11330 | Connective Tissues | 12640 | Crying |
| 10150 | Conabulation | 11340 | Connotations | 12650 | Crying Cat Syndrome |
| 10200 | Cold Effects | 11350 | Consanguineous Marriage | 12670 | Cuba |
| 10220 | Coins | 11360 | Conscience | 12680 | Cues |
| 10230 | Col' Ent Exam: Bc Scholastic Apt Test | 11370 | Conscious (Personality Factors) | 12690 | Cultism |
| 10250 | Collective Behavior | 11380 | Consciousness Disturbances | 12700 | Cultural Assimilation |
| 10280 | College Academic Achievement | 11387 | Consciousness Raising Groups | 12710 | Cultural Deprivation |
| 10290 | College Dropouts | 11390 | Consciousness States | 12730 | Cultural Test Bias |
| 10300 | College Environment | 11400 | Conservation (Concept) | 12750 | Culture (Anthropological) |
| 10320 | College Students | 11403 | Conservation (Ecological Behavior) | 12760 | Culture Change |
| 10330 | College Teachers | 11405 | Conservationism | 12770 | Culture Fair Intelligence Test |
| 10350 | Colleges | 11420 | Consistency (Measurement) | 12780 | Culture Shock |
| 10370 | Color Disorders | 11430 | Consonants | 12790 | Curare |
| 10380 | Color | 11440 | Constipation | 12800 | Curiosity |
| 10390 | Color Blindness | 11470 | Consume: Attitudes | 12810 | Curriculum |
| 10400 | Color Perception | 11480 | Consume: Behavior | 12820 | Curriculum Development |
| 10410 | Color Pyramid Test | 11490 | Consume: Protection | 12830 | Cursor: Writing |
| 10430 | Colostomy | 11500 | Consume: Psychology | 12840 | Cushings Syndrome |
| 10440 | Columbia Mental Maturity Scale | 11510 | Consume: Research | 12850 | Cutaneous Sense |
| 10450 | Come | 11520 | Consume: Surveys | 12860 | Cybernetics |
| 10470 | Commissioned Officers | 11540 | Contact Lenses | 12875 | † Cyclic Adenosine Monophosphate |
| 10480 | Commitment (Psychiatric) | 11548 | Content Analysis | 12880 | Cycloheximide |
| 10510 | Communes | 11550 | Content Analysis (Test) | 12890 | Cyclothymic Personality |
| 10540 | Communication Skills | 11560 | Contentual Associations | 12900 | Cynicism |
| 10550 | Communication Systems | 11580 | Contingency Management | 12910 | Cysteine |
| 10560 | Communication Theory | 11630 | Contraceptive Devices | 12920 | Cytochrome Oxidase |
| 10570 | Communication: | 11710 | Conversion | 12930 | Cytology |
| 10580 | Communications Media | 11720 | Conversion Neurosis | 12940 | Cytoplasm |
| 10590 | Communism | 11750 | Convulsions | 12950 | Czechoslovakia |
| 10600 | Communitas | 11758 | † Cooperating Teachers | | |
| 10620 | Community Attitudes | 11780 | Cooperation | | |
| 10627 | Community College Students | 11790 | Coping Behavior | 12970 | Dance |
| 10630 | † Community Colleges | 11800 | Copper | 12980 | Dance Therapy |
| 10640 | Community Facilities | 11830 | Cornea | 12990 | Dark Adaptation |
| 10647 | Community Mental Health | 11860 | Coronary Thromboses | 13000 | Darwinism |
| 10650 | Community Mental Health Centers | 11900 | Corpus Callosum | 13020 | Data Processing |
| 10658 | † Community Mental Health Services | 11910 | Correctional Institutions | 13040 | Daughters |
| 10660 | Community Mental Health Training | 11980 | Cortical Evoked Potentials | 13070 | Day Care Centers |
| 10670 | Community Psychiatry | 12000 | Corticosteroids | 13080 | Daydreaming |
| 10680 | Community Psychology | 12010 | Corticosterone | 13090 | DDT (Insecticide) |
| 10690 | Community Services | 12020 | Corticotropin | 13100 | Deal |
| 10700 | Community Welfare Services | 12040 | Cortisone | 13110 | Death and Dying |
| 10720 | Comparative Psychology | 12045 | Costs and Cost Analysis | 13115 | † Death Anxiety |
| 10740 | Compensation (Defense Mechanism) | 12070 | Counseling Psychology | 13120 | Death Attitudes |
| 10745 | Compensatory Education | 12080 | Counseling: | 13150 | Death Rates |
| 10750 | Competition | 12090 | Counselor Attitudes | 13160 | Decarboxylases |
| 10810 | Compliance | 12100 | Counselor Characteristics | 13166 | † Decentralization |
| 10820 | Comprehension | 12120 | Counselor Education | 13170 | Decapod |
| 10830 | Comprehension Tests | 12150 | Counselor Role | 13180 | Decerebration |
| 10840 | Compressed Speech | 12160 | Counselor Trainees | 13190 | Decision Making |
| 10850 | Compulsions | 12170 | Counselors | 13200 | Decompression Effects |
| 10890 | Compulsive Repetition | 12180 | Counterconditioning | 13210 | Decontication (Brain) |
| 10900 | Computer Applications | 12190 | Countertransference | 13230 | Deer |
| 10910 | Computer Assisted Diagnosis | 12195 | Countries | 13240 | Defecation |
| 10920 | Computer Assisted Instruction | 12210 | Courage | 13250 | Defense Mechanisms |
| 10930 | Computer Programming Languages | 12215 | † Course Evaluation | 13260 | Deterioration |
| 10950 | Computer Simulator | 12260 | Cousins | 13290 | Dehydrogenases |
| 10960 | Computer Software | 12290 | Crabs | 13297 | † Delay of Gratification |
| 10970 | Computers | 12310 | Crafts | 13300 | Delayed Auditory Feedback |
| 10980 | Concentration Camps | 12330 | Cranial Nerves | 13310 | Delayed Development |
| 11000 | Concept Formation | 12340 | Cranial Spinal Cord | 13320 | Delayed Feedback |
| 11010 | Concept Learning | 12360 | Crayfish | 13340 | Deletion (Chromosome) |
| 11030 | Concepts | 12380 | † Creativity | 13380 | Delirium |

6.33 Extract from the Rotated Alphabetical Terms Section
of the Thesaurus of Psychological Index Terms

Obstetric	Complications	Atmospheric	Conditions
Postoperative	Complications (Physical)	Working	Conditions
	Comprehension	Brain	Conduction Anisotropy
	Comprehension Tests		Cone: Eye
Listening	Comprehension		Confabulation
Number	Comprehension		Conference Proceedings
Reading	Comprehension		Confession (Religion)
Sentence	Comprehension		Confidence Limits (Statistics)
	Compressed Speech		Conflict
	Compulsions	Mental	Conflict
	Compulsive Repetition	Role	Conflicts
Obsessive	Compulsive Neurosis		Conformity (Personality)
Obsessive	Compulsive Personality	Mental	Confusion
	Computer Applications		Congenital Disorders
	Computer Assisted Diagnosis	Drug Induced	Congenital Disorders
	Computer Assisted Instruction		Congenitally Handicapped
	Computer Programming Languages	Self	Congruence
	Computer Simulation		Conjoint Therapy
	Computer Software		Connective Tissue Cells
	Computers		Connective Tissues
Analog	Computers		Connotations
Digital	Computers		Consanguineous Marriage
	Concentration Camps		Conscience
	Concept Formation		Conscious (Personality Factors)
	Concept Learning		Consciousness Disturbances
Conservation	(Concept)		Consciousness Raising Groups
Self	Concept		Consciousness States
Temporal Spatial	Concept Scale		Conservation (Concept)
Tennessee Self	Concept Scale		Conservation (Ecological Behavior)
	Concepts		Conservatism
God	Concepts	Political	Conservatism
Mathematics	(Concepts)	Wilson: Patterson	Conservatism Scale
	Conceptual Imagery		Consistency (Measurement)
Brain	Concussion		Consonants
	Conditioned Emotional Responses	Test	Constipation
	Conditioned Responses	Mental Health	Construction
	Conditioned Stimulus	Professional	Consultation
	Conditioned Suppression		Consultation
	Conditioning		Consumer Attitudes
Avoidance	Conditioning		Consumer Behavior
Classical	Conditioning		Consumer Protection
Escape	Conditioning		Consumer Psychology
Eyeid	Conditioning		Consumer Research
Operant	Conditioning		Consumer Surveys

In the second edition of APA thesaurus, some 180 terms have been deleted as they had never been used as access points to the psychological literature - in the cumulated machine-readable databases of PA.

6.4 ON-LINE RETRIEVAL SYSTEMS AND INDEXES

An On-line information retrieval system allows the user to interrogate a machine readable data base of documents directly via computer. (29) Though input output devices like teletypewriter or cathode ray tube display, which are connected to the computer, the two way communication between the user and the computer is maintained. This system is used in a dedicated mode, however, frequently it is also implemented in a time shared environment. In time sharing, the computer shares its processing time between two or more completely independent activities and thus different users can use the computer simultaneously. As such in case of an on-line time shared system, a number of concurrently usable terminals are under operation. Each terminal user is allotted a specific processing time. Real time is another form associated with on-line computing. This is the time when the computer receives data, processes it and returns it quickly because the results obtained are utilized in the continuation of the task being conducted. In information retrieval, real time indicates that the computer responds quickly to interact with users search process.

6.41 PsycINFO

In the field of psychology, Psychological Information Services (PsycINFO) is a family of inter related information services that provides access to the world's literature in Psychology and related behavioral and social sciences in a variety of ways. PsycINFO consists of:

Psychological Abstracts (PA) - It is a professional journal published monthly by the American Psychological Association. It is the comprehensive monthly compilation of nonevaluative summaries of the world's literature in psychology and related disciplines. The abstracts's coverage includes books and monographs, chapter of books and articles, technical reports, theses, occassional reports and journals. It covers materials in other disciplines like Sociology, Psychiatry and Philosophy of special interests to psychologists. PA lists more than 1100 journals, which are regularly searched and selectively abstracted. Eightyfive percent of abstracts are of journal articles. It is very useful for new books and articles on psychology, but gives relatively poor coverage of allied fields such as education and medicine. Coverage of these fields must be found in specialized tools such as Index Medicus and Excepta Medica^r. The APA user study found that European Psychologists depend heavily on Psychological Abstracts for information on recent work in a field. American Psychologists use the abstracts for an exhaustive search of information on a given subject. The user study found that the articles of greatest use and interest to psychologists are usually covered by this tool.

The monthly PA issues contain abstracts listed under 16 major classification categories, with some categories having subsections under each classification heading, the abstracts are arranged alphabetically by the first author.

Abstracts are numbered consecutively each year . The volume contains approximately 37,500 abstract records. An author and brief subject index appear in each monthly issue. Cummulative indexes appear every six months. An expanded and integrated annual index is published at the end of each volume. Subject headings are reviewed annually and revised as interests shift and grow. The last issue of each volume specifies all the research for that volume.

Three year cummulative indexes to PA are also available. They are author and subject indexes for all entries in the PA journal for 1969-71; 1972-74; 1975-77; 1978-80; and 1981-83.

Time lag between publications in a journal and publications in the abstracts is about eight months now, but previously it was 18-24 months. This improvement is due to the use of automatic typesetting machines. However, Bloomquist points out that more coordination is needed between indexes and abstracting tools of various inter-related disciplines, such as Chemical Abstracts, Psychological Abstracts and Biological Abstracts. He has suggested that such coordination may be developed if the lead is taken by National Library of Medicine, since it has got fund from the Medical Libraries Assistance Act of 1965.

Psychology, however, is probably better off than most social sciences. Since, Psychological Abstract is so good

and so complete and because the results of the A.P.A. user study have been taken seriously and are resulting in improvements in the communications systems. Gap exists, but as long as improvements continue to be sought after and, and the outlook for communications and bibliographical control is optimistic, there is nothing for concern.

PsycSCAN : Clinical Psychology, Developmental Psychology and Applied Psychology - It is a quarterly publications containing abstracts from subscriber - selected journals in the areas of Clinical Psychology, Developmental Psychology and Applied Psychology respectively.

PsycSCAN : LD/MR - A quarterly publication containing abstracts on learning disabilities, communication disorders, and mental relations.

PsycSCAN : Psychoanalysis - A biannual publication containing abstracts from selected journals in the area of Psychoanalytic Psychology.

PsycSCAN : Applied Experimental and Engineering Psychology - A quarterly publication consisting of abstracts from selected index terms in applied experimental and engineering psychology.

PsycINFO Retrospective - Mental Retardation (an Abstracted Bibliography, 1971-1980). A comprehensive 10 year review including abstracts on mental retardation.

PsycINFO Retrospective - Learning and communication disorders (An Abstracted Bibliography, 1971-1980) A comprehensive 10 year review including abstracts on learning disabilities and communication disorders.

Thesaurus of Psychological Index Terms : 4th Edition - It is a compilation of the vocabulary used in psychology and related disciplines as generated from files of PA.

PsycINFO Users Reference Manual, 1987 - It is developed for the individual researcher of information available from PsycINFO service whether through use of the printed PA issue indexes or by computer assisted search of the database.

PASAR (PA Search and Retrieval) - Retrospective search and retrieval service is available through PsycINFO office.

PsycINFO Database - Magnetic tapes of psychological records to institutions for annual lease are designed for use by information analysis and semination center. This database is used for direct interaction by individuals through computer terminal in their own facilities. This device is available through several dissemination centers throughout the world.

PsycINFO deals about behavior, lawyers will find information about child advocacy, jury selections, or evidence validity; advertisers about consumer behavior or brand loyalty; physicians about drug interactions, behavioral aspects of disease, or the addictive responsibility; Managers

about employee motivation or personal selection. Behavior is a part of everyone's business. Thus social scientists, educators, and psychologists have long relied on PsycINFO for behavioral information.

PsycINFO online version consists of 25% more records than the printed version, from 1980 onwards. It also includes additional material from Dissertation Abstracts International. Besides Psychology, the database includes the related areas such as anthropology, behavioural sciences, communication and language, education, neurology, personality, pharmacology, physiology psychiatry, and sociology.

PsycALERT is a current awareness file of nearly 10,000 newly published references prior to their transfer each month to PsycINFO. Updated weekly is also available on DIALOG as File 140. It is an inprocess file which is later made available in the PsycINFO file.

Besides the above, there are other specialized Abstracts also in the field. They are as under:

Child Development Abstracts and Bibliography V.1 - 1927 -
Chicago, Society for Research in Child Development. 31 yr.
It contains about 1,200 abstracts per year from approximately 190 professional periodicals. Emphasis is given on general, experimental, social and clinical psychology. Other subject areas included are Biology, Public Health, Medicine and Education. It also reviews about 75 books annually, related to growth and development of children. It contains Author and subject indexes also.

Developmental Disabilities Abstract V. 1-13; 1964-1978

brought out by Department of Health, Education, and Welfare, Developmental Disabilities Office. It is published quarterly.

Psychopharmacology Abstracts V.1-; 1961 - . Provides access to the world's literature regarding new developments and results in the field of psychopharmacology. It contains classified arrangement with author and subject indexes, which cumulate with each volume.

French Language Psychology V. 1- ; 1980 - . New York, North-Holland, Volume 1 in 4 issues. Basically for English speaking psychologists about the literature of psychology in French speaking countries.

German Journal of Psychology V. 1 - ; 1977 - . Contains work on psychology published in Austria, Federal Republic of Germany, the German Democratic Republic and Switzerland. Abstracts are of journal articles, books and psychological tests and are arranged alphabetically by author within broad subject categories. Also publishes review articles on selected topics on current researches.

6.42 Coverage of other Information Retrieval Tools in Psychology

One of the most important and best review of Psychology is the Annual Review of Psychology. It contains high-level comprehensive bibliographical essays on particular fields. This contains 15-20 topics of current interest, discusses

events and research within these fields during the year and provides a long bibliography after each article. Faster in publication time is Psychology Bulletin, a monthly journal which contains evaluative reviews of research literature on particular subjects and is used mainly for information on recent work in other fields. These review types of literature are very important in Psychology and are among the four major sources of information used by the psychologists. The four are the Annual Review, Psychological Bulletin, Psychological Abstract, and Contemporary Psychology.

It may therefore, be concluded that UDC compared to DDC and CC is more successful in indexing, abstracting and in mechanized retrieval systems. Among the various indexing systems KWIC indexing appears to be more well stabilised. Retrieval with the help of PsycINFO online database is more fruitful. The databases can be searched and researched using special computer programs, and thus, access to world wide collection of documents. The psychological information system (PsycINFO) has started to play an important role in bibliographic control and information retrieval.

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CHAPTER VII
CONCLUSION

C O N C L U S I O N

Psychology is the scientific study of behavior. It was closely associated with philosophy for a very long time. At the end of the nineteenth century, psychology came into existence as an independent discipline.

Psychology mainly deals with the behavior of individual organisms. It differs from other social science disciplines which concentrate on groups, organizations and institutions and from biology where functioning of particular organs are studied. By and large, psychology has a closer relation with biological sciences and a weaker one with humanities. Certain areas of psychology have both biological and social science aspects. Child psychology, Clinical psychology, Industrial psychology and Educational psychology etc. may be included in this area. Similarly, areas like clinical psychology, physiological psychology are related with medical sciences. Values, meanings, language etc. are more closely related to humanities.

The second chapter embodies the historical and chronological development of psychological thoughts. The chapter also presents the growth of seminal ideas in a chronological table. While summarizing this chapter one is reminded of the remark of Herman Ebbinghaus that psychology has a long past but a short history. By long past he meant the speculations about human behavior dating from classical antiquity, the middle ages

and the renaissance. By short history, he refers to the fact that psychology as a science is very young, being just over a century old.

Initially, psychologists both in United States and Europe were closely associated with philosophers. By the turn of the present century a new element, experimentation was seen to influence psychology. The third trend has been the development of specialised branches. Every field of human endeavour is now seen to be influenced by psychology.

The third chapter deals with the methods and techniques commonly adopted by the psychologists in their studies. A variety of methods have been used by the psychologists. The basic method, used in psychological studies, has been observation. One of the massive changes in psychology has been the evolution from the subjective method of introspection of the middle nineteenth century to the more comprehensive scientific and objective measurement, methods relating to observation and experimentations. Experiments involve experimental and control groups to test hypothesis. Clinical psychology uses interview, case studies and psychotherapy as well as variety of tests. Psychoanalytical method is treated as one of the important methods. Psychometric method is used for analysing the data or results obtained after observation.

In chapter four, the growth of the psychological studies has been evaluated. Several variables like growth in books,

periodicals, articles, dissertations and also in manpower were taken into consideration for the study. The study reveals that there has been tremendous growth in every spheres between 1965 and 1985. Along with this, many new branches emerged with lapse of time and considerable addition was noted in the number of books and articles. Simultaneously, the research output both in terms of publications and manpower also increased.

Chapter five has been divided into two sections. Section I deals with the structural pattern of compound subjects in psychology. Distribution of documents when evaluated in terms of number of facets, indicates that documents between one to three facets are fairly significant. The highest cluster of documents was observed in case of subjects lying between 1 to 3 faceted dimension. With respect to quantitative scatter of the incidence of five fundamental categories between 1965 and 1985. manifestation of personality facet has the highest incidence. In 1965 the energy facet was reasonably high. The incidence of space and time facet, on the other hand was insignificant in both the years.

The second part of this chapter pertains to the study of complex subjects. It was observed that biological sciences have the highest incidence of phase relation with psychology and next in the series are medicine and philosophy. Except religion, in case of other subjects, interrelationships during 1985 showed increasing tendency. No growth has been noted in case of history and literature.

Studies pertaining to the design of information retrieval system in psychology have been compiled in chapter six. Various information retrieval systems such as classification, indexing, hierarchic indexing and the on-line data bases used in the field of psychology were studied. Comparative study of DDC, UDC and CC classification schemes reveals that DDC and UDC based on strictly hierarchical genus - species relationship for most of their subdivisions. CC with its theoretical foundation and faceted structure has vast potentialities for organizing literature in bibliographies and also for access to databases. Retrieval with CC is possible for individual facets as well as the whole subject. However, revision of CC is not that current. As such UDC compared to DDC and CC is being used more extensively for indexing and abstracting purposes. It can successfully be used in mechanized retrieval systems. A comparative study of various subject retrieval system reveals that LCSH, though used for MARC, is not based on sound principles. PRECIS compared to LCHS is more co-extensive. However, in view of the post World War information explosion and with the advent of computerised retrieval systems, KWIC indexing system appears to be more well established. The future lies with on-line information retrieval system like the PsycINFO.

CHAPTER VIII

SOURCES OF INFORMATION
IN PSYCHOLOGY

SOURCES OF INFORMATION IN PSYCHOLOGY

8.0 INTRODUCTION

Information, whether in raw or in any other form, plays an important role in the research work. The valuable source of information ranges from a printed page to the document of various forms. It includes books, periodicals, reports and other documents. Every year the research literature is growing anourmously It is assessed that it is doubled after every ten to fifteen years.

8.1 CLASSIFICATION OF SOURCES OF INFORMATION

The classification of varieties of such information sources which exist in the universe of knowledge depends on its nature, presentation, purpose, coverage of information and also its level of treatment etc. However, these sources may for convenience, be grouped into two broad categories:

- (1) Primary Sources; and
- (2) Secondary Sources

8.11 Primary Sources

An upto date information about current research may be made available through primary sources. Various types of original material such as contribution to seminar and conferences, periodical articles and publications in the form of monographs are grouped under the category of primary sources. According

to Katz (1974), the primary or first hand material "include what is found in sources such as daily newspaper reporting, monographs, dissertations, patents, manufacturer's literature and manuscripts, The forms of reference works which allow access and control to primary sources are indexes and abstracts and bibliographies"⁽¹⁾. Thus the original reports of research investigations form the bulk of what is recognized as the primary literature.

Current Information

The best way to have an upto date information is through personal contact with scholars engaged in the field of interest, attending lectures presented by scholars attending symposium and seminars. The following are further resources to obtain relatively current material:

1. American Psychologists : The official journal of the American Psychological Association started publication monthly in 1946. The journal includes the official papers and reports of the association and its committees. Generally, the papers published in the journal are of wide professional interest.
2. In 1948 British Psychological Society started publishing a bulletin which provides reviews of developments which are one of the interest to members. It also includes all such papers which keep members aware of the profession as a whole, abstract of the papers read before the society, report of organized activities, correspondence and other discussions of general interest to the profession as a whole.

3. The first volume of International Journal of Psychology : Journal international de Psychologie appeared in 1966. It is being published quarterly. The journal is mainly devoted to cross-cultural, comparative and cooperative research in general, genetic and social psychology throughout the world, and provides informations on the functioning of the IUPS and national psychological member societies.
4. Psychology Today is a monthly journal of American Psychological Association and started publishing in 1967. This monthly journal generally includes the articles having popular appeal, such as on personality, sex or social interactions. The articles which are included in the monthly are of general interest for the public.
5. American Psychological Association Monitor is also a monthly newsletter started publishing in 1970 by the American Psychological Association. This newsletter includes articles on recent and pending legislation of interest of psychologists, on activities of the association's boards and committees. The research and practices of the prominent psychologists and the classified advertisements and announcements are contained in the journal.
6. Psychologia : An International Journal of Psychology in the Orient started quarterly publication in 1975 by the Kyoto Psychologia Society. The journal is a medium of communication between east and west and as a body of international discussion. It consists of contributions of various nations, publisher's reviews, world news, brief reports, and discussions mainly from Japan, India, and other Asian countries. The language of the journal is English.

7. Journal of Genetic Psychology : developmental and clinical psychology started publishing its first volume in 1891.
8. Journal of Educational Psychology started publishing a bimonthly journal from the American Psychological Association.
9. Journal of Experimental Psychology started publishing in 1916. Reports research on sensation, perception, learning and other aspects of general psychology.
10. Journal of Applied Psychology started publishing a quarterly journal in 1917 by the American Psychological Association.
11. Journal of Comparative and Physiological Psychology started in 1921 by the American Psychological Association.
12. Journal of Social Psychology started publishing in 1929 with a bimonthly frequency issue.
13. Journal of Counseling Psychology started quarterly journal in 1954 brought out by the American Psychological Association.
14. Contemporary Psychology started in 1956 a monthly journal brought out by the American Psychological Association.
15. Behavior Research Methods and Instrumentations a journal brought out in 1968 by the Austin Psychonomic Society in monthly issues.
16. Developmental Psychology a quarterly journal of the American Psychological Association brought out by the American Psychological Association, in 1969.

17. Professional Psychology : Research and Practice a bimonthly journal of the American Psychological Association started in 1969.
18. Cognitive Psychology brought out by the Academic Press in 1970.
19. Physiological Psychology a quarterly journal of the Austin Psychonomic Society started in 1973.
20. Memory and Cognition a bi-monthly journal of the Austin Psychonomic Society started in 1973.
21. Journal of Experimental Psychology : Human Perception and Performance a bi-monthly journal of the American Psychological Association in 1975.
22. Psychology of Women Quarterly a journal brought out by the Human Sciences Pr., New York in 1976.
23. British Journal of Social Psychology brought out by the British Psychological Society in 1981 and started a quarterly publication.
24. Journal of Comparative Psychology a quarterly journal of the American Psychological Association brought out in 1983.
25. Behavioral Neuroscience a bi-monthly journal of the American Psychological Association in 1983.

Monograph Series

In the earlier decades of this century, many universities such as University of California at Berkeley, Stanford, and Columbia issued monograph series with specialized focus and

various journals, for example, the journal of the American Psychological Association, the British Journal of Psychology, and Psychological Reports. They published longer research reports as supplements from time to time. A massive series, published for four decades, was Archives of Psychology.

American Psychological Association also published 233 psychological monographs, general and applied, from 1895 to 1966 in 80 volumes. Some other monographs are as under:

1. Genetic Psychology Monographs : Child Behavior, Animal Behavior and Comparative Psychology started in 1926.
2. Nebraska Symposium on Motivation first issue appeared in 1953.
3. Society for Research in Child Development a monograph started in 1936 from Chicago.

Theses and Dissertation

Dissertations and theses may be recognized as reports on research carried on in universities. Universities sometimes publish their own list of dissertations. Besides some are as under:

1. Dissertation Abstracts always a year out of date
2. Aslib Index to Theses
3. Psychological abstracts also indexes, theses and dissertations.

Growth of Resources for Research

Libraries and historical societies have long collected the correspondence and other personal papers of leaders in almost every profession or occupation and the records of many different types of organizations and institutions.

The Archives of the History of American Psychology (AHAP) established in 1965 at the University of Akron, has provided an example of what can be done in the social science. They became interested in collecting the archives while they were teaching courses on the history of psychology and discovered that little had been done to collect the primary unpublished sources. Although APA had already agreed to deposit its records in the Library of Congress, the AHAP has acquired the papers of many individuals and the records of regional, state and other psychological associations.

8.12 Secondary Sources

Another group of information sources which are basically concerned with the dissemination of information contained in the primary sources are known as secondary sources of information or secondary publications. A secondary publication is "a document such as an abstract, digest, index to periodicals, current awareness journals or popularization, which is prepared in order to disseminate more widely, information which has already appeared in another form, particularly in primary publication"⁽²⁾ The secondary sources of information in the

field of psychology may for convenience be grouped under :
Bibliographies, Dictionaries, Encyclopedias, Yearbooks, Reviews,
Indexes, Handbook, and Government Publications.

Bibliographies

1. Rand's Bibliography is the best source of nineteenth century literature published in Bibliography of Philosophy, Psychology and Cognate Subjects, published by Macmillan in 1905. Benjamin Rand is the editor of this series. The bibliography is in three volumes.
2. Mental Health Administration : An Annotated Bibliography published by the National Instt. of Mental Health Staff College in 1978. More than thousand fully annotated entries from literature of the period 1965-75. It includes journal articles, books, government publications etc. Topics related with roles and training of the mental health administrator, planning and decision making, program description, management information etc.
3. Psychology Index is an annual bibliography of the literature of psychology and cognate subjects published by Princeton, New York, Psychological Review Corps. The bibliography contains 42 volumes from 1894-1934. Began as a supplement to psychological review, provided extensive coverage of all the literature of psychology and allied fields. Listed original publications in all languages - books, articles, and translations - and new editions in English, German, French and Italian. Indexed about 3,000 titles a year in 350 periodicals. Classified arrangements, alphabetical and other index is also provided. Its task of listing psychological literature was observed by Psychological Abstracts.

4. Psychological Register edited by Carl Murchison, Worcester is published by Clark University. It is in three volumes and contains brief biographies with full bibliographies of prominent psychologists throughout the world, arranged country wise. Volume 1 designed to include psychologists from ancient times to 1929, was never published. Volume 2 (1929), with 1,250 psychologists from 29 countries, Volume 3 (1932) with 2,400 psychologists from 40 countries.
5. Psychological Abstracts cumulated subject index to psychological abstracts, 1927-1960. Boston, 1966. It contains two volumes along with two supplements. Its first supplement was brought out in 1961-65 and the second in 1966-68.
6. World Bibliography of Bibliographies covers only separately published books and contains many out of date bibliographies. Such bibliographies are the first place to begin a literature search unless only recent information is desired.
7. Bibliography Index includes material from periodicals, some research reports and some conference reports as well as books. It is good source of current bibliographies in psychology and covers many specific subjects such as altitudes and intelligence.
8. International Bibliography of Mono- and Multilingual Vocabularies in the field of Psychology and Psychiatry published in 1987 by International Information Centre for Terminology

Dictionaries

Dictionaries are useful controls since they tend to standardize the language, and they give the language in both technical and popular terms.

1. Dictionary of Psychology by J.P. Chaplin was published in 1975 and is mainly for 'accurate, concise, and meaningful definitions' of technical terms used in the literature of psychology. Also includes some terms from the related disciplines of psychoanalysis, psychiatry and biology. A number of semi-popular terms and terms from the literature of pseudo psychology and spiritualism are also included. Some entries are in the form of 'extended articles', such as on the control concepts and schools of psychology, and special names. Includes six appendices which gives additional information.
2. Dictionary of Psychology Rev.ed by Harvey Wallerstein was published in 1971 by Penguin is a dictionary of nearly 4,000 concisely defined terms. Adequate cross references are provided. It also includes foreign terms.
3. Dictionary of Psychology and Psychiatry English-German. Published under the auspices of the Centre for Psychological Information and Documentation at the University of Trier, West Germany in 1980.
4. Hanbook of Psychological Terms by Philip L. Harriman in 1965 published by Littlefield. Satisfactory for most commonly encountered terms and concepts where tense definitions, without variance of use, are sufficient. Contains illustrations and diagrams also, which increases its value.
5. Dictionary of General Psychology : Basic Terminology and Key Concepts by Charles A. Heidenreich was published by Kundall in 1970. Intended for undergraduate students and the interested lay person. It provides brief definitions of basic terms used by psychologists (and sociologists) regarding personality, social adjustment and personality development and of key concepts in general psychology.

6. Comprehensive Dictionary of Psychological and Psychoanalytical Terms : A Guide to Use by B. Horace and C. Alva in 1988. It is a bit old but still useful. It defines and explains most or obscure points for more than 13,000 terms. Includes not only the basic nomenclature for psychology but also relevant terms from mathematics, medicine, and other related fields, Labels specialized terms or usages of branch of science, school, or individual. Extensive cross references are provided.
7. Longman Dictionary of Psychology and Psychiatry is edited by Robert M. Golderson and Walter D. Glanze and it is published by Longman in 1984. Claims to be the first dictionary of its kind both in size and scope. Contains 21,000 entries and over three quarter million words. Includes the vocabulary of all the psychosciences as well as terms from hundreds of fields with which the psychosciences interact.
8. Dictionary of Psychology by Howard G. Warren is published in 1934 by Houghton gives precise definitions, many cross references and German and French equivalents, glossaries.
9. Comprehensive Dictionary of Psychological and Psychoanalytical Terms includes the terms mostly used in a special or technical sense by the psychologists.

Encyclopedias

1. Encyclopedia of Psychology is edited by H.J. Eysenck and others and published by Herder in 1972 and contains three volumes. It provides an authoritative general treatment for anybody - specialist or lay person interested in the subject. Two types of entries are provided: ordinary definitions of a line or two and articles covering imper-

tant terms and concepts ranging upto 4,000 words and containing carefully selected bibliographies for further study.

2. International Encyclopedia of Psychiatry, Psychology, Psychoanalysis and Neurology edited by Benjamin B. Wolman. It was published by Van Nostrand Reinhold in 1977 and contains twelve volumes. It contains articles on topics in the fields of psychiatry, psychology, psychoanalysis, neurology and related disciplines written by 1,500 specialists, specially from United States and from other countries. Each article include bibliography. Volume 12 has a complete list of articles and name and subject indexes.
3. Psychology Encyclopedia is edited by Stanley Schindler and published by Dushkin in 1973. It is a well organized illustrated encyclopedia for non-specialist. Contains more than 1,000 short articles tied together by cross references. It includes extensive bibliography also.
4. Encyclopedic Handbook of Medical Psychology, edited by Stephen Krauss and it is published by Butterworth in 1976. It contains articles of one to five pages. These articles are mainly written by practising psychiatrists on a wide range of topics, many of which are pertinent to psychopathology or to general psychology as well as to psychiatry. Most articles have a list of references.
5. The New Encyclopedia of Child Care and Guidance is edited by S.M. Gruenberg and published by Doubleday in 1968. It defines terms, lists relevant organizations, contains extensive annotated bibliography, and features 30 chapters by specialists on various aspects of child care and guidance.

6. Encyclopedia of Human Behavior, Psychiatry and Mental Health. It is edited by Robert M. Goldenson and published by Doubleday in 1970. It is a substantial set of 1,000 essays of varying length, illustrated and indexed. It is intended primarily for the lay reader.
7. Encyclopedia of Pediatric Psychology is written by Write, Logan and others and published in 1979 by University Park Press. It provides broad coverage of the entire field of pediatric medicine, but particularly those areas in which behavioral and psychological problems constitute an important component of the problem.

Year Book

1. Mental Measurement Yearbook edited by Oscar Krisen Buros started in 1938 by Aryplan Press. Eight yearbooks have been published so far. It is one of the most important source of information available on tests published as separates in English speaking countries. Test entries are arranged according to broad subject categories, with sub-categories, and provides basic facts, such as, title description of groups, cost, scoring services etc.

Reviews

1. Annual Review of Psychology is an annual volume which started publication in 1950. Since 1950 it is an authoritative, widely used reference source of approximately 20 articles every year. Each article is written by an expert who critically reviews a special topic in the field. Each articles contains bibliography covering 100-400 citations. The review covers the major areas of the field periodically but does not follow any systematic order since 1979, a new 'continious' feature has been introduced. It is a prefactory chapter written by an eminent psychologist.

2. Canadian Psychological Review : Psychologic Canadienne started in 1951 by Canadian Psychological Association. It was formerly known as Canadian Psychologists and was published quarterly. The journal contains official papers and proceedings of the association, names of officers, announcements and reports of professional activities, comments on psychological affairs, evaluative reviews of general interest and original papers on psychological theory.
3. Annual Survey of Psychoanalysis started publishing annually from 1952.
4. The Psychoanalytic Study of the Child is an annual publication started from 1945 by the Yale University Press. The articles are grouped under psychoanalytic theory, problems of development, clinical contributions, applications of psychoanalysis etc. Bibliography with each article is provided. Includes subject index also.
5. Annual Review of Behavior Therapy Theory and Practice started from 1973 by Brunner/Mazel.
6. Progress in Behavior Modification started publication from 1975 by Academic Press. It includes a scholarly theoretical aspects. Evaluates the research findings for which a careful survey is made. The topics cover the studies of fear behavior, measurement and modifications of classroom behaviour, remedial methods for the retarded and physically handicapped, the use of drugs in behavioral approaches and contributions of behavior therapy to the treatment of physical illness etc. Volume 9 was published in 1980.

7. Annual Review of Gerontology and Geriatrics started publication since 1980 by Springer. It presents a comprehensive description and analysis of recent literature and of the salient issues in the fields of ageing, from the biological and behavioural sciences to social and health sciences. The aim of the review is to provide and evolve issues in relevant areas and critical synthesis of advances.
8. Advances in the Study of Behavior started publication by Academic Press during the year 1965. It contains recent developments in research on all aspects of behaviour using both animal and human subjects. Its basic aims is to include "intensive factual reviews of recent work, reformulations of persistent problems, and historical and theoretical essays, all oriented toward the facilitation of current and future progress".
9. Advances in Mental Handicap Research started publication in 1980 by Wiley. The review puts emphasis on language, basic learning processes and social interactions. Based on research findings and tries to be relevant to education and other services for the mentally handicapped.

Indexes

1. Index of Psychoanalytic Writings started publication in 1956.
2. Psychological Index 1894-1935 : an annual bibliography of the literature of psychology and cognate subjects began as a supplement to Psychological Review and provided extensive coverage of all the literature of psychology and allied fields. It indexes original publications in all languages - books, articles, and translations. Indexed about 3,000 titles a year in 350 periodicals.

3. Cumulated Subject Index to Psychological Abstracts 1927-1960

The first supplement covers the period from 1961-65 and the second supplement from 1966-68. Cumulated Subject index to Psychological Abstracts is brought out by American Psychological Association. Its coverage is from 1927-1960. Supplement in 2 vols. covers the period from 1961-65 and 1966-68.

Handbook

1. Psychology : A Study of a Science published in 7 volumes, This massive work provides an overview of all psychology. It sponsored by the American Psychological Association and founded by APA and the National Science Foundation.
2. Handbook of General Psychology edited by Benjamin Wolman was published in 1973.
3. Reference Handbook of Research and Statistical Method in Psychology started publication in 1982.

Directories

1. Graduate Study in Psychology for 1975-76 brought out by American Psychological Association. It provides information on programmes of study, financial aid, educational facilities in graduate programs in Psychology in the United States, Canada and Lebanon.
2. International Opportunities for Advanced Training and Research in Psychology published by American Psychological Association in 1966. It provides a discussion of psychological activities in countries throughout the world. It includes information research and training both in and outside the universities, national organizations,

bibliographical sources, professional and legal criteria for recognition of psychologists, and international exchange of students and scholars.

3. The World of Learning started publishing in 1947 by Europa. This includes universities, colleges, research centres and learned societies.

Audio Visual Materials

The most general survey of audio visual material pertaining to psychology is by James B. Maas and Carol M. Howe, Chapter six in Psychology Teachers Resource Book edited by Margo Johnson and Michael Wertheimer published by American Psychological Association in 1979. It lists film catalogue, film series and special collections, television courses, slides and overhead transparencies, audio catalogues and programmes, and a topical listing of films and filmstrips. Also includes addresses of distributors.

Government Publications

1. Monthly Catalogue of Superintendent of Documents This publishes all publications available from the Superintendent of Documents. It sometimes lists additional publications printed for official use only or which have been referred by other bureaus for including in the list.
2. Monthly Checklist of State Publications Here publications of state government received by the Library of Congress are found. Basically more useful for educational psychologists.

Other Information Sources

1. Guide to Library Research in Psychology by J.E. Bell.
Published by W.C. Brown in 1971. It consists of 1900 reference sources and texts in psychology and related fields. Mainly for undergraduate students.
2. How to Find Out in Philosophy and Psychology by D.H. Borhardt. Published in 1968 by Pergamon Press.
3. Professional Problems in Psychology by R.S. Daniel and C.M. Loutlit. Published by Prentice Hall in 1953. It provides information on professional matters, psychological literature, organizations, journals and reference works.
4. Harvard List of Books in Psychology published by Harvard University Press in 1971. It is a guide to psychological literature. It is periodically updated.
5. UNESCO's World List of Social Science Periodical
It includes periodicals from individual countries and from international organizations.
6. The Students Psychologists Handbook : A Guide to Sources
It was first published in 1969 by Cambridge University Press in 1969 and distributed by Harper and Row.

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