Chapter - I

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

Although there had been relatively much speculative discussion of memory before Ebbinghaus, experimental study of memory has been largely dominated by the Ebbinghaus tradition, both in terms of methods and materials used. The doctrine of associationism was to the fore at the time experimental interest developed in memory, and naturally greatly influenced evolving concepts relating to this function. According to the associationistic view-point all mental life could be explained as an organisation of sensory impressions resulting from the stimulation of the sense organs by the various stimuli that impress upon them. A mechanical view of memory fitted easily into this ideational system. Memory was effective when an impression or idea was firmly associated with another impression or idea so that the occurrence of one called forth the other. This view dominated the thinking of, and the experiments on memory conducted by Ebbinghaus as it had dominated the work of Wundt and his students in the case of attention. It also considerably influenced Muller although he broke away from strict associationism to the extent of saying that the interaction among the aroused associations was important in determining the emerging idea or

memory. The mental processes which were considered fundamental to memory were, on the one hand, regarded as the imprinting of impressions and the forming of associations, and on the other hand, the reproduction or revival of these impressions and associations. It was further assumed that every perception or idea which comes to consciousness, leaves behind it a trace or after-effect and since this residuum had to do with subsequent revival it was called a 'disposition to remember'. The relative strength of associations and the valence or strength of dispositions was explained in terms of frequency of contiguous occurrence, best exemplified by the law of frequency.

Ebbinghaus was concerned with the memory process, largely in quantitative terms of remembering and forgetting. Picking up frequency of repetition as the essential condition of association, he showed how repetitions could be used as a measure of memory. Although the concept of memory he got from the British associationists, and the idea of mental measurement from Fechner, it is Ebbinghaus's own contribution to have shown conclusively that memory products are as amenable to experiment and measurement as any other natural facts with which science deals. The nature of memory, in the words of Ebbinghaus, may be stated as follows:

> "Mental states of every kind -- sensations, feelings, ideas which were at one time present in consciousness, and then have disappeared from it, have not with their disappearance absolutely ceased to exist ... but in a certain manner continue to, stored up, so to speak, in memory. ... We cannot, of course, directly observe

> their present existence, but it is revealed by the effects which come to our knowledge ... We can call back into consciousness by an exertion of the will directed to this purpose the seemingly lost states, that is, we can reproduce them voluntarily." (Ebbinghaus, 1885).

If we examine Ebbinghaus' work closely we shall find that he exerted considerable influence on contemporary thinking and during the next twenty or thirty years which followed the experimental investigations of Ebbinghaus, research in the field of learning and memory was dominated by his method.

The behaviouristic view of memory is in general accordance with associationistic view point but with an emphasis on physiological rather than mental components. It regards memory as a resultant of relatively fixed, low-resistance pathways connecting apparent sensory impulses with apparent motor responses. According to Watson (1919) memory is a general term to express the fact that after a period of no practice in certain habits, whether we call them explicit bodily habits or implicit word habits, the function is not lost, but is retained as a part of the modification of brain although it may, through disuse, have suffered greater or less impairment:. In other words, memory is merely the maintained association of a response with a stimulus over an interval of time. Successive increments generated through repetitions of an association summate to yield the strength of a habit. Whenever, the

same stimulus tends to evoke two or more incompatible reactions, the one having the strongest habit strength in association with the stimulus will occur.

It was, however, early recognised by many psychologists that the frequency principle was insufficient to explain the complex phenomena of memory. Several other factors were emphasised. Thus Ebert and Meumann (1905) held that our general capacity to retain and to reproduce also depends upon the development of other functions of consciousness especially upon the concentration and persistence of attention, the effort of Will, the emotional condition and the like. It is a familiar fact that occurances which are intimately tinged with emotion are remembered more readily and in more complete detail. Ziehen (1924) hypothesized that the interaction of all the aroused associations or "constellations" has a role in determining the emerging idea or memory. A similar concept "complex" was introduced by Muller who, as stated earlier, held that the interaction among the aroused associations was important in determining the emerging idea or memory. Ach (1910) of the Wurzburg school introduced the concept "determining tendency" to emphasize a selective psychic function in contrast to the merely quantitative strength of association. Thus he added something more dynamic to the standard theory of strengthening associations through repetition. He designed a series of experiments in which a habit of reproducing nonsense syllables was set up through repeated exposure, and

then a determining tendency was introduced which might either facilitate or hinder the habit created by practice.

With the emergence of the Gestalt school there was the increased emphasis upon the active nature of the remembering process. According to Gestalt theory, there is a systematic change in the organisation of retained material as a function of time. The principles of organisation involved appear to be similar to, or identical with, those formulated by the Gestalt psychologists in relation to perception. Gestalt psychologists have hypothesized that there are "fields of organisation" in memory and that these are related to "physiological fields" in the cerebral cortex. They advanced the notion that the memory trace tends towards a better form, and that every form approaches something like an "ideal in memory. If the original impression was in the form of a slightly distorted circle, the trace in the brain field drawn by this impression (excitation) will include the same dynamics, i.e., a continuing tendency towards a good circle. As pointed out by Osgood, "Rather than being merely a passive etching which is gradually obscured, for Gestalt psychologists like Koffka, Kohler and Lewin, memory trace is a dynamic affair existing in fields of stress set up by conditions of perception and motivation" (Osgood, 1956). The trace concept was further elaborated by Katona, Katona (1940) made a distinction between individual traces, referring to specific items, and structural traces, derived from the wholeness character of a process. The structural

traces are said to be more adaptable and flexible, to be formed more quickly, and to persist longer than individual traces.

Although adhering to Gestalt principles, a slightly different treatment is given to memory by Lewin and his followers. Lewin was critical of the association theory of memorization and retention and was of the view that there is no "force" within mere association to lead to reproduction. Emphasizing the dynamic interplay of forces, he held that memory like other psychic events, must be understood in terms of other psychic "tension system" set up by the needs or intention of the organism. It was his belief that reproduction itself must be motivated. This early recognition of the dynamic organisation of reproductive tendencies is reflected in later experiments by Zeigarnik (1927) and several other investigators on the relationship between tension and retention as shown in memory for finished and unfinished tasks, and the tendency to resume unfinished task when the opportunity arises.

The foregoing account of the various concepts and theories of memory indicates two distinct approaches which have largely influenced and determined the direction of research in this area. There is, on the one hand, a static or mechanical view of memory regarding it as the passive retention of impressions or the maintained association of a response with a stimulus, generated through successive repetitions of the association. This view has been widely held by those adhering to

the association theory or its variant like behaviourism. The Gestalt and the dynamic approach to memory, on the other hand, emphasize the importance of set, motivation and perceptual organizing forces as determining factors of retention. This view is represented by Ach, Lewin, and psychologists of the classical Gestalt school.

Following the scientific logic of operationism, whereby facts and concepts are related to the concrete operations, and with the model provided by Ebbinghaus, the behaviorists have dealt with the phenomena of memory mainly in quantitative terms. Among the many problems investigated, the problem of forgetting has received considerably greater attention. A considerable amount of theoretical and experimental argument has concerned around the variables and conditions which operate during the retention interval and bring about decrement in retention or forgetting. As in the case of memory phenomena, in general, the behaviourists have also explained forgetting in terms of their basic stimulus and response constructs. Thus forgetting, according to them, is a direct function of the degree to which substitute responses are associated with the original stimuli during the retention interval. Experimental studies carried out under the name of retroactive and proactive inhibition amply justify this view.

In general, the behaviourists have tended to bypass problems of the type studied by Ach, Lewin and psychologists of the classical Gestalt school. They have concentrated on experimental situation in

which peripheral stimuli and responses can be independently manipulated and objectively measured. Using such situations, they have derived concepts which can be anchored to specified operations. Thus retroactive inhibition, an observed decrement in retention can be meaningfully and empirically related to a number of variables such as nature of the interpolated activity and its temporal position. On the other hand, the psychologists of the classical Gestalt school, Lewis and others, holding a dynamic viewpoint, have dealt with central processes such as perception, memory trace, motivation etc. which seem difficult to be manipulated in the experimental sitting of a psychological laboratory. "Forgetting", according to the Gestalt psychologists, "represents the failure of the present excitation to come into communication with an older trace or trace system" (Osgood, 1956). The factors which are considered responsible for forgetting are: autonomous disintegration, assimilation and low tension in the trace system. In keeping with their interpretation of memory, they have described the retroactive inhibition situation in terms of figure-ground organisation. In other words, if an isolated or dissimilar item is inserted in a list of similar items, the memory trace of such an item, standing out as figure on a ground, will be retained better than the memory traces of similar items which assimilate with one another and loose their identity. Evidence for the hypothesis that perceptually isolated items are learned and retained better than similar items was presented by Von Restorff(1933).

inhibition should occur only when the interpolated learning occurs immediately after original learning because this is the time at which interpolated learning should interfere with the setting-in process of original learning. But experimental evidence shows that this is not always the case. Neither can the perseveration theory predict the effect of similarity which, according to the competition theory, is the major determinant of retroactive inhibition. According to Gibson (1940) competition should occur when there is a low degree of discriminability (or a high degree of similarity) between stimuli connecting two different responses. While the competition theory seems to be correct as far as it goes, some psychologists think that it does not account for all the data of retroactive inhibition (Melton and Irwin, 1940; Melton and Von Lachum, 1941; Barnes & Underwood, 1959).

From what we have said above, it should be clear that there are different explanations of forgetting and each accounts for some of the known facts. A major implication of the interference theory is that the fundamental condition that produces the decrement in recall is a form of interaction between original and interpolated activities. Another interesting implication of this theory is that the amount of forgetting should be independent of the temporal position of the interpolated activity. On the other hand, the essence of the Gestalt theory is that memory traces established in original learning will persist longer and resist assimilation and interference if the materials presented for original learning are well structured or highly organized. It may

be interesting to note that the Gestalt and interference theories do not differ to any great extent with respect to the explanatory principles they employ. The Gestalt principles of assimilation and isolation duplicate the behaviouristic principles of generalization and discrimination. Similarly, the Gestalt concept of tension systems yields about the same prediction as the behaviouristic concept of drives. These are important considerations which have guided us in formulating the problem of the present investigation.

Instead of a negative approach of trying to find out the conditions which bring about decrement in retention, the present research attempts to discover the factors which enhance retention under interfering conditions or, in other words, counteract the effect of retroactive inhibition. Set, motivation and perceptual organisation are the three factors which have been selected for this purpose. Assuming the existence of the phenomenon of retroactive inhibition, the investigation under consideration raises the question as to the possible relationship between inhibition and set or/and motivation, on the one hand, and between inhibition and perceptual organisation, on the other. As mentioned earlier, temporal position of the interpolated activity, and, to a greater extent, similarity between original and interpolated activities have been considered to be the major determining conditions of retroactive inhibition. Although one of the implications of the interference theory is that retroactive inhibition should be independent of the temporal position of interpolation, those upholding the Muller and Pilzecker perseveration theory may still claim that the inhibitory effect of interpolated activity will be more pronounced if

such an activity is introduced immediately after original learning. The problem of the present investigation, therefore, necessitates the use of retroactive inhibition situations in which interpolated activity is introduced immediately after original learning and the factors of set, motivation and perceptual organisation are introduced without simultaneously varying the degree of similarity between original and interpolated activity. Thus using a behaviouristic model of experiment, the present study attempts to determine the extent to which the dynamic factors of set, motivation and perceptual organisation minimize the inhibitory effect of interpolated activity.

For some years now, psychologists have realised that an attack on the problem of forgetting should be more appropriately mounted in terms of a positive approach of trying to find out the conditions under which the material is well remembered. The present study is an attempt in this direction. Some of the studies which bear directly or indirectly on the present research are mentioned in the next chapter. Aim and importance and a detailed outline of the present research have also been given at the end of the next chapter.