CHAPTER ONE

INTRODUCTION

RETENTION

Achievements in various walks of life in general and academic achievement in particular are the corner stones for successful living in today's competitive society. Acquisition of knowledge about self and the world, retention of it and the retrieval of same at appropriate time and place are, therefore, the matters of prime concern for achieving anything in life. Clearly, a good memory and an efficient retentive function are of great help in everyday life to all brain workers who heavily lean on their facility in acquiring and retaining predominantly verbal information.

Retention refers to the stability of learned material over time. Or another words, remembering is the retention of knowledge overtime. Information about the past is available for use today and information about today's event can be stored for future use. Experience changes the individual and this change persist overtime. For Psychological purpose of scientifically studying human learning, retention has been defined as remembering now what has been learned before. It signifies the process of preserving and maintaining effects of earlier learning experience and later using them in some kind of behavior. But remembering here and now what has been previously learned presupposes that it must have been retained in some form in the meanwhile. Therefore, learning, retaining and remembering constitute a memory. So memory is a comprehensive process which include learning, retention, recall and recognition. The names given to this process may vary e.g., an alternative nomenclature would be trace information, trace storage and trace utilization (Melton, 1963). According to Adams (1967), memory is the habit states of a subject that give the capability for correct occurrences of a criterion response. There is an initial acquisition session in which the subject makes a discriminative response to a stimulus, followed by a period of time called as the "retention interval" when the criterion response does not occur. After an interval there is a retention test in which the subject is asked to recall the criterion response in its original form when a stimulus is presented or, in the case of recognition, to indicate with an identification response whether he has experienced the stimulus criterion response before.

INFORMATION STORAGE

Memory is a complex system with numerous interacting stages rather
than as something mediates between the presentation of a stimulus and emergence of a response. Waugh and Norman (1965) used the term ‘Primary memory’ to refer to short-term store and ‘Secondary Memory’ to refer to long-term store. In his modal model Murdock (1967, 1972) assumed that information is initially held in a modality specific sensory store, but that information is rapidly lost through decay unless attention is paid to it. Attended items are passed on to a limited capacity short-term store, where they are rehearsed or displaced by further items. Rehearsal is used both to maintain items in short-term store and to transfer (or copy) information about the items to a semi-permanent long-term store. Any items in short-term store at the time of test can be recalled. The capacity of long-term store is essentially unlimited, with forgetting being determined by interference. According to Norman (1970), first newly presented information would appear to be transferred by the sensory system into its physiological representation that is stored briefly in a sensory information storage system. Following this sensory storage, the presented material is identified and encoded into a new format and retained temporarily in a different storage system, usually called short-term memory. Then if extra attention is paid to the material, or if it is rehearsed frequently enough, or if it gets properly organized, the information is transferred to a more permanent memory system long-term memory. Then, finally when it is necessary to retrieve information from memory, decision rules must be used, both to decide exactly how to get access to the desired information and then to decide exactly what response should be made to the information that has been retrieved". It has been suggested (Baddley, 1972) that an important distinction between short-term store and long-term store is that information processing is primarily phonemic (i.e., acoustic and/or articulatory) in short-term store but predominantly semantic in long-term store.

One important distinction can be drawn between the two types of stimuli i.e., the nominal and the functional. The former is the stimulus as the experimenter presents and defines it, the latter is the stimulus as coded by the subject. The subject acts upon or transforms the physical stimulus and this is termed coding. The function of this sensory registration of nominal stimulus is to retain material for a sufficient period for coding processes to act upon the physical stimulus and transforms it. The two basic aspects of coding process are first, the structural limitations upon the amount of information that can be processed at any one time; second, the variety of the coding process available. These two aspects are reflected in the distinction between reduction and elaborative coding (Baddley and Patterson, 1971). Reduction coding reduces the amount
of material the subject has to process, elaboration coding adds to it. Both type of coding serve to assist the recall performance, reduction coding by easing the information load on the system, elaboration coding by making material more distinctive from other material, and therefore more easily retrieved. Craik and Tulving (1975) and Lockhart et al. (1975) were unsatisfied with the original analogy of Craik and Lockhart (1972) regarding depth of processing. They argued that the original formulation suggested that a stimulus was processed through a fixed series of analyzers from structural to semantic. Such a model is unsatisfactory since it is difficult to conceptualize a continuum of analysis in which structural analyses shade into semantic analyses. They prefer to think of domains of encoding with separate processing within each. Some processing must occur in the structural domain before semantic analysis can begin: Only processing necessary to provide evidence for other domains is required. If a stimulus is highly predictable (e.g. a word in a familiar phrase, an object in a familiar room) then only minimal processing may be necessary at the structural level before analysis begins at the semantic level. Craik and Tulving (1975) prefer a model based on encoding elaboration to one based upon depth. They suggest that a word is usually identified, but the minimal encodings can be elaborated by further structural, phonemic or semantic encoding. They conceptualize the memory trace as the record of the pattern recognition and interpretive analysis carried out on both the stimulus itself and its context. Context is important. The more elaborate the semantic question sentence, the better the recall. In understanding language one must rapidly retrieve and make use of what he has learned about the meanings of the words that he has read or heard. One must select alternative meanings and be able to interpret statements metamorphically as well as literally. So it is clear that an important function of the memory system involves providing rapid access to the meaning to the words. The part of the memory system concerned with the storage and access of the meaning of words in semantic memory. Semantic memory stores the knowledge necessary for the use of language and the information stored in semantic memory does not retain details of the situation in which it was acquired. On the other hand, episodic memory is the store of personal experience, is stored on the basis of the time and place of its occurrence and its temporal and spatial relationship to other events. According to Tulving (1972) “Semantic memory is a mental thesaurus, organized knowledge a person possesses about words and other verbal symbol, their meanings and referents, about relations among them, and about rules, formulas and algorithms for the manipulation of these symbol, concepts and relations. Semantic memory does not register perceptive properties of in
but rather cognitive referents of input signals". The majority of studies investigating semantic memory have been concerned with the individual words and their attributes, it is also important to consider those aspects of semantic memory that underline the retention of sentential information. Studies of sentence memory by Bartlett (1932) and Bransford et al. (1972), have indicated that subjects frequently remember both the information actually specified in sentences and information that can be inferred from that provided. Presumably such inferences are stored in semantic memory. Kintsch (1972) presented subjects with simple sentences, and asked them to specify any information that the sentence conveyed to them that was not explicitly stated. The two major inferences made by the subjects dealt with (a) missing grammatical cases; and (b) semantic implications. For example, to the sentence “seymour carves the Turkey” many subject responded by supplying the instrumental phrase with a knife. It seems that in many cases our coding of relation between sets of attributes goes beyond the relationship apparently expressed by an utterance. The depth-of-processing approach has been successfully applied to sentence memory, where the evidence indicates that the more deeply sentences are processed, the higher the level of recall. Bobrow and Bower (1969) varied the level of perceptual processing of visually presented sentences by measuring subject’s incidental recall of the object noun in the sentences for which they had previously had either to disambiguate the meaning of a word or to judge the accuracy of its spelling. They found that the task which had oriented subjects to the meaning of sentences led to much better recall at the end of the experiment than the task which had required them to work for spelling errors. In another experiment reading the sentence three times led to proper recall than generating a continuation of the sentence. They concluded that semantic coding during input is necessary for efficient memorization. Similar findings have been obtained by Anderson and Hidde (1971). Treisman and Tuxworth (1974) conducted an experiment wherein when subjects were asked different level, their subsequent recall showed an interaction between recall delay and type of target (Phonemic or semantic anomaly). The difficulty of the monitoring task was equal for these two types of target. The results therefore suggested selective interference by phonemic monitoring with the semantic encoding of a sentence which was necessary for it to survive a delay. The most influential theorist who has emphasized syntactical factor is Chomsky (1965). His complex theoretical position has been explicated in several places (Greene, 1972; Anderson and Bower, 1973). His crucial assertion is that every sentence has both a deep structure and a surface structure. The surface structure is related to the physical form, or sound pattern of the sentence and it determines the phonetic interpretation.
of the sentence. Deep structure refers to the underlying abstract structure which determines the semantic interpretation of the sentence.

A number of correct models of human memory (e.g. Anderson and Bower 1973; kintsch, 1974) describe the process of encoding a sentence as drawing upon two types of information: (1) Syntax-Knowledge of the structure of linguistic expressions, grammatical as well as the lexical information and. (2) Sentence-Knowledge of objects and their relations used to determine the reference of the expression.

The gist of simple English sentences and of propositions in complex sentences tend to be recalled in an all-or-none manner. Goetz et al. (1981), have interpreted this finding as a support for the Gestalt view of sentence memory in which propositions are well-formed wholes and are remembered as such. Anderson (1976) however, has suggested that an associate view, in which the memory representation of a sentence consists of a set of independently linked concepts, can adequately account for the all-or-none recall of sentence gist.

Recent research with sentence materials has shown that sentences tend to be recalled better when they have an integrated structure than when they do not. Goetz et al. (1981) showed that sentences were easier to recall when they were just to characterize orderly situations in which actors and objects “go together”, than when the sentence described unlikely situations. Yekovich and Manelis (1980) found that when the same concepts were repeated across proposition (integrated structure), immediate recall and delayed cued recall were better when the same concepts were not repeated (non-integrated structure).

Bartlett (1932) argued that the central meaning of a prose passage is stored in schematic form, with subsequent recall being achieved by a process of reconstruction from the underlying schema. The central concept of the 'schema' was defined as “an active organization of past reactions, or of past experience, which must always be supposed to be operating in any well-adapted organic response”. This approach was adopted by Bartlett in his best-known study, subjects brought up in England were asked to memorize a story 'The war of the Ghosts' which is a tale taken from the North American Indian culture. The subjects gave a series of attempted recalls of the passage, and showed a tendency to distort and change the style and content. It is of importance to determine whether the changes introduced by subjects were memorial distortions or whether
they were rather the result of deliberate inventions on the part of the subjects in order to smooth out, or facilitate the telling of the story. Since Bartlett did not give any very specific instructions to his subjects it is probable that the subjects did not always limit themselves solely to what they could definitely remember from the passage. So, it is probable that the subset of semantic memory attributes for each concept in a sentence that is actually activated during sentence processing is strongly determined by contextual factors. Context is to be thought of as operating both forwards and backwards in the sentence, rather than merely left to right (Cf., Miller and Selfridge, 1950). Bartlett (1932) asserts that the configuration that is formed may incorporate semantic attributes only indirectly related to those defining the words in the sentence.

Collins and Quillian (1969, 1970) introduced an experimental technique. They presented their subjects with sentences such as 'A canary has wings' and asked them to indicate as quickly as possible whether the sentence was true or false. They argued that the characteristics of canaries (e.g.) they have wings, they have skin and they are yellow could either be stored in semantic memory with the concept 'Canary' or might be stored at some higher level of hierarchy. Since essentially all birds have wings, they claimed that it would be cognitively uneconomical to have information about the possession of wings stored with each bird name. A process of inference could be used, in which the subject would verify the sentence "A canary has wings" by retrieving the information that a canary is a bird and that birds have wings. Information about the possession of skin would be stored still further up the hierarchy since nearly all animals have skin. At an empirical level, it should take longer to verify a sentence, the greater the separation of subject and predicate in the hierarchy.

Thus, 'A canary is yellow' should be verified quickly, since the predicate is yellow' would be stored with the concept canary. 'A canary has wings' should be verified somewhat slower, because two steps (canary is bird to animal) are involved.

The results supported this hypothesis, but some more recent work has rendered it untenable. The basic difficulty is that, while the various sentences above may differ in the distance between subject and predicate, they undoubtedly differ in several other salient characteristics. For example, it is probable that the reader is more familiar with the sentence 'A canary has skin', and Cornard (1972) has confirmed the importance of this factor. She found no effect of hierarchical distance, but a substantial effect of sentence familiarity. She concluded
that properties are stored with every word which they define, and that inferential processes are not used. However, Anderson and Bower (1972) noted that unusual sentences may indeed require inferential thinking (and some guesswork) in order to be verified.

Craik and Lockhart (1972) pointed out that stimuli when processed by the perceptual system are analyzed to different degrees. Some items may only be analyzed for their physical or structural features. Others may be analyzed further so that their phonemic characteristics are processed. Others may be further processed so that their meaning is analyzed and perhaps elaborated by the retrieval of associations. According to them the increase in processing that takes place from physical to semantic processing is an increase in the depth of processing. The deeper the processing the more permanent are the trace laid down in the memory and longer is the time required to the processing. Jacoby (1975) manipulated the study encoding of a list of words so as to emphasize either the physical (i.e., sound and spelling) or the semantic word attributes. Subsequent testing confirmed that the experimental manipulation has been successful. A recognition test indicated that physical information was retained over the long term as well as semantic information. Hence, Jacoby (1975) concluded that there must be some factors other than the class of attributes chosen from encoding that determines retention.

**SEMANTIC MEMORY**

Deese (1970) has introduced the method of free association in which the subject is asked to respond with the first word that comes into his mind after being presented with a word by the experimenter. It, thus, has the advantage of permitting subjects to respond with any word they wish it is largely free from the external context. In a series of studies, Deese (1961, 1962, 1965) has investigated the mean relative frequencies with which all the words in a list tend to elicit each other in tests of free association. The greater this relative frequency for any list, the greater is its inter-item associative strength. Several experiments have obtained significant relationships with inter-item associative strength. On the basis of the results obtained Deese (1965) postulated two processes to account for associative overlap. The first is that of a sharing of common attributes of meaning. He suggests that the overlap of the associations to two stimulus words is a result of the overlap of attributes which those words share. The second basic process is that of contrast. Deese supposes that instead of grouping items together on the basis of several attributes, we sometimes...
select an attribute and contrast the position of different nominal items along it. This explains the frequent occurrence of antonym responses (hot ≈ cold), particularly in the case of adjectives. Such antonym responses might be expected to occur when one particular attribute of meaning is by far the most dominant in one's coding of a word.

This interpretation of associations in terms of attribute has support from Deese's (1959) finding that items which were more likely to elicit each other as associates were better recalled in a free recall task. This result suggests that overlapping attributes permit better coding of relations and hence better recall.

One method of investigating semantic memory is to present strings of letters to the subjects and to ask him to decide as rapidly as possible whether each string is an English word. Rubenstein, (1970) conducted a study in which subjects has to distinguish between English and nonsense words. They found that response times were faster for English words than for low frequency words, and for homographs (i.e., words with more than one meaning) than for non-homographs. Rubenstein et al. (1970) explain there findings in terms of the dictionary search metaphor. They suppose that homographs have more 'lexical entries'. In terms of the attribute model, the presented letter strings would be coded in attributes, both phonological, syntactic and semantic. As soon as sufficient attributes had been coded to assure the subject that this was a word, he could respond. The greater speed of English over nonsense words would be explained in terms of all three types of attributes being available, of more frequent over less frequent in terms of practice of constructing and of homographs over non-homographs in terms of the greater number of semantic attributes being available for the homographs.

In his experiments Meyer and Schvaneveldt (1971) found if the two strings were highly associated English words (bread ≈ butter), reaction time was faster than if they were not closely associated. This implies that coding by semantic attributes is important in the English versus nonsense comparison. In a task in which subjects have to decide the truth of statements such as 'A Robin is a bird', Smith et. al (1974) assumed that subjects would retrieve both characteristic and defining features of the two nouns and determine the overall degree of feature similarity. If the overall similarity is high, the subject rapidly response 'true' while if the overall similarity is low, the subject rapidly responds 'false'. However, if the degree of overall similarity falls in the intermediate ran
a second comparison occurs on the basis of the defining features only of the category and test instance. Thus, for 'true' sentences, the greater the degree of semantic relatedness, the faster the response latency should be, since highly related nouns will only require the first comparison process. Johnson Laird (1974) also states that the greater the similarity in meaning between words, the easier it is to make a positive judgment, and the harder it is to make a negative judgment, about a semantic relation between them. One theory that has attempted to interpret this generalization is an extension of the Schafer and Wallace hypothesis proposed by Rips et al. (1973) and by Smith et al. (1974) their initial assumption is that the meaning of a word is not an unanalyzable unit, but can be represented as a set of semantic features. Moreover this semantic features may be divided into defining and characteristic features. For example, some of the defining features of the concept 'robin' are having wings, having distinctive colors, and being a biped, whereas perching in trees and being undomesticated appear to be characteristic features. For more abstract term such as 'bird' it is possible that we commonly think in terms of a typical bird having among its characteristic features, a specific size and ferocity (Rosch, 1974). A sentence such as ‘that bird is big’ is evaluated in terms of our conception of the average size of a bird.

An alternative approach to characterize overlaps between codings in a more general way - i.e., one may judge that two words have similar codings, and try to discover which attributes are responsible for this apparent similarity. Miller (1972) has employed the method of incomplete definitions in order to try to discover these shared attributes. An incomplete definition is a substitutable phrase that has a more general meaning than the word it replaces but which expresses some important semantic aspect of the word. Miller (1972) applied his method of incomplete definitions to 217 verbs of motion and located 12 major semantic components of this verbs. He states that the results do not provide evidence as to how the subject has learned to code by attributes or as to how he understands or produces sentences using these attributes. His experiments are the studies of lexical memory. However, the usefulness of attributes in a generative way can be imagined. That is, one might use different ways of combining attributes to understand complex output.

Schafer and Wallace (1969, 1970) presented subjects with word pairs composed of trees, flowers birds and mammals, and asked them to respond 'same to those pairs consisting of two members of the same category and
to respond 'different' to all other pairs. The conclusion is that the subjects considered the degree of attribute or concept overlap between the two members of a pair. A substantial overlap of attributes facilitates the judgment that the words are from the same category but has a detrimental effect on the 'different' judgment.

In the experiment by Freedman and Loftus (1971) the basic procedure involved the presentation of a category name followed by a single letter. The task for the subject was to respond as quickly as possible with a member of a specified category starting with the designated letter. The results confirmed that the category-letter pairs that had an appropriate responses of high frequency and of high dominance produced the fastest responses. Loftus (1970) found that the time taken to retrieve a member of a category did not vary with category size. However, reaction time did correlate closely with the word frequency of the most common category member. The more common a word is in the language, the faster it is likely to be retrieved. The same applies to the frequency with which an item is given as a member of the category (Loftus and Freedman, 1972). Furthermore, with frequency held constant, the earlier a word is acquired in development by children, the faster it is retrieved (Carroll and White, 1973).

For 'false' sentences, the opposite should be the case, with low degrees of semantic relatedness facilitating fast responding. Black et al. (1979) found that narrative with a consistent point of view were remembered better, read faster and rated as more comprehensible than those with a change in point of view. Other studies (Morris et al. 1979; Owens et.al. 1979) have shown that presenting relevant information prior to a study can provide a coherent frame work in which to interpret the prose. Whether this prior information provides a motive for story character (Owens et.al. 1979) or allows for elaboration (Morris et al. 1979) can result in improved recall of the story. However, Morris et al. (1979) showed that recall improved only when the prior information was consistent with the learner's general knowledge of the word. These studies than show that interrelationships between sentence in stories, as well as their relationships to the reader's knowledge, affect retention. Similar results have been reported with a series of conceptually related sentences i.e., recall is better when sentences are integrated into a coherent whole than when they are not. Black and Bern (1981) have shown that when the events described in two adjacent sentences of a narrative story are casually related, they are easier to recall than when not casually related.
O'Brien and Myers (1986) conducted two experiments to extend the earlier work in which an inverse relation between processing difficulty and subsequent memory performance in sentences containing a target word was found. Forty-two undergraduates read passages that contained a target word that was either predictable or unpredictable from a proceeding context. Experiment I demonstrated that by using reading times, subject took longer to comprehend a line of text when it contained an unpredictable target word, but this increased processing time facilitated recognition of the unpredictable word. In experiment II subjects showed better recall for passages that contained an unpredictable word. This difference in recall was only for information that proceeded the unpredictable word. It is proposed that when readers encounter concepts that are difficult to integrate, they will reprocess earlier portion of a text in an attempt to integrate the unexpected concept with the text. If successful, this reprocessing will improve memory for selected portion of a text. Several studies of sentence memory (Johnson-Laird and Stevenson, 1970; Sachs, 1967) have shown that sentence meaning is much better retained than syntactical features over a short retention interval.

A recent study with deaf subjects (Hanson and Bellugi, 1982) also supports this conclusion. In this study at delayed testing, paraphrases were as not well discriminated from originally presented, sentences as were changes in semantic context. Thus, it appears that the gist of either signed or spoken sentences constitutes the primary information retained. They have found that with delayed testing changes in sign order and lexical changes which preserved meaning were detected better than would be expected by chance. Yokowich and Thorndyke (1981) found that information concerning the gist as well as the exact wording is retained. They showed that sentence paraphrases could be discriminated from sentences previously read in story even after a one hour delay. Further more, this effect varied inversely as a function of the importance of centrality of the sentence to the story. In other words, the more important a sentence was the less well subjects retrieve the exact wording of the sentence. Christianson (1980) found that after one week sentence wording was retained at an above chance level; however, the wording was not remembered as well as information about sentence gist or paragraphs theme.

**Measurement of retention**

Verbal responses constitute the major part of man's waking life. Thus, scientific study necessitates their measurement. Retention can never be measured
directly. It is inferred indirectly. Some of the ways to measure retention are given below.

1) Recall- The most obvious measures of the degree of learning or amount remembered are the number of items correctly recalled or the number of trials or time taken to reach perfect recall of the list. Recall may be tested under two general types of conditions. In free recall the subject is presented with a list of items and, following a retention interval, is allowed to recall the items in any order he wishes. The second type of test condition involves providing the subject a cue for recall.

2) Recognition- A second technique for investigating memory is the recognition memory task. In recognition the subject is required to select the items he previously learned or experienced from a larger group containing both the old items and similar items that were on the study list. Memory is indexed by the number of correctly recognized items where correct recognition involves not only selecting the appropriate old items, but also includes rejection of the new distracter items.

3) Paired-associate learning- In paired-associate learning, subjects are shown pair of items, the first designate the stimulus, the second the response. Recall is tested by showing first the stimulus items and requiring the subject to recall the response.

4) Savings- The savings method requires that the subject relearn the material, usually to a criterion used during original learning. This procedure permits a comparison.

5) Reaction time- The procedure in this technique involves probing for well-memorized information and measuring the elapsed time between presentation of the probe and the subject's responses.

6) Reconstruction- In this method the stimuli are presented in a certain arrangement, then this arrangement is broken up and the stimuli are handed to subject with an instruction to reconstruct the original order.

Theories Of Retention Or Forgetting

It cannot be denied that forgetting is an important practical problem in everyone’s life. Retention is the term referring to the positive aspects of memory,
forgetting a term referring to its negative aspects. Retention and forgetting are thus, reciprocal terms for the quantitative aspects of memory, with retention indicating the amount remembered under specified conditions and forgetting the amount not remembered under the same conditions.

The process which causes forgetting is not initiated only after learning ceases; it is present during learning but becomes clearly evident only when active learning stops. It may be assumed that two processes are involved in learning as we record it. One of these processes tends to strengthen response tendencies (Learning) and the other to weaken response tendencies (forgetting). When we measure an increment in performance were measuring the net effect of two simultaneous processes with learning greater in magnitude than forgetting. From slow learning we may infer a forgetting process of greater magnitude than we infer from fast learning. Since the forgetting process continues after active learning, we arrive at a prediction of rate of forgetting from an observation of the rate of learning. “When learning is rapid, forgetting will be slow and when learning is slow, forgetting will be rapid.”

A basic fact of retention is its clear loss with lapse of time. This has been summarized by Ebbinghaus (1885) in the major generalization that retention decreases as the interval from that practice increases. He calculated amounts retained after varying lapse of time (saving method: original learning-relearning) and plotted them against time, in an attempt to trace the exact course of retention. This is the famous Ebbinghause curve. The main features of the curve are a rapid loss of retention followed by slow rate of forgetting as time goes by. Under usual laboratory conditions, most of forgetting occurs within the first few hours and after the initial twenty-four hours the decline in retention is indeed very slow and gradual. As time advances, the curve of forgetting flattens so completely that total forgetting is only theoretical possibility.

The most common conceptualization of forgetting has been that it is caused by interference. Originally learned materials cannot be reproduced they are forgotten because in the mean while, new responses get associated with the old stimuli. These subsequently learned responses interfere with the recall of old ones. Forgetting is due to subsequent learning of new materials. There is failure to remember because earlier memories are disturbed and dislocated by later experiences. The two sources of interference include (1) learning that has occurred prior (Prior learning, PL) to the learning to be retained (Original learning, OL) and (2) learning interpolated (interpolated learning, IL) between
OL and the retention test the former is referred to as proactive interference (RI) and the latter as retroactive interference. Retroactive interference is interference from later acquired responses or in other words the adverse effect upon retention of an activity interpolated between learning and recall. In respect of the degree of original learning, the usual finding is that retroactive inhibition decreases as the degree of original learning increases. The more firmly the first task associations are established the better they can withstand the interference of interpolated activity. Many experiments have proved that similarity between the original and interpolated tasks is an important determiner of RI. As similarity between the original and interpolated activity decreases from their near identity, retention of the former drops to some lowest level at intermediate degree of similarity. As the similarity between the two activities lessens still further, retention picks up again and rises to a second high where the diminishing similarity reaches a stage of the two activities being entirely dissimilar. Moreover, effective similarity is not limited to within task similarity of stimulus and response terms but also includes the similarity of environmental contexts in which learning and moulding of behavior takes place. If two lessons have to be practiced, one after the other, interference between them could be considerably reduced by learning them under contrasting conditions. Quantity or amount of interpolation is a pertinent variable affecting retroactive inhibition. Greater the number of interpolated tasks greater the interference and retroactive inhibition.

**Theories of Retroactive Inhibition** - Various theories have been developed to explore the phenomenon of retroactive inhibition in relation to retention.

(i) **Perseveration theory of Muller and Pilzecker** - Muller and Pilzecker (1900) assert that interpolation of second activity immediately after the end of first learning is harmful to its proper retention. Hence, some undisturbed rest interval is necessary for 'soaking in' or consolidation of the first list traces. This is perseveration theory of retroactive inhibition which presumably indicated a state of continuing neural functioning following original stimulations, a process by which the active memory patterns of first learning get consolidated. Postman (1971) has made a further fine distinction that the perseveration view does not regard RI as the direct cause of long term forgetting; it only suggests that immediately following intervening activity so disturbs and weakens the effects of first learning as to render them liable to forgetting.

(ii) **Webb's Theory Of Transfer And Disruption** - Webb's (1971) theory involves a transfer of some phases of original activity to the interpolated activity, and
also a transfer of some phases of the interpolated activity to the relearning of the original activity. The first transfer results in the partial disorganization of the original activity, at the time of interpolation—this is the disruption aspect. The second transfer results in the partial reinstatement of the interpolated activity at the time of the recall of the original activity. Webb (1917) considers similarity between original learning and interpolated learning as a necessary condition in order for RI to occur. Woodworth and Scholesberg (1971) also agree that retraction is a back and forth transfer, and retroactive inhibition is a double negative transfer effect.

(iii) McGeoch's Theory of Reproductive Inhibition—McGeoch's (1942) theory of reproductive inhibition comprises two closely linked hypotheses. First, it is asserted that the availability of the original associations is not reduced by interpolated learning; the old system of response remains intact while the new one is being acquired. This assumption has been designated as the independence hypotheses (Barnes and Underwood, 1959). Second, competition between alternative response, inhibits recall. This is the hypothesis of response competition or reproductive inhibition proper, which specifies the mechanism of interference at the time of recall.

(iv) Two-Factor Theory of Melton and Irwin—Melton and Irwin (1940) performed an experiment to study RI as a function of interpolated learning, and on the basis of their experimental findings, identified two factors, Viz., 'response-completion' and 'factor X' called unlearning. According to postman (1971) the main innovation of this two factor theory is the assumption that the process involve for the retroactive inhibition have a dual focus: as interpolated learning proceeds, an increasing number of the original responses are unlearned and thus become unavailable; those which remain available are subject to completion from interpolated responses at the time of recall. Thus "response-competition" has viewed by them as a factor having minor importance in forgetting as compared to the 'factor X' i.e., unlearning.

(v) Gibson's Theory of Generalization—Discrimination—Gibson (1940) used the concepts of generalization and differentiation by analogy with conditioning to explain RI phenomenon. As pointed out by Flores (1970) the concept of generalization covers the probability of interference, and the concept of differentiation eliminates it. Thus, when stimuli are similar and responses different, according to this theory, there will be an affect or RI which will increase with the relative similarity of stimuli.
(vi) Underwood and Postman's Unlearning-Recovery and Response-Competition Hypotheses- Underwood and Postman (1960) identified previously learned associations between letters, e.g. A-B and previously learned associations between words, e.g. SUN-HOT, as the two sources of interference. They presume that to learn a unit sequence like SUN-CAT 'unlearning' of responses such as HOT to SUN has to occur. However, over the retention interval the response of HOT to SUN would undergo 'spontaneous recovery' and thus 'compete' with the response CAT, resulting in the observed forgetting. Thus this theory predicts differential forgetting for items differing in meaningfulness and presumes the previously well-formed language habits as the most probable source of extra experimental interference. However, as pointed out by spear (1970) the failure of spontaneous recovery of verbal learning to emerge as a phenomenon with sufficient robustness to account for the fundamental characteristics of RI and PI and the fact that meaningfulness that determines the extent of extra-experimental interference has been found to have little, if any, influence on rate of simple forgetting, have caused theorists to rethink the basic trends of Underwood's and Postman's theory.

(vii) Postman's Set to Respond and Generalized Competition- Based on his research findings, postman (1967) rejected the view that RI is mainly due to extinction (i.e., unlearning) and suggested that in a A-C,A-B paradigm of RI, when A-B is learned after A-C, the selector mechanism functions to exclude from the subject's immediate response repertoire all items from A-C, except those in the A-B list. Since the excluded items from List (A-C) are unavailable for immediate recall and the subject is 'set' to give responses from the second list (A-B) it being most recently learned, the resulting RI has been viewed by Postman as a function of set to respond and generalized competition.

(viii) Keppel's Non-Specific Unlearning- Keppel (1968) is of the opinion that the primary source of interference may be in the general (non-specific) linguistic activity that occurs during the retention interval and the basic mechanism of forgetting is unlearning of the list acquired in the laboratory due to non-specific linguistic activity which occurs during the retention interval. According to spear (1970), this non-specific unlearning is analogous to that occurring in a C-D, A-B paradigm, which has been interpreted as unlearning of the associations between the responses and the contextual stimuli.

(ix) Adams' Concern for NLM- Adams (1967) acknowledging the basic ideas of the interference theory expanded them so as to incorporate the operation of natural language mediators (NLM).
The current view of the interference theory of forgetting in general and RI in particular can best be expressed by this quote from Tulving and Madigan (1970): "Unlearning is still a major concept in the theory but it has changed its character drastically. Rather than referring to the extinction of both specific (stimulus-term and response-term) and general (experimental context and specific response terms) associations, it is now envisaged as a kind of suppression of the whole first-list repertoire of response in the course of second list learning. During learning of the first list, the subject limits his response selection to those occurring in that list. When he comes to learn the second list containing different responses, new 'Criteria of selective arousal' must be established. These criteria require the suppression of the first-list repertoire. When the subject is asked, immediately after learning the second list to recall the first list, the selector mechanism cannot shift back to the criteria used during first-list acquisition because of its 'inertia'; With passage of time, however, the set to give second-list responses dissipates, resulting in the lifting of the suppression of the first-list responses and consequent observably spontaneous recovery. The emphasis on response repertoires-rather than in specific associations- the central position of the concept of the selector mechanism, the postulated relation between the scanning process and criteria of selection, and the elevation of the concept of 'generalized' response competition to a position of dominance have drastically changed the nature of theory.

**Determinants Of Retention Or Forgetting**

The various conditions that operate (a) at the time of learning, the time when the original impression is being formed, (b) some during the interval between the end of practice and the retention test and (c) yet others at time of retention test itself are some of the causal conditions determining the degree of retention or forgetting. Learning and Retention are of one piece and run into each other, it is only natural that condition under which learning takes place should affect retention. These conditions are the degree of original learning, method by which it was carried, the kind of material, the length of lesson etc.

(i) **Degree Of Original Learning** - Amount of retention varies positively with the degree of original learning. An overlearned lesson is more durable and firmly fixated; therefore, its retention is superior. By contrast, an unlearned
or a barely learned lesson has an uncertain fate and may not be satisfactorily remembered on a retention test.

(ii) Influence Of Length Of Lesson- Common experimental finding is that longer lesson is better retained than shorter, if both are learned to the same level of mastery. A long and difficult task requires many more repetitions than the short and easy one. There is, therefore, greater scope for saving of effort and time and hence better retention.

(iii) Nature Of Learning Material- Meaningfulness refers to the associations called up by an item. The term 'association value' for the measure of meaningfulness was first devised by Glaze (1928). Larger the number of associations invoked by a verbal unit the more meaningful it is. Meaningfulness powerfully influences verbal learning; it definitely facilitates verbal learning, in all its varieties like free learning, serial learning, paired-associate learning etc. Meaningful words are learn-faster than nonsense syllables. Greater the meaningfulness or association value of verbal elements, the faster and easier is their learning. One of the reasons as to why meaningful material is more easily learned is that it is immediately available for appropriate associate learning. On the other hand, nonsense materials with all their unexpected combinations of elements have to be integrated, unified and made available for use as responses. The associative learning process of chaining has to start thereafter which accounts for their slower learning. Therefore, serial learning of a list of common words is easier and faster than that of low meaningful triagrams. Words being already well-integrated, no learning time need to be spent on their response learning; their serial ordering proceeds forthwith (Noble, 1952).

Frequency is the another index which is the predictor of the rate of verbal learning. According to Underwood and Schulz (1960) "the order of availability of verbal units is directly related to the frequency with which the units have been experienced". For example Howes (1957) found that the greater the frequency of words according to the word count by Thorndike and Lorge (1944), the more often they were given as responses in a free-association test. The point is that verbal units experienced more frequently in the past may be more readily emitted as responses or more correctly associated in a learning task or both. Common words are tend to be better recalled than rare words. Also rare words are easier to recognize than common words (Berry, 1971; Murdock 1974; Gregg, 1976; Morris, 1978). According to Deese (1960) high frequency items are better integrated in terms of the response learning stage and thus, are more promptly
available for overt production as responses. It is also true that high frequency items have occurred in the language in the presence of many other words, compared to low frequency words and thus have developed more inter item associations to facilitate the formulation of mediating connections.

Concreteness as an attribute of words consistently facilitates performance. High imagery (concrete) items are easier to learn in general than abstract materials (Paivio, 1971).

Familiarity with the material also puts its effect on verbal learning. Even the familiar words with low frequency are recognized more accurately (Arthur, 1976) whereas the non-familiar words are poorly recognized.

Another task variable having the greatest influence on verbal learning is intralist similarity. Intralist similarity usually increases forgetting. similarity may be formal or semantic. Formal similarity is defined in terms of the common letters possessed by verbal items. Semantic similarity may be of two types: meaningful and conceptual. Meaningful similarity usually is indexed in terms of degree of synonymity and conceptual similarity occurs to the extent that items belong to the same concept. In paired-associate learning, the higher the degree of stimulus similarity, the poorer the rate of learning whether similarity is formal (Johnson and Runquist, 1968), meaningful (Beecroft, 1956) or conceptual (Underwood et al. 1965). However, free recall or the response learning phase of paired-associate learning is facilitated by high meaningful similarity (Underwood et al. 1959) and high conceptual similarity (Ekstrand and Underwood 1963) but is retarded by high formal similarity (Horowitz, 1961, Underwood et al. 1964).

Sequential dependencies is the another aspect of the verbal material which affects the learning. Miller and Selfridge (1950) found that more closely a sequence of words approximates the order found in the language, the more rapidly it will be learned. For purposes of psychological investigation of the influence of sequential dependencies among words, various investigators have produced sequence of words which reflect different degrees of sequential structure. These structures are called approximations to English. Miller and Selfridge (1950) developed the first orders of approximation to English. Data gathered by Miller and Selfridge (1950) on the effects of orders of approximation resulted in superior recall.

Since the grammar of a given language can be described in many ways, it is not easy to specify the relation between grammatical structure and...
verbal learning. Epstein (1961) conducted an experiment on grammatical structure using types of nonsense sentences and concluded that the sentence containing the grammatical structure of English was easiest to learn. The only sentence easier to learn was the sentence employing normal English syntax and common English words. Despite the fact that same nonsense sequences occurred in all the nonsense sentences, those nonsense sequences embedded in sentences with normal English syntax were easier to learn. Therefore, it is clear that grammatical structure held the retention of individual words in ordinary sentences.

(iv) Recency- Another factor acting to determine the verbal output of an individual is recency. The probability that an item will be given back correctly decreases with increasing intervals from the time it was given to the subjects. Subjects rarely make an error by responding with an item that is not in the list being learned at the moment, a tendency governed by a hypothetical “selector mechanism”. Underwood and Schulz (1960) were the first to comment on this selector mechanism and its dependence upon recency. The selector mechanism provides a ‘set’ to respond from a restricted pool of items and this set dissipates as a function of the length of the retention interval that follows exposure to the items.

(v) Arousal And Affectivity- Kleinsmith and Kaplan (1963) measured changes in galvanic skin responses (GSR) during the learning with paired-associate with words as stimuli and digits as responses. Some of the words were selected to produce an emotional response and other to be less emotional. There was poorer recall of responses having high arousal stimuli after two minutes but this relationship gradually reversed with longer retention intervals. Also Paivio (1968) and Yullie (1968) found significant correlations between rated emotionally and paired-associates recall with unemotional words leading to better retention. The affective nature of the verbal materials is also important factor in determining the degree of retention. Kind of material (Pleasant, Unpleasant or neutral) varies from learner to learner. Pleasant experiences are generally more easily learned and better retained and remembered. According to Edward (1941) and Levine and Murphy (1943) retention was significantly better for materials which were compatible with the attitude of the subjects rather than for the materials which were incompatible. They had found for example that political orientation of the subjects influences their learning and retention. Covalant pro-communist passages were better retained by pro-communist subjects than by the anti-communist subjects. Similar results were obtained for anti-communist subjects.

(vi) Personality Dimensions- Being representative of fundamental higher-order
mental processes, the fields of learning, memory and forgetting attracted general-experimental psychologists who were mainly preoccupied with the verification of the S-R bonds, and being experimentally biased, treated "individual differences" in these processes as being simply a part of "error variance", without making any systematic effort to investigate the "Why" of such variations. On the contrary, psychologists dealing with individual differences, particularly personality psychologists, were more concerned with the identification of the source and/or surface traits of personality. However, Snygg (1955), Cronbach (1957) and Gardner and Long (1960) felt a dire need to adopt a dynamic field as the model of our conceptual system to avoid the separation between learning theory and personality theory. Thus, the modern literature on learning, mnemonic behavior and personality strongly mirrors a growing tendency among many psychology to adopt a holistic approach, so as to arrive at a fuller and better understanding of the nature of human behavior. (Sears, 1944; Dollard and Miller, 1950; Mowrer, 1950; Eysenck, 1957; Bandura and Walter, 1963; Bandura 1969 and Helode, 1991).

While accounting for the individual differences in learning and memory in the light of intelligence, Hovland (1951) in his review noted that "the correlation between learning scores and intelligence tends to be fairly high for complex ideational tasks and for verbal learning, but rather low for simple motor learning. Kapat (1956) reported correlations around .25 to .30 between intelligence and memory of a prose-passage, and between intelligence and memory of drilled Bengali-Arabic vocabulary. Maiti (1931) concluded that natural intelligence is only one of the determinants of memorizing nonsense syllables. Smith et al. (1979) observed no I-Q related differences in scanning for letter or triagrams. Thus, it seems that intelligence, a cognitive dimension of personality has by and large, a countable share in influencing, especially, learning and memory of the verbal material.

The role of trait and state anxiety in influencing learning and memory has been investigated by many psychologists (Shreedhar and Murthy, 1969 and Srivastava et al., 1980) and found a definite bearing upon learning of the verbal and motor tasks.

With an intention to study the main and interaction effects of Extraversion-Introversion and Neuroticism on learning and memory numerous studies (Wosinska, 1947; Farber and Spence, 1953; Eysenck, 1956; L'Abate, 1956; Franks, 1957; Bending and Vaughan, 1959; Buchwald, 1959; Jensen, 1962; Das and Mitra 1965; Shanthakumari, 1965; Singh, 1966; Holmes, 1967; McLaughlin and Eysenck, 1967;
Gray, 1968; Mohan, 1968; Mohan and Claire, 1968; Laungani, 1968; Tole and Pandey, 1969; Pederson, 1970; Snyder and Katahn, 1970; Hekmat, 1971; Jobin, 1971; Murray and Grand, 1971; Tunstall and Eysenck, 1971; Frith, 1971; Eysenck and Levey, 1972; Burjorjee and Helode, 1973; Gakhar and Luthra, 1973; Jolley and Spielberger, 1973; Mohan and Rajinder, 1973; Mohan and Munjal, 1974; Berry, 1975; Eysenck, 1975a; Eysenck, 1975b; Schneller and Garske, 1976; Reeves and May, 1977; and Ajawani, 1979) have been conducted and inspite of certain inconsistencies regarding their roles in learning phenomenon like verbal conditioning, extraversion-introversion and neuroticism dimensions of personality have definitely established their linkage with learning and remembering processes.

Efforts have also been made by the investigators to study the influences of Rrigidity (Pyron and Kafer, 1967); Need for Approval (Strickland, 1970; Miltham and Jacobson, 1978); Achievement Strivings (Weiner, 1978); Repression-Sensitization (Luborsky et al., 1965; Markowitz, 1969); Sensation Seeking (Kish, 1967; Kish and Ball, 1968; Bone and Cowling, 1974); Authoritarianism (Dillehay, 1978); Dogmatism (Ehrlich, 1961; Christensen, 1963); and Machiavellianism (Gels, 1978); on learning phenomena.

Leveling-sharpening, Field-articulation are the recently modified cognitive dimensions of personality. Holzman and Gardner (1960); tested the difference in memory-schemata in leveler and sharpener females. They found that sharpeners were superior to levelers in their recall of “the pied pipe” (i.e., the old memories). However, when Gardener and Long (1960) subjected 10 leveler and 10 sharpener women to rote serial learning of two 8-word lists, the sharpeners recalled more words than the levelers. Gardner and long (1961) and Long (1962) observed that persons good at field-articulation learned the verbal material more quickly than those who are not sufficient in articulation.

FIELD DEPENDENCE-INDEPENDENCE is another and very important cognitive dimension of personality which has attracted the psychologists in recent years.

The study of cognitive functioning has become increasingly important in the field of psychology in general and in the field of personality in particular. A mounting evidence now available leads us to believe that each individual has a characteristic way or manner in which he moves towards thinking, perceiving and ordering his cognitive world. Many studies have revealed that variety of
cognitive styles regulate a person's adaptive behavior. Cognitive style refers to the processes through which the individual obtains information from the environment, transforms that information in his own ways, and then uses it to respond to the environment. The nature of his reaction, however, depends upon his characteristic cognitive style.

A number of cognitive styles have been proposed and identified so far but among them field dependence/independence occupies a unique status. It describes degrees of individual's consistency in susceptibility to misleading postural and visual frame of reference. It is a dimension of individuals's variation which is characterized as an aspect of information-processing. The subject of field dependence/independence has been extensively investigated by Witkin and his colleagues (1972, 1974). They define the dimension of field dependence/independence in terms of the capacity to overcome an embedding context in perception. According to Witkin (1959) the term field-independence is used to refer to performances which reflect ready ability to perceive object apart from context in which they occur to overcome an embedding context or to deal with a field analytically. The term field-dependent is used to refer performance which reflect, dominance of perception of an item by the organization of the prevailing field or relative inability to separate item from field or to deal with a field globally.

On the basis of the concept of field dependence/independence, field-dependent person are those who cannot shake themselves free from the constraints of the situation in which they find themselves. After administering tests and employing other interviews and other techniques, the investigations tell us that these subjects are people who in general are very dependent on environmental supports; they lack ability to initiate, are passive in many respects, and submit readily to the forces of authority; they are not insightful regarding their inner lives and fear their own aggressive and social impulses; they tend to have low self-esteem and low self-acceptance.

By contrast, the field-independent subjects do not demand environmental supports; they have initiative and organizing ability; they are active and want to achieve; they are aware of their own inner lives and accept their impulses even while they have good control over them, they have high self-esteem and self-acceptance. It is helpful to look into the historical origins of the field dependence/independence dimension in order to understand the nature of this ubiquitous trait. Originally Witkin and his coworkers (1972) were investigating
the factors involved in the perception of verticality in visual stimuli. In particular
they were studying the relative importance of external cues about verticality
(such as the presence of other vertical lines in the environment) and
internal cues about verticality (cues made available in the mechanisms of
balance in the body). They devised the following several ingenious tests by
which they could separate the influences of the external and internal cues.

1) THE ROD AND FRAME TEST (RFT):

In the rod and frame test (RFT), the cues available in the external
environment are distorted by having the subject sit in a darkened room and
adjust a luminous rod set in a luminous frame. Nothing can be seen but the
rod and frame. The frame can be tilted so that if the subject when asked
to set the rod vertical, relies on external cues, then the rod will be lined
up parallel with the frame since that is only external information available. If
the subject relies on internal cues, then the rod will be set vertically and hence
at an angle to the frame. Subjects who behave in the former way may be
described as field-dependent, those who behave in the latter way may be described
as field-independent.

2) THE ROTATING ROOM TEST (RRT):

In the RRT the subject task is to set his or her own body position
so that it is upright. The subject is seated in a box like room which is suspended
from an arm into a circular track. The room is then spun round on the horizontal
track causing its occupant to be subjected to gravitational and centrifugal forces
which distorts the mechanism of balance inside the body. The chair in which
the subject is seated is adjustable and while the room is being spun round,
the subject is asked to adjust the chair and thus him or herself to the upright.
Reliance on internal cues in this situation would result in error since these
cues are distorted by the forces resulting from the motion of the room.

3) EMBEDDED FIGURE TEST (EFT):

The EFT is a paper pencil test that requires a subject to find a
simple figure or shape within a large complex figure. The simple figure is hidden
by the complex pattern of the larger field. In this test the subject is first shown
the simple figure alone and is then shown the complex figure. He then is
Rudin and Stagner (1958) conducted an experiment in terms of figure ground phenomenon. The measures for perception of physical objects included the EFT, RFT and the brightness contrast test. The results indicated that field-dependent subjects tended to have their views of themselves more influenced by the situation context than did field-independent subjects. The social and non-social stimuli are perceived similarly and that individuals who have trouble in separating figure from ground also have difficulty in maintaining a separate, stable identity or a stable perception of the identity of others. Field-dependent subjects show more change in their self-concept across different situations than do field-independent subjects. In a study, subjects were tested on embedded figure test (EFT). The results indicated that field-dependent and independent subjects differ strikingly in their ways of relating to their environment and to themselves. More field-dependents were characterized by a passive acceptance of the environment, whereas more field-independent subjects expressed an active copying in dealing with the environment. The former showed either inhibition of impulses or uncontrolled expression of hostility and were unable to exclude or assimilate unintegrated material in the play situation. In contrast to them, field-independent subjects showed an ability to express their impulses in a relatively controlled manner and were organized in their play. They showed an ability to act, to assert themselves and to control disruptive forces in the pursuit of a goal.

A large number of studies have indicated that females may be more field-dependent than males (Waber, 1977). It is believed that field dependence/independence is a trait which develops from social learning and that sex differences on this dimension are culturally rather than biologically induced. Witkin (1959) for example found that his 51 women from Brooklyn college were much more field-dependent than his 52 men, the women accepted much greater tilts, accurred in two hand co-ordination and much slower in finding embedded figures; they more often accepted a new visual framework “as is” without any effort at active analysis of it and they tended to be more concerned with their relation to the surrounding field than with their body sensations. Other experiments have also shown men to be more flexible (Newbiggin, 1954, Bieri et al., 1958). The greater field-dependency of women may result from the role assigned in our society, they are not expected to achieve economic independence, they are not expected to assume responsibility for earning the families livelihood and they are expected to be relatively passive. Being perceptually dependent upon
the environment is consistent with such expectations. Witkin (1959) also suggested that the field-dependency of women may result from their anatomy.

Studies in the social domain have tested the hypothesis that field-dependents are more responsive to the social stimuli provided by others in the environment than are field-independent people. Clearly, such sensitivity could either be advantageous or disadvantageous, depending on the situations. When sitting on the examination, sensitivity to the appearance of the other candidates would be distracting rather than helpful whereas when one is conducting a job interview, the behavior and appearance of the candidate is of prime importance. Witkin and Goodenough (1977) reviewed a wide range of studies of field-dependence and interpersonal relations, and concluded that field-dependent people make use of information provided by others in the environment only under certain conditions; when the situation is ambiguous and the source of information is regarded as helpful. Under the same conditions field-independent people do not make use of the social information.

The attention to social stimuli characteristic of field-dependence can be measured in terms of the amount of time spent looking at others. In a study by Ruble and Nakamura (1972), looking at the experimenter was compared in the field-dependent and field-independent children aged around eight years. There were two tasks. In the first task, the child had to assemble a puzzle, and in one condition on the first trial the experimenter also assembled the puzzle in front of the child. Field-dependent children were found to look at the experimenter face more than field-independent children. However, looking at the experimenter did not improve their performance on the next third trial. Presumably, watching how the experimenter solved the problem, would have been helpful in this situation rather than looking at her face. In the second task the field-dependent children's tendency to look at the experimenter worked to their advantage. It was a concept formation task in which on each trial, the child had to select the correct instances out of a choice of three. In one condition the experimenter provided social cues as to which was the correct instance. Field-dependent children did better than field-independent in this condition where looking at the experimenter's face did provide relevant social cues.

Although field-independent persons are found in study after study to be more mature and generally more competent than field-dependent individuals, not all the advantages are on their side. Elliott (1961) noted that field-dependent people are likely to be more gregarious and sociable than field-independent
people. This suggest that field-independent individual may experience some difficulty in maintaining satisfactory interpersonal relations.

Studies in the cognitive domain have typically involved different kinds of problem solving tasks (Witkin et al., 1974) and the field-independent person usually although not always (Nebelkopf and Drayer, 1973) is more successful than the field-dependent person in such tasks. Effective problem solving often requires that a person has reached Piaget's stage of formal operation which permits abstract, scientific thinking. Possibly as many as 50 percent of adolescents and adults fail to achieve the stage of formal operations and Lawson (1976) hypothesized that these people would be field-dependent. To test his hypothesis he gave twenty five 10 to 12 years old the EFT and two Piagetian tasks. A significant positive relationship between field-independent and success on each task was demonstrated. The study showed that, for these young subjects at least, the attainment of formal operations and field-independence co-occur.

Field-independent people emerge as possessing the necessary qualities to be effective in the cognitive domain; they possess a clear view of distinction between self and others, and an ability to analyze the environment into its components and make use of this information selectively. According to Witkin and Goodenough (1977) such individuals are not particularly popular and are described by others as ambitious, inconsiderate and opportunistic. They tend to be found in occupations such as engineering, architecture, experimental psychology and science teaching (Goodenough, 1978). In contrast, field-dependent people possess qualities resulting in superior effectiveness in interpersonal relations. They are sensitive to other in the environment and are regarded by other as popular, friendly, considerate and warm (Witkin and Goodneough, 1977). They tend to be found in occupation such as social work, clinical psychology and elementary school teaching (Goodneough, 1978).

Some investigators notably Vernon (1972) have claimed that field dependence/independence is indistinguishable from intelligence. Since certain performance sub-tests of the Wechsler Intelligence Scales do correlate with field dependence/independence, it can be argued that field dependence/independence is not a dimension in its own right, but merely a spatial aspect of intelligence. Developmental studies have shown that between the ages of 8 and 17 years there is a steady increase in field-independence as measured by the RFT (Witkin et al., 1967) and these changes are found cross culturally. Such findings support the view that field dependence/independence is indistinguishable from
intelligence, since intelligence also increases with age.

However, work on sex difference in field dependence/independence conflicts with the intelligence hypothesis. Women tend to perform less well than men on spatial tasks (Macoby and Jacklin, 1974) and since performance on spatial task is correlated with field dependence/independence (Vernon 1972), it is reasonable to expect sex difference in field dependence/independence and such differences have been found. On the EFT, females from 12 years upwards are more field-dependent than males (Macoby and Jacklin, 1974). On the RFT majority of studies show that females are more field-dependent than males since there is probably no sex difference in intelligence, the findings, suggesting, if anything, a trend towards higher I.Q. in females (Jensen, 1971; Macoby and Jacklin, 1974) then the association between females and field-dependence goes against the hypothesis that field dependence/independence is merely measuring intelligence.

Witkin (1959) considers field dependence/independence to be one aspect of a general concept of cognitive differentiation, and he considers that cognitive differentiation increases with age, as we mature we become more able to differentiate between aspects of the environment and hence more field-independent.

In intelligence test and in the RFT and RRT the better and the more sophisticated strategy is typically the field-independence strategy. It could be argued that as children get older what they learn is to adopt the better strategy and hence they only appear to be growing more field-independent.

Field-dependency changes with age in an interactive fashion with sex. Field-dependence is high for the young of both sexes and then declines with increasing age stabilizing at about 13. At about age 15, however, the field-dependency score of the female group begins to rise sharply, while that of the male group increases slightly, yielding the large sex difference that Witkin (1959) originally found in his college-age-subjects.

Witkin et al. (1967) and Goodenough (1978) reviewed implications of field-dependence for education and also its relations with learning and memory. Field-dependent and field-independent persons are said to be about equal in learning and memory abilities but different in the strategies they are likely to employ and in the type of material. They learn easily. Field-independents, tend to make greater use of mediators; field-dependents often either cannot or do not impose structure on material, and thus need an external source of structure.
An analysis of cognition researches by Martorella (1979) focussed several major areas in which cognition research would seem to have pregnant implications for conscious design of social studies texts and sketches, the ways in which the structure of text might be shaped if research were applied. The first area discussed is matching text to significant user characteristics is his cognitive style. A number of investigations have established the value of systematic use of imagery in retaining information.

In their study Davis and Frank (1979) found more efficient memory of field-independent learners. It has been proposed that field-independent and field-dependent learners differ more in the process they use than in the effectiveness of their learning and retention. It has been suggested that greater effectiveness of field-independent learners is related to memory efficiency and the ability to conduct combinational analysis. Research concerning short term memory and free recall was also examined. High information load, greater interference potentials, and less subjective organization are suggested as factors that contribute to the less efficient memory of field-dependent learners.

Satterly and Tefler (1979) studied the interaction of field-independence and advance organizers in learning and retention in 96 boys and 84 girls aged 14-15 years. Field-independence (measured by an embedded figure test used by R.W. Gardner et al., 1960) was stratified into three levels and subjects randomly assigned to twelve, teaching groups followed by random allocation of teachers to groups for one of three treatments (lessons, lessons plus advance organizers, and lessons plus advance organizers plus specific reference to its organizing properties). Two lessons on meaning, analysis and construction of words were taught, and the groups were compared in recall and transfer. Four-way ANOVA showed significant difference between cognitive styles in recall and transfer and between learning and retention. Residual estimates of learning were obtained and a significant interaction of style with treatment was observed. Field-dependent subjects achieved greatest gains where the organizer was used with specific reference to its organizing properties.

Brooks and Dansereau (1981) studied 32 students and assigned randomly to two groups the DICEOX group which received training on the use of knowledge schemata and the control group which did not receive training. A 2500 word passage dealing with the theory of plate tectonics was used as a material to be learned. The Group Embedded Figure Test and the Delta Vocabulary Test were employed as measures of individual differences. Dependent measures
consisted of an essay test, short answer test multiples choice test and cloze test. A 2X2 analysis of covariance was conducted for each of the four dependent measures. Results revealed that high scorers (field-independent) on GEFT significantly outperformed low scores on all the dependent measures.

Piotrowski (1984) found the field-independent individuals tended to engage in a hypothesis-testing, participant role in learning. They seemed to function on intrinsic motivation and were perceptive of non-salient cues in acquiring information relevant to the task. On the other hand individuals tended to ignore non-salient cues in the field and seemed to be motivated by extrinsic rewards. They were susceptible to social influence and tended to comply and confirm to experimenter demands. Also in stressful and/or threatening circumstance, field-dependent individuals appear to utilize repression and thus exhibited inferior or distorted recall.

Smith and Rothkopf (1984) studied whether (1) diversification of physical settings and/or (2) distribution of material versus cramming a lot of instructions into a short time would lead to better retention of content, 100 students at Texas A & M were assigned to one of four experimental groups that were then exposed to the independent variables of context enrichment and distribution of instruction time in an 8-hr. statistic course. Retention of content was tested 5 days later, and the field-dependence of the subject was measured by the GEFT. Results show that the distribution of lesson over 4 days was more effective than was the 1-day presentation, and diversification of context resulted in better productive performance for field-dependent subjects.

Gillies (1984) tested the hypothesis that a verbal advanced organizer — a 300 word expository statement expressing in general terms two or three unifying concepts to subsume an integrate facts conveyed during instruction — would increase the learning and retention of class content more in subjects with greater field-independence and higher scholastic aptitude. 43 junior baccalaureate nursing students were randomly assigned to experimental and control groups. Sophomore cumulative GPAs were used as a measure of scholastic aptitude and GEFT scores as measures of field-independence. An expository organizer was presented to experimental subjects and a passage of non-organizing historical information to controls at the beginning of each of six classes. Class quizzes were used to measure initial learning and long range retention of class content. Increased initial learning occurred to exposure to a verbal response organizer in subjects with above-average scholastic ability and below-average field-independents, but intermediate and long-term retention were not significantly higher in these
Roberts and Park (1984) examined the effects of feedback and cognitive style on performance in computer based instruction, using 30 undergraduates who were classified as either field-dependent or field-independent and randomly assigned to 1 or 2 treatment groups. Both treatment groups were given a similar computer-based lesson on introductory psychology with the treatment differing only in the type of feedback given during instruction. One group was given only the knowledge of the correctness of their response (KRO), while the other groups received this information as well as our explanatory statement (KRE). Four dependent variables were used to assess performance: number of practice examples required, instructional time, post test score and retention test score (administered one week after instruction). Results indicate that the KRE feedback was superior to the KRO feedback and that field-independent subjects performed better than field-dependent subjects. However, no interaction between feedback and cognitive style was found.

Carrier et al. (1984) studied 44 seven graders who were classified as field-independent (N=20) or field-dependent (N=24) on the basis of the scores on the GEFT and assigned them randomly to one of the two treatments. Both groups studied a computer based lesson dealing with the four advertising concepts of bandwagon, transfer, testimonial and repetition. In the options treatment, subjects were given the choice to see four options: additional definitions, additional expository instances, additional practice instances, and analytical feedback. The no-options subjects were not given the choice to see any of the optional items. A 16 item post test and identical retention test were administered immediately following the completion of the lesson and 5-days later, respectively. There were no differences due to treatment, but field-independent subjects out performed the field-dependent ones.

Park (1984) tested the effectiveness of the example comparison strategy (ECS) and the classical attribute identification strategy (AIS) in 12th grade students acquisition of a set of abstract verbal concepts using 34 subjects whose learning style was field-independent (FI) and 34 subjects whose learning style was field-dependent (FD). Subjects' cognitive style was determined by the GEFT. Findings show that AIS presentation resulted in significantly better performance in subjects of both cognitive learning style than did ECS; AIS required a significantly longer time for subjects to complete the instruction booklet. ECS significantly facilitated prototype formation in memory and resulted in a higher degree of retention.
Evidence suggest that field-dependent subjects need more example in expository form than do field-independent subjects to form the conceptual prototype.

In a study by Lane and Newman (1985) college undergraduates (N=44) were given a measure of field dependence/independence prior to receiving instructions in conditional reasoning. Results indicated conditional reasoning performance increase following instructions and was maintained after 2 weeks. There was a positive but non-significant relationship between field dependence/independence and conditional reasoning. However, examination of Beta weight for Covalences (B=.23) does indicate a positive relationship between the two variables. This suggest that lack of support in the study may be because of statistical power. It is possible that with a larger sample or more extensive test of conditional reasoning and field independence/dependence a significant relationship would be found. It is also possible that due to the apparent difficulty of conditional reasoning, teachers fail to see or use their respective field independent/dependent strategy when dealing with the syllogism used.

Collins et al. (1986) evaluated the effects of conversational noise on the comprehension/retention of 2000 words text excerpts using 44 undergraduates who were randomly assigned to study the text under noise or no noise conditions. Subjects also completed the delta reading vocabulary test, Rotter's I.E. locus of control scale and the GEFT. Significant difference was found between the performance of identifiable sub-groups under noise and no noise study conditions, field-independents outperformed field-dependents in under noise, while the reverse was true under no noise conditions.

However some of the psychologists found that there is no difference between field-dependents and field-independents.

Ortiz and Morelan (1974) studied the effect of cognitive style and learning conditions on the role verbal learning performance of Mexican American subjects classified as field-independent or field-dependent. Field-dependent referred to a strong perceptual influence caused by the context or background while field-independent refer to an ability to overcome the influence of a surrounding perceptual field. The sample consisted of 44 Mexican American children. The portable RWD and frame Test classified subject as field-independent or dependent. The learning component consisted of three stages: (I) the response learning stage, which reflected when the subject recalled the response as a unit, (II) the associative one stage, which reflected the first correct association between stimulus and
response, and (III) the associative two stage, which indicated actual mastery of the correct association. The subjects were tested in a distraction free room within the school by Mexican American experimenters. One- half of the subjects from each group were randomly assigned to one of two learning conditions: personalized and impersonalized rewards. Results demonstrated that Mexican American children, regardless of cognitive style, required fewer times when personal rewards were employed. The present study failed to reflect field independence/dependence as a major dimension of individual differences.

In a study by McLeod and Adams (1979) students in three mathematics classes were assessed on two aptitudes, field-independence and general reasoning and randomly assigned to either an expository or a discovery treatment. The expository treatment used a detective sequence of instruction and provided maximal guidance for the students. The discovery group used an inductive sequence with minimal guidance and provided calculators to help students discover concepts and rules independently. The topic of instruction involved errors in measurement and calculations with approximate date. No interactions with field-independence on the retention test was observed.

Blake (1985) investigated the relationship between dependence-independence, as assessed by the EFT and comprehension test scores for expository and literary text type derived from the Iowa silent reading tests level 1. 121 sixth grade subjects were randomly assigned to an expository or literary text type group. Findings showed that the difference between the mean comprehension scores for the FD-I group were not statistically significant but did approach statistical significance.

Ward and Clark (1987) observed that an outline helped field-dependent students in recall of high structure information and field-independent students in recall of low structure information. Performance of field-dependent and field-independent student was equivalent on probed recall of low structure information.

LOCUS OF CONTROL (i.e., internal locus of control and external locus of control) is still another personality dimension found to play its vital role in human behaviour.

Behavior occurs in a situational framework. The psychological situation refers to what is experienced by the organism together with the meaning that the situation has for the organism. The situation is the meaningful environment in which behavior occurs. It is represented in the organism in term of internal
(personal) or external (non-personal) control over the consequences of behavior. Internal control refers to instrumental behavior that one believes is related causally to desired reinforcers. A person with an internal locus of control is one who believes that reinforcements are consequences of one’s own behavior, that whether the consequences are positive or negative or neutral, are determined by the person’s action themselves. External control refers to reinforcement unrelated to one’s behavior. A person with external locus of control believes that he or she is not in control of the consequences and outcomes in life, that there are important external forces that determine these outcomes and over which control is difficult or impossible. The stronger the perceived expectancy that a particular reinforcement will be obtained, the greater the potential that behavior will be directed toward its attainment.

Success ascribed to personal ability or effort produces greater pride in accomplishment than attributions to the ease of task or to good luck. In general, outcomes attributed to the self magnifies affective reactions in achievement-related contexts, whereas outcomes ascribed to the environment minimize affective reactions. The 'Locus of control', or the ascriptions of outcomes to oneself versus to the environment, also has been conceived as an individual difference variable and correlated with a variety of behavior. For example, individual with a tendency to perceive the world as personally or internally controlled appears better able to cope with failure and adapt better to their environment.

The concept of internality-externality was first proposed by Rotter (1966) and it forms a relatively small part of a more extensive personality theory incorporating many of the principles established in the psychology of learning, this theory is known as social learning theory (Rotter, 1954; Rotter et al., 1972). Rotter proposed that the degree to which people believe their lives to be under their control is an important dimension of individual variation.

People who are relatively internal believe they are responsible for their destiny, whereas people who are relatively external believe the good and bad things that happen to them are determined by luck, chance or powerful others. In Rotter’s social learning theory internality-externality is regarded as a characteristic attitude towards the world, referred to as a generalized expectancy. The expectancy about the rewards and punishment generated by a person’s position on the internality-externality dimension will influence the way that person perceives most situations, and hence will partially determine how the person will behave.
Rotter (1966) developed the first scale to measure the internality-externality dimension. Rotter's I-E scale consists of 29 items each comprising a pair of statements lettered 'a' or 'b'. The respondent is asked to choose the statement from each pair which he or she believes in more strongly. Twenty-three of the items measure locus of control while the remaining six are fillers consisting of statements unrelated to locus of control. The filler items are included to make the dimension being measured by the test less obvious to the respondent. The reliability coefficient of Rotter's scale ranges from 0.65 to 0.79.

The characteristics of internal and external people have been explored in a large number of studies like Phares (1976, 1978) and Strickland (1977). Investigations reported by Phares (1978) regarding the relationship between I-E and demographic variables suggest that there are no sex differences in respect of internality/externality. Phares also reports that there is no substantial relationship between intelligence and locus of control.

From the research summarized by Phares (1978) relating internality-externality to a wide variety of behaviors, a distinct picture of the internal as compared with the external person emerges. The internal person is more likely to be receptive to aspects of health care such as weight-watching, giving up smoking, taking exercise and carrying out prophylactic measures such as going to the dentist regularly. In part this behavior is a result of the internals superior knowledge about such things, since internals are characterized by their efforts to seek out information which enables them to exert greater control over their environment. Their desire for self-determination is reflected in their greater resistance to social influence and attempted attitude change. In the area of mental health, internals are generally found to be better adjusted and less anxious than externals, and external beliefs are symptomatic of a number of psychiatric disorders such as depression and schizophrenia. In short, the internal individual, in contrast to the external is independent, achieving and masterful. Strickland (1977) has concluded that internality-externality beliefs are related to a number of aspects of emotional and psychophysical well being, ranging from preventive to remedial health care. Internals report themselves to be more psychologically adjusted than externals and they respond to psychotherapy differentially. As regards the physical disorder, internals appear to take precautions against accidents and disease; they seem to be somewhat more likely to be able to control physical functioning through biofeedback mechanism. According to Strickland (1977) internality-externality may be related to susceptibility to disease or disorder, since internals are more...
likely to assess themselves as experiencing less life stress and as being generally more healthy than externals. Rotter (1966) investigated the effects of generalized expectancy for internal versus external control of reinforcement, and found that the effects of reinforcement for predicting behavior depend in part on whether the individual perceives reinforcement as contingent upon his or her own behavior or as independent of that behavior.

Locus of control has been difficult to assess during the preschool years primarily because test used to measure it require language skill not yet available to preschool children. Efforts to assess have been made however. Stephen and Delys (1973) developed a test for preschools which assesses perceptual cognitive style and shows promise of providing information about the early development of locus of control.

Appel et al. (1977) studied the impact of administrative climate, individualized instruction and counseling to develop internal control in students. Results demonstrated that: (1) internality was affected by strong vocational programs; (2) counselling for internality was effective; and (3) gains in internality could not be used as indicators of gains in academic productivity. Norris (1981) noted that locus of control belief is a life span developmental process. Steitz (1982) also supported this finding.

Educational conditions are important in the development of locus of control belief. Sadow (1976), Murphy (1976) and other have obtained that traditional educational practices produce an externality in the subject. Family conditions are also important in the development of locus of control beliefs. Rohner et al. (1980) found that internality increased significantly with the perception of increased parental acceptance (as well as with age). Nowicki and Schneewind (1982) found that internal showed greater family cohesion and expressiveness and lower conflict than externals.

Other studies show that the belief about control is determined by the cultural training and socialization. Social acceptance has been found to enhance internality (Stein, 1977). Kramper (1982) found that the perception of high freedom movements in socialization was related to internality. Roiner et al. (1982) observed that external locus of control is related to under socialization.

Membership in different socio-economic strata of cultures may lead to noticeable differences in the complex web of relationship between I-E expectancies and social behavior. The researches clearly show that the low socio-economic
status is related to external beliefs. The ethnic and minority groups that have little access to social or economic power and are likely to be over represented in the external category.

Garibaldi (1977) has observed that competition-oriented subjects show greater internality while cooperation-oriented subjects show externality. Similarly, Chitwood (1977) has found that the knowledge of and positive attitude toward the environment are found to be related to internality.

Some early field and laboratory evidences (Seeman and Evans, 1962; Seeman, 1963; Ducette and Walk, 1973) indicated that the internal-external dimension encompassed particular cognitive process. Specially, internal more actively seek and acquire control relevant information than do the externals.

While investigating the role of internal-external locus of control in conditioning Getter (1966) found that those who conditioned will tended to be external. Doctor (1971) reported that externals showed greater resistance to verbal conditioning as compared to externals. Alegre and Murray (1974) found that verbal conditioning was greatest in externals, less in mid-range subjects and least in internals. Though the empirical evidence reported in the literature is insufficient, on the basis of these studies, it can be said that this dimension of personality has shown its noticeable influence upon conditioning.

Segal (1974) tested the hypothesis that learning of an unfamiliar passage by sixth-grade external locus of control subjects can be improved by the help of Advance Organizers (AO) which provide optional anchorage and mobilize existing relevant concepts. It has been observed that AO has a significant effect only on the retention ability of lower socio-economic with an external locus of control.

Standahl (1975) observed no significant evidence that children with internal locus of control spontaneously verbalized more than did externals or that they perform better on the verbal control task.

Moyer (1978) investigated the relationship between internal and external locus of control in subjects in a verbal learning experiment. As hypothesized, it was found that the lack of freedom of choice was associated with decreased recall of internals. However the condition when the subjects were freed to choose material both internals and externals lead to faster learning.

In his analysis, Martorella (1979) considered locus of control as one
of the important characteristic of the learner. The focus of research on cognitive processes have shifted toward an examination of the relationship between memory and inter-individual differences of personality.

Mitchell and Young (1979) has conducted a one minute, self paced student development course at Mesa community college. The course was designed to help entering students define why they are in college, determine what they want from the college experience, develop a plan to achieve their educational goals, and correlate their educational goals with carrier selection. The benefits of the course, determined through various pilot tests, include improved retention with an increasingly internalized locus of control and enhanced intrinsic motivation. The results of this study indicate that internal locus of control is related with better retention.

Saunders and Yeany (1979) designed a study to determine the effects of diagnostic testing followed by prescribed remediation on the immediate and retained science achievement of middle school students and to determine if effects of treatment were persistent across students race and locus of control levels. Three intact seventh grade science classes were randomly assigned to them to one of three treatment levels: (1) Comparison levels- objectives only; (2) experimental level I- diagnostic level, and (3) experimental level II- diagnostic/remediation level. Data were analyzed using ANOVA procedure in 3x2x2 (Treatment X LOC X Race) factorial design. Pretreatment achievement data were used as the co-variates. The study indicates that students who experienced diagnostic remedial instruction showed a 10%-12% greater retention of science concepts. Internal locus of control students scored higher than did external students.

Tobin and Capie (1979) investigated several student variables likely to influence process skill learning and observed that locus of control was related to both achievement and retention.

Van Damme and Masui (1980) studied interactions between internal-external locus of control and other student characteristics, and lectures and two variance of the Personalized system of Instruction. The three treatments varied in degree of study of guidance. The research was done with 60 college freshman in an introductory course on psycho-diagnostics. The extreme group analysis of variance and regression analysis indicated several aptitude-treatment interaction (ATI) effects. An important ATI effect— the more guidance the better the achievement of externals compared to the internals— was found for a retention test but
not for the test taken during the studying period.

Saunders et al. (1981) assess the subject for locus of control and made them to experience either no diagnosis; diagnosis; or diagnosis and remediation. Immediate achievement was measured twice during the experiment; and retention was measured 30 days later. Finding suggests a significant interaction effect between instruction and locus of control i.e., internals retention level increases significantly more because of diagnostic or diagnostic/remedial instruction.

Sherris (1981) conducted a study of the relationship between degree of concept relatedness of an instructions sequence and a person’s locus of control orientation. 541 high school biology students involved in the study were measured on the adult Nowicki-Strickland locus of control scale. The experimental instruction treatment stressed the conceptual relationship through conceptual clues and concept mapping exercise, while the control treatment did not. Dependent variables measured were scores on a meaningful learning post test and on six week retention test. Two-way analysis of co-variance by treatment and by locus of control resulted in a significant treatment-locus of control interaction effect for retention test scores. Subject with an external locus of control orientation who were exposed to the experimental treatment outperformed the control group. However, students with an internal locus of control orientation retained the same amount of information regardless of treatment group.

Abatso (1982) conducted a study to determine whether there is an identifiable coping personality related to academic achievement and retention for black college students. No coping students were also taught coping strategies to determine whether mastering academic requirements facilitates achievement and persistence. The relationship of black students and the colleges academic/social system were also assessed. The total freshman class of 265 students from a small, private historically black, liberal arts university was administered the Student Information Form, a self report battery, during freshman orientation week. The battery was concerned with self concept of ability, locus of control, expectancy of success or failure, perception of the opportunity structure coping, and verbal ability. In addition, two versions of a freshman follow up form were administered to on-campus-returnees and transfers/dropouts. Low and high coping freshman were also taught coping strategies and study skills and expose to a network of support groups. It was found that coping strategies were related to achievement and that achievement significantly influence retention. Students who persisted had learned personality attitudes that gave them a sense of control over events.
Looking at the relations studied by Abatso (1982) it can be reasoned that internals will have high retention.

In a study by Tobin and Capie (1982) 12 pupils from each of the 13 middle school science classes have participated. Findings indicate that locus of control was not related to process skill, achievement and retention.

In two experiments with 178 undergraduates Ellis and Franklin (1983) examined (a) the effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall and (b) the effects of personality variable locus of control, on susceptibility to superficial features. It has been observed that when given an option to encode both semantic and superficial features, subjects with an external locus of control encoded the superficial features more extensively and showed poorer free recall than internals. But only when semantic cues were present, no difference in recall or clustering occurred between internals and externals. They had interpreted the data in terms of differences in ease of distraction with externals being less able to distinguish relevant semantic from less pertinent perceptual features.

Thal et al. (1983) administered children's locus of control (LOC) measure to 153 sixth grade students who were then assigned to 1 of 4, processing conditions. Groups were instructed to encode a word list semantically, acoustically, orthographically or in anyway the subjects wished and to retain the words for a letter recognition test. They used total number of words correctly recognized and four varieties of distracter choices as the criteria. Results support the contention that externals tend to encode stimuli in more superficial ways than internals do, although the amount of variance in recognition memory accounted for by the locus of control measure was small.

A review (Pitrowski, 1984) of the research on two such personality traits (i.e., locus of control and field dependence/independence) shows that studies of locus of control as a factor in learning and memory have been concerned with verbal conditioning, awareness, demand characteristics and levels of anxiety. Generally, internals when compared to externals were more prone to the aware of informational strategies for successful completion of task, less susceptible to experimenter's influence and more superior retention recognition in non-stressful situations. On the other hand in the threatening or high anxiety provoking situations, internals appear to utilize repressor mechanism and thus, showed a decrement in information/recognition when compared to externals.
Sherris and Kahle (1984) developed two five-week instructional treatments; the first treatment stressed concept relationships for 282, ninth and tenth graders; the second's for 259, ninth and tenth graders did not stressed concept relationship. Subjects were administered the Nowicki-Strickland locus of control scale for children and 3 alternate from achievement tests. ANOVA showed that subjects with an internal locus of control orientation achieved more than externally oriented subjects. ANCOVA showed a significant treatment by locus of control interaction effect for retention scores. Subjects with external locus of control who were exposed to the concept-related treatment generally retained more than those in the comparison groups. While subject with internal locus of control retained about the same amount of information regardless of treatment group. Interaction effect appeared greater for the 53% of subjects who were females than for males.

In a study by Frankel (1985) ten predictors of academic performance and persistence for adult college students were studied with 100 college juniors and seniors in Mercy College. The ten variables are: time spent at work/employment, ability to pay for education, time spent at study, place of study, ability to get to school, ability to get course of choice, ability to get a 'good' schedule, desire to join groups or clubs, getting school advisers to help and ability in maths or reading (self assessed). It was proposed that the variables representing total external locus of control were time spent at work and cost of dedication. Administration of a questionnaire allowed students to indicate the variables they felt most in control of, using 37 triads of forced choices, variables on which the students felt the most control, in order of most to least control were: getting to school, joining clubs/groups, time to study, place to study, ability to set their own schedule, ability to get particular courses/sections, ability to get advises from counsellors/advisors and ability in reading and mathematics. A significant difference between external and internal locus of control was found. It is concluded that retention rates can be increased and this increase will be more in case of internals, if students are allowed to be self determining.

Martin and Knight (1985) tested the hypothesis that people with internal locus of control will perform equally in a paired associate verbal learning test regardless of whether the trials are administered by computer or human experimenter, while people with an external locus of control will perform better when learning trials are administered by a human experimenter. 60 subjects aging 16-51 years who had been divided into internal or external locus of control groups were tested in 1-trial-to learn paired associate task. The analysis of variance supported
the study's hypothesis revealing the significant interaction between subjects locus of control and their performance in two testing conditions.

Bers (1986) examined the relationship among locus of control, commitment to college, and academic performance and retention of community college students in introductory baccalaureate courses. The results indicate that locus of control, objectives and commitment are minimally related to performance, but more strongly related to retention.

In a study by Brooks and Mckelvie (1986) 24 internal and 24 external undergraduates selected on the basis of their scores on Rotter's internal-external locus of control scale read 6 passages representing three operationally defined levels of relevance under either a cued (inform of memory test) or uncued (not inform of memory test) condition. Retention was tested 24 hours later. It has been found that internals scored consistently higher than externals. However, results do not support the contention derived from social learning theory that internal would only be superior to externals on relevant material under uncued condition.

Beaute and Mckelvie (1986) selected 34 and 36 undergraduates on the basis of median split of their course on Rotter's internal-external locus of control scale classified as internals and externals respectively. All subjects read 6 passages representing three levels of relevance for lives of students. In the cued condition subjects were informed that a memory test would follow 4 days later. In the uncued condition the subjects rated the relevance of the passage. The material of low relevance was remembered more poorly than that in the two higher levels, but internal and external subjects performed similarly in all conditions. Results cast doubt on the prediction from social learning theory that internal subjects would be selectively superior to external ones on more relevant material in the uncued conditions.

Benson and Yeany (1986) examined the influence of locus of control and diagnostic testing with prescribed remediation on immediate and retained science achievement in 43 undergraduates. To test the generalizability of results across instructional units and to check on the existence of a treatment warm up period, the experiment was conducted across three biology units. Although no locus of treatment interactions were found, the internal locus of control subjects achieved significantly higher than externals in one unit.

Collins et al. (1986) evaluated the effects of conversational noise on
the comprehension / retention of 2000 word text excerpts using 44 undergraduates who were randomly assigned to study the text under noise or no noise conditions. Subjects completed Delta Reading Vocabulary Test, Rotter I.E. Locus of Control Scale and the GEFT. Results indicated that internals on Rotter's I.E. Scale out performed externals under noise, while the reverse was true under no-noise conditions.

In their evaluation report Harty et al. (1986) pointed out the role of locus of control in students retention and achievement.

The experiment by Wilhite (1986) examined the effects of headings and adjunct questions embedded in expository text on the delayed multiple choice test performance of college students. It has been found that subjects in heading present group performs significantly better on the retention test than did the subjects in the heading absent group. The main effect of adjunct questions was not significant but there was a significant interaction of locus of control and adjunct questions i.e., for subjects with an external locus of control performance in the questions present condition exceeded significantly than performance in the questions absent conditions; however, adjunct question did not significantly affect the performance of subjects with an external locus of control. The results support the view that the headings may promote the organization of the passage information so as to increase its general availability and the results suggest possible differences in the organizational effects of adjunct questions in readers differing in locus of control.

Gadzella et al. (1987) have examined the relationship between scales of the Inventory of Learning Process (ILP) and academic performance of the college students and to determine whether there were significant relations among levels of processing, locus of control and achievement for college students, subjects (N=50) enrolled in two introduction to psychology classes completed the ILP, Leveneon's locus of control inventory and a psychology test prepared for this study the Psychology test was administered immediately following a unit on learning and again a week later. The ILP was scored for Deep processing, Elaborative processing, Fact retention and Methodical study. The Psychology Test was scored for factual, comprehension, application and total scores. For the ILP the results revealed significant and positive relationships between (1) Deep processing and Elaborative Processing, Fact Retention and Methodical study, Superlatively: (2) Elaborative Processing and Methodical study; and (3) Factual retention and Methodical study. Scores on the ILP Deep processing scale correlated negatively and significantly
with the Powerful others and chance scales of the Locus of Control Inventory. None of the correlations between the scale of locus of control inventory and the ILP and sub test and total of the Psychology test were significant. The factual sub test and total psychology test were only the positive and significant correlations with great point averages.

Feather and Volkmer (1988) selected 80 subjects from an introduction psychology course subjects completed the questionnaire measures of the type A behavior pattern, test anxiety and external locus of control. Results showed that type ‘A’ behavior pattern was negatively associated to external locus of control and that externals tended to have higher test-anxiety score than internals. It can be reasoned that being high test anxious externals may hamper their own performance in the testing situation.

Nishikawa (1988) investigated the effects of two factors- locus of control and varied feedback strategies on learner performance during computer assisted instructions. It was hypothesized that learners who attribute their successes and failures to internal events (internals) will perform best under delayed feedback condition while those who attributes their successes and failures to internal events (internals) will perform best under delayed feedback conditions while those who attributes successes and failures to external events (externals) will perform best in given immediate feedback. In addition it was hypothesized that there is significant interaction between feedback and locus of control. Junior high students from 8th and 9th classes were divided according to locus of control scores. Treatment consisted of giving immediate, delayed or no feedback during computer assisted instruction to each group of student identified as having internal or external locus of control. Students were then tested for retention and recall. The results indicated that the internals perform significantly better than the externals on delayed feedback on the test for recall, but no other significant differences or interaction were found.

Winefield et al. (1990) conducted attrition analysis from a longitudinal survey of 3,130 15-17 years old annually over 1982-1988. The initial sample was reduced to 4483 after 8 years indicating an average retention rate of just under 80%. It has been found that the dropouts exhibited greater externality of locus of control than those who stayed in.

Hagborg et al. (1991) compared grade-retained high school students (N=38) with matched non-retained students. It has been found that retained
students were lower on scholastic variable, self-esteem, were more often absent and were associated with lower grades, educational expectations and self control, had more discipline problems and external locus of control; and had less positive attitudes and time on home work. Since, retention can be reasoned to be correlated with lower academic achievement which in turn depends upon retention potentiality, it can be presumed that students with external locus of control may be with low retention potentiality.

Thomas et al. (1992) examined effects of retention in kindergarten and first grade students to 31 non-retained students with similar grades on grade point, and average in second through fifth grades and teacher assessed social competence, cognitive competence, externalizing problems, internalizing problems. It has been found that retention is not associated with long term beneficial effects but appears to be associated with proper academic and social functioning specifically to say that retained and non-retained students did not differ on externalizing and internalizing problems.

FRUSTRATION as a trait or as an induced condition in influencing memory has also been considered of vital importance specially viewing at the modern era of severe struggle and competition.

The term frustration has been defined in different ways by different psychologists. Generally, frustration is considered either as a state of the organism or as a hypothetical construct. In general, psychologists agree in emphasizing the role of interference in blocking of a goal response in producing frustration. According to Freud (1920) "Frustration occurred whenever pleasure-seeking or pain avoiding behavior was blocked." Sears (1941) defined frustration as a condition which exists when goal response suffers interference. On the other hand Amsel (1962) defines frustration as a conceptualization of a hypothetical implicit reaction elicited by non-reward after a number of prior rewards.

According to Brown and Farber (1951) there are at least four conditions which may initiate frustration. These are: (1) physical barriers, (2) delays between the initiation and completion of the response sequence, (3) omission or reduction of a customary reward and (4) elicitation of a response tendency that is incompatible with the ongoing ones. Although these conditions differ in several respects, Brown and Farber (1951) assumed that all of them can arouse reaction tendencies that interfere with ongoing chains of responses.

The failure to receive an anticipated reward produces a primary emotional
frustration reaction which, in interaction with the prevailing conditions, is an important determinant of the organism's subsequent behavior in the face of non-reward (Amsel, 1958, 1962, 1967). Here the frustration reaction is assumed to be elicited not by non-reward per se but by failure to receive an anticipated reward. One consequence of the primary frustration reaction is the immediate disruption of the learned behavior.

In order to produce frustration, experimenter blocks or interferes with goal-directed behaviors. It is the general observation that after blocking, the behavior of the organism deviates from what it had been before blocking. This deviant behavior is called frustrated behavior. Consequently, frustration may be defined as that state which leads to the deviant behavior as a result of the blocking of or interference with a goal-directed behavior sequence.

THEORIES OF FRUSTRATION

During the late 1930's and 1940's a number of independent theories of frustration began to appear. All these theories shared several things in common. They identified frustration as a somewhat unique topic in its own right; they tended to define the terms by a rather simple set of operations, and they concentrated on hypothesizing about the behavioral effects of this phenomenon. A brief discussion of some of the important theories are given below.

a) Rosenzweig's Frustration Theory

In (1934) Saul Rosenzweig gave a heuristic classification of types to reaction to frustration. The theory consisted of three major points. First there was a very global definition of frustration conceived of as occurrence of an obstacle that prevented the satisfaction of a need. Second was a classification of types of reactions to frustration and the third point dealt with the concept of frustration tolerance. There have been two main lines of work originated from Rosenzweig's ideas. One of these concerns memory and preference for success and failure experiences as a function of age (Rosenzweig, 1933, 1943, 1945; Rosenzweig and Mayson, 1934) This was regarded by Rosenzweig as an indication of frustration tolerance-recall of, or a tendency to resume, tasks on which the subject had previously failed was regarded as showing higher frustration tolerance. These researches formed the basis for Rosenzweig's statement that frustration tolerance generally increased with age. The second line of research
concerns Rosenzweig’s classification of reaction to frustration.

Rosenzweig’s theory would have seem to have failed to generate the experimental work he urged in his early experimental work and in his early writings. The reason seems very simple: no very specific hypothesis has been made and no relationships between independent and dependent variables are very definitely stated.

b) The Frustration-Aggression Hypothesis

This theory was developed by social scientists at Yale’s Institute of Human Relations. The basis of this theory consisted of two propositions: (1) The occurrence of frustration always increased the tendency for an organism to respond aggressively and (2) Whenever an organism responded aggressively, this was prima facie evidence of the previous occurrence of frustration. Frustration was defined as interference with a behavior sequence normally leading to a “goal response” or reinforcement of the type specified in the various versions of the Law of effect. In brief, frustration ultimately leads to aggression, aggression always implies that frustration has occurred at some previous time.

Dollard et al. (1939) described four main classes of factors that determined that aggression might take as a result of frustration. Firstly, they discussed the conditions that could affect the strength of the tendency to respond aggressively to frustration: (1) the greater the strength of the goal-response sequence interfered with, the greater would be the tendency toward aggression (2) the greater the amount of interference with the goal-response, the greater would be the tendency toward aggression (3) The more frustrated response sequences occurring over a period of time, the greater would be the tendency toward aggression.

In the second set of conditions they realized that organismic and inanimate environment does not take aggression passively. The tendency of an organism to respond aggressively is frequently punished, both in the case of specific outbursts and in principle. Punishment tends to inhibit the expression of aggression. Therefore, the degree to which aggression will be expressed at least overtly is a function of the amount of punishment expected for a particular aggressive act. Dollard et al. (1939) made the assumption that the positive and negative tendencies toward aggression should be summated algebraically to determine whether aggression would occur overtly after frustration.

The third set of conditions deals with the factors determining whether
aggression would be direct or indirect. It is hypothesized that the strongest aggressive tendency is directed toward the agent perceived as being the source of frustration; less direct forms of aggression are less strongly aroused by frustration. But in fact the most direct form of aggression is most strongly inhibited following which indirect forms of aggression occur. This is called displacement of aggression. Displacement is generally thought of as referring only to a change in the object of aggression. Therefore, Dollard et al. (1939) extended the reasoning for the cases in which the form of aggression as well as the object was changed. According to them such changes are due to the interaction of positive and negative tendencies with respect to the most direct form of aggression, and to the fact there is a hierarchy of indirect forms of aggression that increase in likelihood of occurrence as stronger (more direct) forms are inhibited. The fourth class of the theory includes that the successful occurrence of aggression is itself reinforcing. This leads to a decreased tendency toward aggression for the time being. This term is called catharsis. Combining the principles of displacement and catharsis lead to a final conclusion; these is an inverse relationship between the tendency of different forms of aggression to occur. As one forms is inhibited, others are strengthened; when one form occurs, others are weakened.

c) The Frustration- Regression Hypothesis

According to Freud frustration could cause an individual to revert to modes of action that had characterized his behavior at an earlier development stage. This hypothesis is empirically formulated by Barker et al. (1941). This is called the frustration- regression hypothesis. Basically, the frustration regression hypothesis requires that we begin with a developmental picture of how certain kinds of behavior change with maturation. Then subjects are exposed to a frustrating situation, and an assessment of the development stage of their subsequent behavior is made. If the behavior is that which is characteristic of an earlier development stage than the subject showed just prior to frustration, regression is said to have occurred.

d) The Frustration-Fixation Hypothesis

Maier (1949) stated that the basic characteristic of behavior in a truly frustrating situation was that it become 'fixated', that this fixation did not arise because of ordinary reinforcement or motivational factors, and could not be changed by the therapeutic application of these factors. Fixated behavior was an end in itself and was to be considered entirely different from ordinary problem-solving.
Maier (1949) asserted that a frustrating situation could not be defined by its observable features alone. Whether a situation was frustrating for a given subject could only be determined by observing whether fixated behavior developed.

The outstanding characteristics of the fixated responses are (1) There seems to be an all-or-none quality to its development (2) Fixations can apparently be broken only by the technique of guidance (3) Fixations are highly specific to the situation and the response involved during the frustration period.

Maier (1949) regards fixation of response as the criterion of frustration. But when he turns to a more vernacular description of frustration reactions, he concedes that fixation, aggression, regression and resignation are all possible reactions to frustration. At times he treats the latter three categories as special cases of fixation; at other times he treats them independently.

FRUSTRATION INTEGRATED WITH GENERAL BEHAVIOR THEORY

The next stage in frustration theory development is marked by an increasingly technical view of the concept. This stage has several distinguishing characteristics: (1) An increasing emphasis on a wide variety of experimental work as the basis for theorizing, as opposed to a reliance on everyday examples of frustration and its effect. (2) These theories also attempted a closer alliance with more formal behavior theory. (3) It came to be recognized that many kinds of already well-known independent variables could be involved. (4) It was realized that there was no unique overt behavior characteristic of frustration situations.

There are three theories of frustration that are prototypes of this stage of conceptualization of the phenomenon: the viewpoints of Child and Waterhouse (1953), Brown and Farber (1951) and Amsel (1951, 1958, 1962).

a) The Child and Waterhouse Revision of Frustration-Regression

Child and Waterhouse (1953), two more workers at Yale University, revised the hypothesis formulated by Barker et al. (1941). According to them, frustration is not regarded as generating unique behavior but only changes with respect to the possible behavior controlled by the environment in which the
frustration occurs. They also made the second departure from "Classical" frustration theory in that the mechanisms of behavior-change following frustration were not considered to be unique, either. They identified two basic mechanisms: interfering responses aroused by the frustration situation or its emotional consequences, and changes in motivation. So frustration does not refer to unique antecedent behavioral causes but only to special cases of well-known determinants.

In brief, Child and Waterhouse (1953) argued that when goal directed behavior is in some way interfered with motivation, is changed, and also other responses are likely to occur. The effect of motivational change can be predicted only by knowing a great deal about the alternative behavior possible for a given subject in a given situation, as well the subject's past history. There is no one mode of reaction to frustration.

b) The Brown And Farber Frustration Theory.

Brown and Farber (1951) took the problem of frustration as a special case in point. Their major thesis was that frustration could be regarded as 'a higher-order hypothetical construct'. According to them frustration is a conflict between two opposing response tendencies—one, response tendency being the one originally evoked by the situation (presumably some kind of goal-response), the other being some alternative responses aroused by the frustrating interfering condition themselves. This conflict between opposing tendencies feeds to whatever could be said to be the unique behavioral consequences of frustration. Because frustration is defined in terms of the relationship between two hypothetical constructs—the opposing response tendencies—frustration is a higher-order construct; it is defined in terms of first order constructs (which can theoretically be related directly to observable).

The effects of this conflict between opposing response tendencies are similar in general nature to those placed by Child and Waterhouse (1953). One effect is an increase in drive. Frustration adds to the total motivation of the organism, and thus, strengthens more whatever responses are already strong in the situation. The second effect is to produce unique internal stimuli which might be called 'emotional' or 'affective'. These stimuli in turn may be related to other responses not previously present in the situation.

c) Amsel's "Frustrative Non-reward" Theory.

Amsel's Frustration construct is basically an addition to the concept
of "Fractional antedating reactions". He said that non-reward caused a 'frustration reaction' and fractional components of this reaction could likewise be conditioned to other stimuli in the environment. Hence the 'fractional anticipatory frustration' could itself affect the observable behavior of the organism.

**Types of Response to Frustration**

Under conditions of prolonged frustration the subject is likely to make some form of adaptation to the frustrating situation. But there is no general agreement as to what behavior should occur in a frustrating situation. However, there are certain mechanisms of adjustment or learned response patterns which are evident in most frustrating situations. A brief account of the major response mechanism is given as follows:

1. **Fixation**

   In some frustrating situations response tendencies may become very strong and rigid. When there is little or too much frustration at a particular stage of growth, personality does not proceed normally and a fixation takes place. When this occurs, the individual repeats patterns of behavior regardless of other changes in situations. In other words, the person may become fixated on one of the early stages of development because taking the next step is fraught with anxiety.

2. **Regression**

   Regression means 'going back' or 'flight to childhood'. This refers to the fact that organisms under stress may revert to a behavior that is appropriate for an early age level. According to Barker et al. (1941) "frustration is one factor which produces regression". According to Angyal (1941) "regression often serves the forward going tendency of personality growth". That is an individual may learn something from regression that enables him or her to return to their present problems and fight more effectively with them. Jung (1960) believes that a regressive displacement of energy does not necessarily have a permanently bad effect upon adjustment. In fact, it may help the ego find a way around the obstacle and move forward again. By performing a regression the ego may discover useful knowledge in the unconscious that will enable the person to overcome the frustration. According to Freud (1946) "the path of the regression
is usually determined by the earlier fixations of the person". That is, people tend to regress to a stage upon which they have been previously fixated.

Fixation and regression are ordinarily relative conditions; a person rarely fixates or regress completely.

(3) Aggression

It is a tendency for subject to attack the source of blocking. It indicates hostility and is often accompanied by emotional stages of anger or hate. In some cases the aggression may be displaced or projected away from the actual source of blocking. According to social learning theory when a person is aroused by a painful or aversive events it may or may not lead to an aggressive response. Whether or not the person responds aggressively depends both on the interpretations of the conditions of arousal and the expectations of consequences for aggressive behavior. Such a view is distinct from an instinct view, which focuses on an automatic build up of aggressive energy, and from other learning theories that view aggressive behavior as a response to frustration.

**Figure 1:** Comparison of social learning theory of aggression with instinct and drive theories of aggression.

**INSTINCT THEORY (FREUD)**

Aggressive Instinct ——— Aggressive behavior.

**DRIVE THEORY (HULL)**

Frustration ——— Aggressive Drive ——— Aggressive behavior.

**SOCIAL LEARNING THEORY (BANDURA)**

Aversive Experiences ——— Emotional Arousal

Incentive Inducements ——— Anticipated Consequences

Dependency

Achievement

Withdrawal & Resignation

Aggression

Psychosomatic Illness

Use Of Drugs & Alcohol

Constructive Problem Solving
So, according to social learning theory, frustration may or may not lead to aggression, and aggression can occur in the absence of frustration. Thus, whether or not frustration leads to aggression depends on how the person interprets the arousal, the alternative modes available for response, and the expectation of consequence for these various responses given in the particular situation.

(4) Withdrawal or Resignation

Another way of reacting to a frustrating situation is to get away from it. Under extreme and prolonged frustration a subject may simply resign himself to his fate and refuse to perform any positive action.

According to Rosenzweig (1945) "Consistent adherence to one or more of the reaction types marks an individual as having a particular trait of frustration reaction and would appear to imply some weakness of the personality structure demanding specially defence".

Researches on effect of frustration have involved this inherent frustration on one hand and induced frustration in experimental situation on another hand.

Most of the work on the study of frustration has been experimental, where frustration is induced in the subjects and the reaction are studied. Various methods have been used for inducing frustration. Some of them are as follows:

(1) Depriving the Subject of Basic Needs

This method is based on direct interference with the goal directed behavior of the subject. Marquis (1953) in his experiment on infants took away the feeding bottle from hungry infants. Sears et al. (1940) kept the adult subjects awake all night.

(2) Creating Physical Obstructions

This method had been widely used with animals, less widely with children and only sometimes with adults. Study of Barker et al. (1941) is a good example of this method, whereby physical obstruction was placed between children and the interesting toys they liked to play with.

(3) Artificially Producing Failure

This method has been used in most of the experiments with adult
subjects. Failure can be produced in many ways. One of the ways of producing failure is to set up unobtainable standards in such a way that the subject may not be aware of it. Failure can also be produced by falsifying scores obtained by the subject. In an experiment conducted by McClelland and Apicella (1945) of card sorting, scores obtained were falsified so that the subject failed to attain the aspiration score. Frustration is also produced by condemning the subjects for their level of performance.

(4) Producing Threatening Situation

The method of creating threatening situation have also been used in experiments to produce frustration. In an experiment conducted by Patrick (1934) the subjects were shocked continuously from under the floor, showered with ice-cold water, and at the same time a loud automobile horn was blown.

Principal Dependent Variables In Frustration Research

Frustration exerts its effect on various behaviors of the organism. The kinds of behavioral observations typically made in frustration research are literally the same dependent variables used in any other kind of psychological research.

There appears to be a dual tradition in the writings of psychologists and others who have given attention to this problem. First, there is a tradition that frustration leads to improved quality of performance. In general accounts of psychology of adjustment unreduced tension is shown as giving rise to various forms of adjustment, of which some may be of high intellectual quality (Schafer, 1936). On the level of society as a whole there are notions- such as Toynbee's (Toynbee, 1947) that the protracted existence of a challenge, often in the form of difficulty in meeting the needs of bare subsistence, is the condition for the joint constructive activity that produces a new civilization. Second there is also a condition that frustration leads to lowered quality of performance. This is perhaps the most apparent part of the thesis of psychoanalysis and psychology of adjustment, since on the whole, adjustments of poor quality to frustration have received the greater attention from therapists. This tradition is also evident in much of the discussion about the disorganizing effects of emotion (as reviewed by Leeper, 1948), in as much as emotion is often produced by frustration. Barker, Dembo and Lewin's study of frustration and regression (Barker et al. 1941) is often sited in simple configuration of this tradition, to the neglect
of the rest of its content. This tradition is also represented in Maier's systematization of the effects of gratification (Maier, 1949) as most of the effects he deals with would doubtless be considered to be of poor intellectual quality.

There is, then an apparent conflict of belief in this matter. This apparent contradiction is due merely to failure to appreciate the role of severity of frustration, minor frustrations leading in fact to an improvement in quantity of performance and major frustration to the opposite. The greatest advance toward resolving this contradiction has been made by Barker (1938) and by Barker et al. (1941). By drawing upon their contributions upon other aspects of psychological theory and upon evidence obtained in variety of pertinent studies Child and Waterhouse (1953) advanced still further toward an understanding of the factors which influence the direction of change in quality of performance that results from frustration.

(1) Changes In The Frustrated Response Itself- One effect on the frustrated response itself, has impressed many psychologists is that responses immediately after frustration may not began to weaken right away but instead become stronger. This is the increased vigor phenomenon which can be manifested in many ways i.e., increased speed of responding increased force of responding, increased concentration on a complex task. Some psychologists suspect it is a reflection of prior learning-the more effortful response frequently accomplished what a less effortful one will not; there is a marked tendency for organisms to expand the least energy necessary to obtain reinforcements, and only when reinforcement is no longer forthcoming do stronger versions of the response emerge. Other psychologists (Amsel, 1951; Brown and Farber, 1951), believed that the increased vigor is due to an increased motivation caused by the frustration itself. Whichever turns out to be the case, this is definitely a temporary effect. Progressive Weakening of the response eventually becomes characteristic.

(2) Resumption, Memory And Attractiveness Of Frustrated Behavior- Rosenzweig (1945) has argued that mature people tend more to return to the task on which they have previously failed. Memory for successful and unsuccessful endeavors has also been studied and it is widely believed that we tend to remember the pleasant and forget the 'unpleasant' (Lawson and Mark, 1958) has reviewed the researches with respect to memory of specific success and failure experiences in the laboratory. However, because of inconsistent results it is safe to say that frustration is not the only variable operating with respect to this response tendencies. It has generally been obtained that subjects rate successful task higher in terms of attractiveness than ones on which they were unsuccessful.
(3) Fantasy Behavior Following Frustration- It has been observed that though subjects who have a history of frustration, or once expose to a specific frustrating situation show a particular trend in their verbal fantasies to a projective test material. The changes may be of two types: an increase in aggressive fantasy (Yarrow, 1948) or an increase in punishment expectancy (Crandall, 1951). In terms of long terms history, however, an important variable determining fantasy aggression is the degree to which real-life aggression has been punished (Hollenberg and Sperry, 1951); the less chance for real aggression, the more the tendency to fantasy aggression.

(4) Emotionality- As we study organism higher than the rat, in home only the most extreme forms of emotion are easily inferred from its behavior, we very often observe emotional behavior after frustration. Finch (1942) found that 'Purely emotional' behavior seems to emerge primarily after all adaptive responses to the frustrating situations have been exhausted as Lawson and Mark (1958) suggested, this may have much to do with the common place observation that children react more emotionally to frustration than do adults—they simply have fewer adaptive responses, available in the face of many frustrations. Keister and Updegraff (1937) found that after using the method of successive approximations and a set of problems so that the subjects could handle each new one with the success, children who initially reacted to frustration with much emotional behavior become far less emotional and more adaptive in the phase of unsolvable problems. Davitz (1952) showed that children permitted to behave aggressively in a particular environment showed a great deal of aggression after frustration, whereas children trained to behave quietly and cooperatively in the same environment showed very little aggression to the same sort of frustration.

(5) Effects Of Frustration On Non-Frustrated Behavior- Also of interest is the effect of frustration, may have on other behavior that immediately following, but in no way involved with the occurrence of frustration. The effects are generally deleterious with respect to frustration and problem solving. However, there is an indication that 'increased vigor' sometimes operates in this case, too. Following failure on one task subjects may try harder on a subsequent though different one (Postman, & Bruner, 1948). Barker et al. (1941) found a regressive tendency following frustrating situation. Child and Waterhouse (1952) have suggested that this effect of frustration is due to the generation of competing responses, either conditioned or unconditioned.

In an experiment dealing with success and failure, Sears (1973) forced
his subjects to succeed or fail related to the goal by falsifying scores on an experimental task in which the subject were instructed to sort playing cards into four piles according to suit. The subjects who were allowed to succeed made consistent gains in speed of sorting throughout the experiment and showed, distinct superiority over those in the group who were forced to fail.

Postman and Bruner (1948) studied the effect of induced frustration on perceptual behavior. The frustrated subject showed no improvement in recognition time between initial and test series, whereas the control subjects did. Penn (1964) asked his subjects to learn paired associates. They then performed a tapping task, either associated with failure or no information. The first retention test was then given, followed by some more tapping associated either with no information, failure information or success information. Finally, there was a second retention test. The experimental subjects as compared to the control groups, had a very low level of recall after the failure information and a high level of recall, after the subsequent success information. D'Zurilla (1965) conducted an experiment similar to that of Penn (1964). He asked his subject what they had thought about, immediately after the failure on success information had been given. The failure subjects reported more thoughts than the success subjects that were quite irrelevant to the subsequent task of recalling the words. He opined that the increase in amount of conflicting cognitive event could have reduced the efficiency of recall in the failure groups. The lowering of performance of the failure groups in above studies may be attributed to the frustrating condition because of feeling of failure.

Williams and Geison (1979) conducted three experiments with 89 right handed undergraduates. Their main aim was to study the relationship of delay in response opportunity to response latencies. They expected that the longer delay would bring about greater frustration such that response latencies would be reduced. Statistically significant relationship between delay in opportunity to respond and response latencies was found. Wong (1979) found facilitatory effect of frustration which was interpreted to imply that uncertainty leads to exploration extending it to situation involving frustration non-reward. Both empirical evidences and logical analyses reveal that uncertain frustration leads to exploration, primary function of which is to broaden the scope of response selection.

Learned helplessness has also been considered a frustrating condition. Kollar and Kaplan (1978) experimented on 160 students who solved button pushing problems under feedback condition designed to differ systematically in the amount
of motivation they produced. During a pre-test series of trials one group received contingent feedback designed to enhance both information and motivation. A second group was yoked to the contingent group and thus, low information and low motivation. A third group experienced non contingent success (low information, high motivation) and a fourth group - received non contingent failure feedback (low information, low motivation). A two process model that gives equal weight to information and motivational cues would predict that the task would fail in between that of the contingent group and the failure yoked groups. As a more stringent test of the model, four inventions were factorically combined with the pretreatment. The intervention treatments involved giving either no information, information about the contingencies, praise or derogation. As predicted by the model, simply giving subjects information about the contingencies removed the debilitating effect of learned helplessness.