CHAPTER - I

INTRODUCTION
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Psychologists have long been interested in the way organization affects memory. Study of the complex organizational processes involved in learning of verbal items and their impact on subsequent retention has achieved special prominence in experimental psychology in recent years. Over the years there have been several, rather different, approaches to the problem of clustering or organization. Probably the most productive to date has been the study or categorical organization (clustering by semantic categories), since an attempt has been made to quantify the organizational processes. Clustering was first observed by Bousfield and Sedgwick (1944) while studying sequential characteristics of associative responses. Clustering has come to mean the sequential organization during recall of items that are related to one another in some way even though the items themselves are exposed in a random order during study trials. When clustering is present, second order or conceptual habits are presumed to be engaged.

During the ensuing 20 years, a great deal of research has been done on clustering in free recall as well as in cued recall (e.g. Marshal, 1967; Tulving, 1968; Shuell, 1969; Tulving & Osler, 1968; Thomson & Tulving, 1970; Mandler, 1967, 1972, 1979; Ellis, 1973, 1974; Lauer, Sroby & Battig, 1976; Tulving & Thomson, 1973; Jacoby, 1978; Moscovitch & Craik, 1976; Eysenck, 1979; Jenkins, 1979; Orasanu, Lee & Sribner, 1979;
Thus the clustering phenomenon is largely a product of the contemporary period. In fact, several kinds of phenomena, identified by the nature of the specific conceptual habits elicited, have been investigated, each of which is described in this chapter.

The term organization refers to the relations between to-be-remembered items. Organization has been defined "as a process through which certain relationships among the set of verbal items are established" (Mandler, 1972). In its operational sense, organization refers to the discrepancy between the input and the output item orders (Tulving, 1968). Such organization occurs "when the output order of the items is governed by phonetic or semantic relations among items or by subjects prior extra-experimental or intra-experimental acquaintance with the items constituting the list" (Tulving, 1968). The organization which is observed during recall could occur at the time of input, that is, presentation of the stimulus list, or at the time of retrieval, that is, when the subject recalling the words. However, there is increasing evidence (Anisfeld & Knapp, 1968; Rohwar, Shuell, & Levin, 1967; Tulving & Osler, 1968) that the organization must occur at the time of presentation in order to be effective.
Tulving (1968) has distinguished between two types of organization. The first of these referred to as primary organization. Primary organization describes strategies based on relations such as position in the list, or grouping of items in space or time. This type of organization is defined as the consistent discrepancies between input and output orders which are independent of the subjects prior familiarity with the input items. The serial position effect (e.g. Murdock, 1962) and the tendency for subjects to recall the terminal items first (Postman and Keppel, 1968; Shuell and Keppel, 1968) are the examples of primary organization. The other type of organization is referred to as secondary organization. Organization which involves the semantic aspects of items is termed secondary organization. This type of organization is dependent upon the subjects prior acquaintance with the items in the stimulus list. Secondary organization reveals itself in differences between the ordering of items in the presentation sequence and the subject's recall sequence as when, for instance, the word 'big' and 'large' are recalled one after the other even though they appeared widely separated in the presentation sequence. This reordering of items can only occur if the subject is able to choose his own recall sequence. Clustering on the basis of meaning would be an example of secondary organization.

Three paradigms have been developed for the study of organization, namely, categorical organization, associative organization, and subjective organization. These differ primarily
in the experimental treatment given for inducing clustering. Two of these paradigms are similar in the sense that the basis of organization is determined by the experimenter. Categorical organization refers to list of to-be-remembered items which fall into a number of semantic categories such as birds, professions, and furniture etc. This type of organization is a special case of organization in which certain categorical items are presented to subject in a random order and the subject recall these items in chunks or clusters.

Experiments concerned with categorical organization are characterized by the selection of to-be-remembered words from taxonomic categories such as animals, names, vegetables, and professions (ANVP). Bousfield (1953) initiated a series of experiments using categorical organization with a list of sixty nouns composed of fifteen words from each of the four taxonomic categories: animals, names, vegetables, and professions. Bousfield observed that the words belonging to the same category tended to cluster together in the subject's output. In subsequent studies, Bousfield and Cohen (1953, 1955) found that the recall of any item belonging to a given category tended to activate the recall of the superordinate or category itself, which in turn aided the recall of other members of that category. Clustering was found to be greater for high frequency than for low frequency words (Bousfield & Cohen, 1955) and also for high frequency taxonomic responses (as determined by the normative data) than for low frequency taxonomic responses (Bousfield, Cohen, and Whitmarsh, 1958). Cohen et al. (1957) using taxonomic
norms found that clustering was higher with blocked presentation for both high and low frequency lists. Recall was also better if followed by an immediate test and if the presentation rates were slower. Tulving and Pearlstone (1966) found that subjects in the group who were cued with the category names recalled more words than the unaided group. The cues greatly facilitated recall. Consistent with the pioneer work of Bousfield (1953) and the findings of the other earlier studies, current researches also revealed that categorical organization has facilitative influence on recall performance (Mandler, 1979; Thomas & Bolton, 1979; Orasanu, Lee & Sribner, 1979; Koriat & Melkman, 1981; Ellis & Franklin, 1983; Agarwal & Misra, 1983; Hunt & Seta, 1984; Alam & Saeeduzzafar, 1987; Alam, 1988).

The second paradigm, i.e., associative organization, refers to the situation in which the stimulus list is comprised of associatively related words which are not members of the same conceptual category. Jenkins and his colleagues were the first who investigated associative relationships in recall (Jenkins and Russell, 1952). They discovered that clustering occurs when list contains pair of words in which one word is a common response or associate to the other as a stimulus (e.g., chair as a response to table). The list is presented in a random order during the study trials, with the associates likely to be widely scattered. A high degree of associative clustering was observed in the recall protocols; associated word pairs tended to be recalled together. Later studies (e.g. Jenkins, Mink and Russell, 1958; Mathews, Marcer and Morgan, 1964) found that the tendency
to recall the two members of each pair in succession increased with higher interpair associative strength. Similarly, Deese (1959, 1961, 1962) also found a positive relationship between the degree of interitem associative strength within lists and the amount of free recall. Thus, associative organization suggests that strong preexperimental habits, such as word associations, tend to recombine items during output even though the members of each pair are separated during input.

Cofer (1965) accepted the existence of both associative and categorical organization, although he did not consider the distinction to be useful. He concluded that learners employ both types of mechanisms, depending on the nature of the test conditions. Dominance of associative relationship in items leads to associative organization while the dominance of categorical relationship in the items results in categorical organization. However, neither categorical nor associative clustering is complete. More specifically, neither all the items in a category nor all the associatively related items are recalled together. This suggests that the organization in the list, as it is defined by the experimenter, is not the same as the organization the subject perceives and makes use of it in setting up his plans for storing and retrieving the words. Consequently, experimenter-imposed organization is not always the most revealing method for investigating how the subject encodes the to-be-remembered items.
The third paradigm for the study of organization is subjective organization that differs from the other two paradigms in that the basis of organization is not predetermined by the experimenter. The first experiment, which showed that the subjective organization occurs in the learning of a list of unrelated items, was reported by Tulving in 1962. Tulving defined subjective organization as the tendency to recall words in the same order on successive learning trials, even if there are no experimentally manipulated sequential dependencies among the words of a learning list. The stimulus list is comprised of so-called unrelated words, that is, a random sample of words in which the experimenter has made no attempt to include words which are categorically or associatively related. Thus, the subject is more or less free to organize the words the way he wishes. Organization is determined by the extent to which the subject recalls the words in the same order on two successive trials. Tulving (1962) showed that the number of words recalled from lists of 'unrelated' words increased over successive trials of presentation and recall. This suggests that more words are recalled as chunks. In a later study, Tulving showed that the number of subjective chunks stay fairly constant from trial to trial and increases in the number of words recalled from the list must be due to increases in the size of chunks. There appears to be a limit on the number of chunks recalled but the size of each chunk is increased as learning proceeds.

As stated somewhere else most of the studies to date have been concerned with categorical organization - organization based
on semantic categories. The semantic association effect was first reported by Meyer and Colleagues (Meyer & Schanaveldt, 1971; Meyer, Schanaveldt, and Ruddy, 1975). Using a lexical (word/nonword) decision task, these researchers have demonstrated that a word, the 'target', processed shortly after an associated word, the "prime", is responded more rapidly than when the same word is processed by a nonassociate. To use the classical example DOCTOR is processed more rapidly following NURSE than following BUTTER.

Many researchers have reported that decision based on pairs of semantically similar concepts can be made more rapidly than decisions based on pairs of semantically dissimilar concepts (e.g., Collins and Quillian, 1969; Mayer & Schanaveldt, 1971; Shulman and Davison, 1977; Schanaveldt and McDonald, 1981). Adults are better at remembering words from lists which contains semantically related subsets than words from unrelated lists (e.g., Cofer, 1966; Cofer, Bruce, and Reicher, 1966). In addition, if the semantically related words are separated in the list, adults tend to cluster them by meaning in output (e.g., Bousfield, 1953; Jenkins and Russell, 1952). Moreover, the young children are also better at remembering items which are all from one category than items which are unrelated in meaning (e.g., Cole, Frankel, and Sharp, 1971; Kobasigawa and Orr, 1973; Laurence, 1967; Locke and Locke, 1971; Steinmetz, and Battig, 1969; Vaughan, 1968). Further when more than one category is used, recall is also better for related items if
they are blocked in presentation (Cole, Krankel, and Sharp, 1971; Hoely and Shapiro, 1971).

Generally speaking, there is a positive correlation between measures of organization and the number of words recalled. A number of researchers (e.g., Mandler, 1967, 1972; Tulving, 1968; Rogoff, 1980; Orasanu, Lee and Scribner, 1979; \textit{Garwal \& Misra, 1983; Jachuck \& Das, 1981}) have suggested that recall is dependent upon organization of stimulus materials. Probably the best empirical evidence in support of such position is the study of alphabetic organization (Tulving, 1962). Tulving and others have noted that clustering of items was related to acquisition (e.g., Bousfield, 1953; Bousfield and Bousfield, 1966; Mandler and Dean, 1969; Shuell, 1969). An extensive body of researches documented the fact that organization, that is, the relation among items, plays an important part in memory for related as well as unrelated words.

Much of the research on organization in free recall is concerned with the determination of the variables and conditions which influences the amount of clustering obtained. For instance, the effect of varying numbers of categories appears to be dependent, at least in part, on the length of list and on whether or not recall is cued (Dallett, 1964; Tulving and Pearlstone, 1966; Hunt \& Seta, 1984). Lauer and his colleagues (1976) found that alphabetic cues facilitate free recall learning. There was general superiority of cued over uncued retention. The noncued conditions were able to increase their scores when
retested under cued conditions (Tulving & Pearlsone, 1966). Bilodeau, Fox and Blick (1963) have also investigated the effects of retrieval cues or, in their terms, reminders on recall. They found better recall when appropriate cues are provided. The cues make the items accessible. Tulving argued that the cues were effective in bringing about retrieval because they supplied the plan by which they had been stored. In subsequent study, Tulving and Osler (1968) have observed that cues are only effective if they are present at both input and output phases of the task. Provision of the cue under only input or output is detrimental because recall under these conditions is worse than when no cues at all are given. In general, the relationship between recall and number of categories appears to be a direct one when cued recall is used and an inverse one when noncued recall is used. Earhard (1967) indicated that at least for cued recall the use of categorized list is effective only when the number of words per category is fewer than six or seven items.

Several studies (Bousfield, Berkowitz, and Whitmarsh, 1959; Marshall, 1967; Robinson, 1966; Shuell, 1968; Koriate & Melkman, 1981) employing the alternative study recall procedure have shown that clustering, mean recall, and the mean number of categories recalled increases progressively as a function of trials. In a series of studies, Cofer and his associates (Cofer, 1967; Cofer et al. 1966; Gonzales and Cofer, 1959) have investigated changes in clustering and recall from an immediate-recall test to a second recall test 5 minutes later.
In general, there was an increase in clustering and a decrease in recall. The clustering obtained on the second test is significantly greater than the clustering obtained in a control group which waited an equivalent amount of time but did not have the interpolated recall test (Cofer et al. 1966). They found that recall performance is better if it is followed by an immediate test, and if the presentation rates are slower. Similarly, Cohen and his colleagues (1957) reported that immediate recall and slower presentation rates produced more clustering.

It has also been observed that higher recall occurred under blocked presentation. Blocked presentation refers to the experimental situation in which all members of a category are presented contiguously in the stimulus list, for example, all the examples of one category are presented before those of another category are presented. Blocked presentation is considered to be more effective than random presentation for helping the subject perceive the categorized nature of the list. Dallett (1964) obtained both superior recall and superior clustering with blocked presentation. Thus blocked presentation appears to facilitate both clustering and recall. However, the facilitation for clustering may be partly due to the fact that all members of certain categories appear in the most favourable positions, that is, the first and the last serial positions with the terminal items tending to be recalled first (Postman & Keppel, 1968; Shuell & Keppel, 1968). A consistent finding in
human memory is that items which are in some way distinctive are more easily remembered (cf. Ellis, 1973; Hunt & Mitchell, 1978; Eysenck, 1979; Nelson, 1979; Hunt & Elliott, 1980; Hunt & Mitchell, 1982).

There is growing evidence that information is encoded more effectively if it is processed actively and effortfully and involves reorganization of the materials (cf. Ellis et al., 1974; Ellis et al., 1975; Jacoby, 1978; Slamecka & Graf, 1978; Tyler et al., 1979; Ellis & Franklin, 1983). Recently, Ellis and Franklin (1983) have examined the effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall, and also examined the effect of a personality variable, locus of control, on the susceptibility to superficial features. When given an option to encode both semantic and superficial features, subjects with external locus of control encoded the superficial features more extensively than internals; in addition with this option, externals showed poorer free recall. When only semantic cues were presented, no differences in recall or clustering occurred between internals and externals. They also found that the greater the degree of semantic organization, the better was list recall, whereas higher levels of superficial organization were related to decreased recall. The degree of externality was positively related to superficial colour clustering and negatively to semantic clustering and recall. Finally, where there was opportunity to process the word lists superficially the recall
of externals was substantially diminished but not so for the internals. Thus, Ellis and Franklin (1983) emphasized that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially is equally present for both internals and externals, the externals are much more susceptible to superficial organization and show significantly less recall. Ellis & Franklin (1983) have proposed an attentional-discrimination hypothesis to account for differences between externals and internals.

However, there may be an alternative explanation for the results obtained by Ellis and Franklin. It may be possible that subjects with an external locus of control were inefficient in the use of effortful processes such as organization and consequently they organized the list using the less effective perceptual features. It is established by several investigators that inefficient use of effortful learning processes is related to cognitive rigidity (Tyler, Hertel, McCallum, and Ellis, 1979; Hasher and Zacks, 1979; Leight & Ellis, 1981). It is, therefore, reasonable to assume that findings obtained by Ellis and Franklin may be explained in terms of cognitive rigidity-flexibility. Thus, an important consideration which influenced the thinking of the present investigator to undertake the present research is the presence of considerably body of evidence to suggest that cognitive rigidity-flexibility is a potent determiner of memory and forgetting.
The term 'rigidity' refers to the tendency to perseverate or to resist any change in mental sets, habits, beliefs, that is, in the modes of thinking and behaving even when they are no longer appropriate. It has grown out of experimental studies on phenomena like perseveration and mental inertia (Sheila, 1959).

Rigidity has been defined by different investigators in different ways but resistance to change or the tendency to perseverate in thinking and responses remains the basic features of all the definitions. It is a phenotypical concept that refers to types of behaviours, and results in classifying some behaviours as rigid and others as non-rigid according to whether the behaviours are perseverative or non-perseverative, flexible or inflexible, stereotyped or variable, and so on. In turn, person who manifest 'rigid' forms of overt behaviour (brain-injured, feebleminded) are labelled as 'rigid' persons.

It is defined as "the inability to change one's set when the objective conditions demand it" (Rokeach, 1948), as "lack of variability of response" (Warner, 1946). But one of the best definition seems to be that given by Cattell (1949) when he described disposition rigidity as "the difficulty with which old established habits may be changed in the presence of new demands". A broad definition of rigidity, somewhat similar to that of Cattell, has been given by Shaie. Shaie (1955) defined rigidity as "a tendency to perseverate and resist conceptual change, to resist the acquisition of new patterns of
behaviour and to refuse to relinquish old and established patterns". Resistance to change is not the characteristic of rigidity alone, dogmatism also shares this feature. However, there is a marked difference between the two. Rigidity, according to Rokeach (1960), refers to the resistance to change of beliefs and habits, whereas dogmatism refers to the resistance to change of a set of beliefs or ideas that are organized into a relatively closed configuration. The source of cognitive trouble in a rigid person, according to Rokeach, lies in his inability to analyse, breakdown, overcome or change beliefs when they are no longer appropriate.

Rigidity has been differentiated by some investigators into different types. Cattell (1949) distinguished it into two types: Process rigidity and structural rigidity. The former type of rigidity refers to a tendency for an earlier response to continue, although a change has occurred in the stimulus situation; while, the latter type refers to the resistance in an attitude or personality trait to forces which might be expected to change it. That is, the referent in process rigidity is a specific response or a specific way of acting, whereas, the referent in structural rigidity is a way of thinking or a characteristic of personality.

Kurt Goldstein (1943) identifies two kinds of rigidity called 'Primary' and 'secondary'. Primary rigidity is independent of an impairment of higher mental processes. It is a basic lack of ability to change from one 'set' to another. That
is, primary rigidity refers to the inability of a person to change from one train of thought to another. The secondary rigidity, on the other hand, refers to a preference of making incorrect response to making no response at all by a person who finds himself in a difficult situation. Rigidity here is a secondary phenomena; it is the means to escape from a frustrating situation but this rigidity appears only if the task is too difficult.

Piaget (Mehrabian, 1968, pp. 125-132) has explained rigidity in terms of his cognitive-development theory of personality. The process of adaptation, which is the basic process in his theory, consists of assimilation and accommodation as its components. In assimilation an individual's cognitive structure does not change as a function of experience, but in accommodation his cognitive structure does change. Piaget has also made a sharp distinction among rigid, labile, and flexible cognitive functionings. The cognitive functioning in a rigid person is dominated by assimilatory tendency. Such a person finds it difficult to change himself and to benefit from new experiences. A labile person, on the other hand, is so much changeable that it is difficult to predict any consistency in his behaviour. A flexible individual responds to new information and new experiences without losing his stability and identity.

The cognitive rigidity has extensively been studied in relation to age, sex, caste, religion, socio-economic status,
education, anxiety, adjustment, motivation, and goal setting behavior (Fisher, 1950; Leach, 1967; Rokeach, 1948; Akhtar & Sawaid, 1972; Rabindra Das, 1973; Ali, 1975; Bakht, 1974; Rogers & Wright, 1975; Bakht & Farooqui, 1979; Bakht, 1981; Singh, 1981; Mythili & Nirmala, 1982). However, a thorough survey of literature concerning rigidity reveals that there are few studies which have been carried out to examine the effect of cognitive rigidity on verbal learning, organization and retention. Akhtar & Sowaid (1972) and Imam (1975), for example, found that rigidity has negative influence on incidental learning. Cosden, Ellis, & Feeney (1979) examined the effect of cognitive rigidity-flexibility in recall with perceptual grouping tasks and found that organizational processes involved in their task were influenced by the individual level of cognitive rigidity. They further found that rigid subjects showed significantly poorer recall performance than those of flexible subjects. Cosden et al. thus concluded that cognitive rigidity has detrimental effect on retention. Similarly, Hasher and Zacks (1979) and Leight & Ellis (1981) suggested that rigidity in information processing is related to the inefficient use of effortful learning processes such as organization, mnemonic or elaborative devices, and rehearsal.

Few attempts have also been made to find out the influence of cognitive rigidity on learning and memory in retroactive inhibition conditions (e.g. Khan, 1975; Mythili, 1978, 1982, 1984; Mythili, Kalpana & Krishna Rao, 1982; Nirmala & Mythili, 1988).
Mythili (1978) found that the high and low rigid groups differed significantly in retroactive inhibition. In another study, Mythili (1982) found that high rigid group as compared to low rigid group learned (1) a first list with significantly less numbers of trials and (2) a second list with significantly more number of trials. Comparing high and low rigid groups for recall score using the modified-modified free recall (MMFR) test, Mythili (1984) obtained a significant difference. High rigid subjects showed significantly poorer recall of first list responses as compared to low rigid subjects. However, they showed significantly superior recall of second list responses than those of low rigid subjects in MMFR test indicating greater perseveration, hence greater number of responses were given from the most recently learned list. Similarly, Chhaya (1985) examined the effect of rigidity-flexibility on Zeigarnik Effect, i.e. predominance of the recall of unfinished task, and found significantly greater recall of interrupted task by rigid subjects than by flexible subjects.

Recently, the present investigator (Alam, 1986; Alam & Saeeduzzafar, 1987) in a pilot study examined the effects of the presence of both semantic and superficial perceptual features of word lists on clustering in immediate and delayed cued recall and also examined the role of personality variable, cognitive rigidity, in the manner by which subjects organized material in both immediate and delayed cued recall. It was found that rigid subjects encoded superficial perceptual features of the list.
more extensively than their flexible counterparts under both immediate and delayed cued recall test. On the contrary, flexible subjects encoded semantic categories of the list more extensively than those of flexible subjects under both immediate and delayed cued recall test. Moreover, rigid subjects showed poorer recall performance under immediate as well as delayed cued recall test than those of flexible subjects. However, it was observed that some subjects even from flexible group encoded superficial perceptual features of the list as extensively as encoded by rigid subjects. Moreover, one further fact stood out clearly upon the inspection of the individual recall protocols that few subjects even from flexible group showed as poor semantic organization and recall performance as shown by rigid subjects. These observations suggested that beside rigidity-flexibility some other personality variables affect organization and recall performance.

Thus an important consideration which influenced the thinking of the present investigator to undertake the present research is the substantial body of evidence to suggest that locus of control, a personality variable, is a potent determiner of cognitive processes such as attention, perception, conceptualization, categorization, learning, and memory (Miller, 1960; Seeman, 1963; Efran, 1963; Seeman & Evans, 1962; Rotter, 1966; Phares, 1968; Lefcourt & Wine, 1969; Ducette & Wolk, 1973; Pines, 1973; Pines & Julian, 1972; Lefcourt & Telegdi, 1971; Wolk & Ducette, 1974; Lefcourt, 1972, 1976; Cohen & Lefcowitz, 1977;
The construct of locus of control, as originally derived from Rotter's (1954) social learning theory, is defined as a generalized expectancy regarding the degree to which a person's own behaviour is seen to be the controlling factor in securing reinforcements. In Rotter's (1966) explication, persons with an internal locus of control orientation (internals) are defined as those who maintain the generalized expectancy that reinforcements received are determined by factors under their personal control, i.e., determined by skill, ability, or other internal resources. The generalized expectancy of internal control, in other words, refers to the perception of events, whether positive or negative, as being a consequences of one's own actions and thereby potentially under personal control. Thus individuals having an internal locus of control subscribe to the view that individual's ability and efforts and the reliance upon one's internal resources are the major determinants of performance. The generalized expectancy of external locus of control, on the other hand, refers to the perception of positive or negative events as being unrelated to one's own behaviour and thereby
beyond personal control. Person with an external control orientation (externals) are, according to Rotter's social learning theory, those who maintain the expectancy that reinforcements received are determined by factors beyond under personal control such as fate, chance, social constraints, the complexity or unpredictability of the world etc. In other words, individuals having an external control are inclined to attribute the vicissitudes of existence to fate, luck, the behaviour of others, or environmental factors—in brief, forces external to themselves.

The best theoretical statement introducing the expectancy of control construct was given by Rotter (1966) in his review of researches on locus of control. "A reinforcement, according to him, acts to strengthen an expectancy that a particular behaviour or event will be followed by the reinforcement in the future. Once an expectancy for such a behaviour-reinforcement sequence is built up the failure of the reinforcement to occur will reduce or extinguish the expectancy. It follows as a general hypothesis that when the reinforcement is seen as not contingent upon the subject's own behaviour that its occurrence will not increase an expectancy as much as when it is seen as contingent. Conversely, its nonoccurrence will not reduce any expectancy so much as when it is seen as contingent. It seems likely that, depending upon the individual's history of reinforcement, individuals would differ in the degree to which they attributed reinforcements to their own actions."
Expectancies generalize from a specific situations to a series of situation which are perceived as related or similar. These generalized expectancies will result in characteristic differences in behaviour in a situation culturally categorized as chance versus skill determined, and they may act to produce individual differences within a specific condition.

The construct of locus of control, developed within the framework of Rotter's (1954, 1966) social learning theory and Heider's (1958) attribution theory, has been the focus of considerable research interest in recent years. A number of investigators have reported that locus of control is an important predictor of cognitive activity, learning, and memory. The first study linking locus of control and cognitive activity was conducted by Seeman & Evans (1962) who found that internals were more attentive to aspects of their environment than their external counterparts. Seeman et al. concluded that this difference was due to the fact that internals believed that they could act in their own behalf and therefore required more information, while externals more readily accepted dependency on more competent others and thus had less need of information. Seeman (1963) further tested their assertions and found that internals were effective in selecting and retaining relevant information whereas externals did not. That is, internals recalled more goal relevant informations than externals but they did not differ in recall of less goal relevant informations. On the basis of these results Seeman concluded that an individual's sense of powerlessness governs his attention and acquisition processes. Following
Seeman's (1962, 1963) study, numerous investigators investigated cognitive activities in relation to locus of control. Rotter & Mulry (1965) reported that internals devoted more attention to decisions skill-related matters than did externals. For instance in one such study, Davis & Phares (1967) found that internals sought more information than externals in order to improve the likelihood of being effective. In another study Phares (1968) compared internals and externals in their use of information for decision making and found that internals made better use of information than externals despite the fact that both might have equivalent amount of information. Similarly, Lefcourt and Wine (1969) reported that internal subjects were more likely to attend to cues which help to resolve uncertainties. In subsequent study, Lefcourt and his associates (1973) observed that internals were more quicker at noticing changes in the conditions about them and were also quicker to respond to their perceptions than externals. In essence, internals were not as easily duped for as long a period as were externals due to a greater readiness to recognize and cognitively come to terms with chance.

Pines (1973) cited a number of studies suggesting that internals made greater use of direct experience with problem materials than did externals. He inferred from this that an orientation of internals toward actively seeking information for the solution of a problem was greater than evinced by externals. Pines in one of his study found that internals
responded more to task opportunities to organize the to-be-remembered words than did the externals. He also reported that memory performance of the internals was facilitated and greater than external's memory performance when given additional time for recall of the verbal materials. Furthermore, the presence of an observing audience, however, facilitated the external's retention, while it had no effect on the internal's performance. Similarly, Wolk and DuCette (1974) reported that internals did consistently better than externals on both intentional and incidental learning measures. Further, internals found more typographical errors, recalled more story content, recalled more dates when instructed to and recalled more names when not directed to do so than did externals. Wolk & DuCette (1974) therefore suggested that internals were more "perceptually sensitive" than externals. The more interesting aspect of their findings was the fact that internals showed higher level of incidental learning. Incidental learning is a phenomenon dependent on the acquisition of less prominent aspects of a stimulus array, and since such acquisition has been interpreted as the product of a more attentive and organizing system, it follows that the internal differs from the externals in the manner in which he organizes and uses information. Wolk & DuCette (1974), thus, concluded that the external, relative to internal, possessed a less active perceptual-attentive system and that the external also failed to use this system as efficiently as possible, specially under conditions of ambiguity. It appears that internals are more perceptive to and ready to
learn about their surroundings. They are more inquisitive, curious and efficient processors of information than are external.

Prociuk & Breen (1974) examined the relationship between locus of control and two academically related variables and found that study habits and academic performance were positively related to internal control and negatively to chance control. In subsequent study, Prociuk & Breen (1977) found that internals were more active seeking of information which had relevance to their academic situations than externals, and consequently were more successful at remembering such information. Similarly, Stipek & Weisz (1981) found that internal locus of control had a greater influence on academic achievement. Most recently, Young & Shorr (1986), Agrawal & Misra (1986) and Misra (1987) have also reported that internal locus of control is positively related to academic achievement. Thus, one characteristic of the cognitive activities which distinguishes internals from externals is the internal's greater tendency to attend selectively to the relevant aspects of the task at hand. The failure of selective attention among externals is consistent with the findings obtained by Sanders, Halcomb, Fray & Owens (1976) who found that internals outperformed externals on a test of perceptual vigilance. One inference from the findings of Prociuk & Breen (1977) and Sanders et al. (1976) could be that the externals distractibility, whether or not due to inability to discriminate relevant from irrelevant information, is a major
distinguishing characteristic of that orientation. Similarly, Cohen & Lefkowitz (1977) reported that internals performed better on an anagram task than did externals; moreover, this disparity in performance increased with the difficulty (cognitive effort) of the problems. Colwick (1977) also found that internals showed a preference for tasks in which high effort was a major determinant of outcome. Internal oriented subjects were apparently able to concentrate a larger proportion of their cognitive activity upon relevent aspect of the given task than were externals.

The ability to engage a large proportion of the limited-capacity central processing system upon a particular task, which has been described by Tyler, Hertel, McCallum & Ellis (1979) as a working definition of cognitive effort, also distinguishes externals from internals. Tyler et al. (1979) have observed that the amount of effort required by a task is an important determinant of later recall performance; greater efforts leading to higher recall. Since internals exert more cognitive effort, their recall performance should be better than those of externals. Recently, Ellis & Franklin (1983) examined the effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall, and also examined the effect of locus of control on susceptibility to superficial features. When given an option to encode both semantic and superficial features of the lists, subjects with an external locus of control encoded the superficial features
more extensively than internals; in addition with this option, external showed poorer free recall. The opportunity to encode the perceptual features of the list as a basis for organization reduced organization by semantic categories among external but not among internals. They also found that the greater the degree of semantic organization, the better was list recall; in contrast, higher levels of superficial organization was related to decreased recall. The degree of externality was positively related to superficial colour clustering and negatively to semantic clustering and recall. Finally, where there was opportunity to process the word lists superficially, the recall of externals was substantially diminished but not so for the internals. Thus Ellis & Franklin (1983) emphasized that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially was equally present for both externals and internals, the externals were found to be more susceptible to superficial organization and showed significantly poorer recall than internals.

It may be noted that in Ellis & Franklin study, subjects were given the option of organizing information with both semantic and superficial perceptual features (e.g. colour) of the list and free recall was used as a measure of retention. It has been demonstrated that the recall and clustering depend upon variation in testing conditions (Bransford, Frank, Morris, and Stein, 1979). It is, therefore, reasonable to assume that a different pattern of results would be obtained if a different
retention test is used in which colours and categories names may be presented as retrieval cues. As demonstrated by Ellis & Franklin that externals are relatively inefficient in organizational strategy, such ineffectiveness in the externals' organizational strategy may be simply due to the particular testing condition used (free recall with no instruction as to how to organize the list). We expect different results if different retention testing procedures are used. Furthermore, with respect to the aforementioned relation between cognitive rigidity-flexibility and memory, we hypothesized that rigid subjects would encode the superficial perceptual features of the list more extensively than flexible subjects. Flexible subjects, on the other hand, would cluster more by semantic categories than would rigid subjects. It is further expected, based on the first two predictions, that rigid subjects would perform more poorly in terms of words recalled than flexible subjects. These hypotheses were recently tested by Alam (1986) and Alam & Saeeduzzafar (1987) who found that rigid subjects encoded superficial perceptual features of the list more extensively than their flexible counterparts under both immediate and delayed cued recall test but a significance of difference was obtained under immediate cued recall test only. On the contrary, flexible subjects encoded semantic categories of the list more extensively than those of rigid subjects under both immediate and delayed cued recall test. Moreover, rigid subjects showed poorer recall performance under immediate as well as delayed cued recall test than those of flexible subjects.
These results were explained in terms of cognitive interference associated with cognitive rigidity that resulted in reduced task relevant processing capacity or reduced cognitive effort for task specific demand. Thus the cognitive state of rigid subjects interfered with the efficient use of effortful learning process. This cognitive rigidity may reflect an impaired ability to choose and effectively utilize an optimal control process. However, this rigidity of cognitive processes may be related to other constructs such as learned helplessness (Miller & Seligman, 1975) and locus of control (Hiroto, 1974; Misra, 1974; Leight & Ellis, 1981; Chaudhary, 1983, 1986). It would be, therefore, worthwhile to compare the organizational strategies and recall performance of rigid subjects with the organizational strategies and recall performance of externally oriented subjects and also to compare the organizational strategies and recall performance of flexible subjects with those of internally oriented subjects. In short, the main objective of the present research is to explore the relationship between cognitive rigidity and locus of control and their relative impact on organization and on immediate and delayed cued recall.

Moreover, it is also of great interest to investigate whether subjects having an external locus of control would encode the superficial perceptual features of the list more extensively than internals even when names of semantic categories and names of colours are presented as retrieval cues. Similarly, it is equally important to investigate whether subjects having
an internal locus of control would encode semantic features of
the list more extensively than externals even when names of the
semantic categories are presented as retrieval cues. It is also
interesting to study recall performance of external and internal
under immediate as well as delayed cued recall conditions where
names of colours or semantic categories are presented as retrieval
cues. If externals organizational strategies was relatively
ineffective due to the particular testing procedure used (free
recall with no instruction as to how to organize the list) by
Ellis and Franklin (1983), then it may be hypothesized that
under cued recall conditions external's organizational strategy
should become as effective as that of internals and consequently
there should not be any significant difference in recall perfor­
man ce of externals and internals.

Finally we would also explore whether or not individual
differences in these personality traits (e.g. locus of control
& cognitive rigidity-flexibility) affect immediate and delayed
cued recall differentially and is there any interactional effect
of locus of control and cognitive rigidity on immediate and
delayed cued recall. The patterns of preferred modes of organiza­
tion (i.e. semantic or superficial perceptual features of the
list) adopted by rigid, flexible, internal, and external subjects
on the one hand, and their recall performance on the other, may
provide promising clues about the nature and origin of individual
differences in memory functioning. Such findings may enhance
our understanding about human memory system.