An Experimental Study of Superficial and Semantic Organization in Immediate and Delayed Cued Recall in Relation to Locus of Control and Cognitive Rigidity

ABSTRACT

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BY
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The present research was designed to determine the effects of the presence of both semantic and superficial perceptual features of word lists on organization and on its subsequent retention and also to determine the effects of the two important personality variables, namely, cognitive rigidity and locus of control, on susceptibility to semantic and superficial perceptual category for organizing information in immediate as well as in delayed cued recall. In addition to these main objectives, the study also purposed to compare rigid and external subjects on the one hand, and flexible and internal subjects on the other, with respect to their mode of organization and recall performance in both immediate and delayed cued recall.

A 2x2x2 factorial design, in which two personality variables (i.e., cognitive-rigidity and locus of control) and one task variable (i.e., organization of material) each varying in two ways, was used in this experiment. The two values of cognitive rigidity were (a) rigid and (b) flexible; and locus of control was varied by selecting (a) internal and (b) external subjects. The two values of task variable were (a) superficial organization and (b) semantic organization. Thus there were eight groups of
subjects, each was tested for immediate as well as delayed cued recall which yielded sixteen observations.

In order to form eight groups of subjects, a Hindi adaptation of GSR Scale (Ali, 1975) was administered on 400 undergraduate male students of Aligarh Muslim University, Aligarh. The students securing a score above Q3 (i.e. 16) on GSR scale, were classified as rigid while those securing a score below Q1 (i.e. 12) were categorized as flexible. On the basis of the scores, 125 rigid and 125 flexible subjects were selected. A Hindi version of Liverant & Rotter’s I-E scale (Hasan, 1974) was administered on these two groups to measure their externality on an integer scale from zero (very internal) to 23 (very external). On the basis of their scores, each group (i.e. rigid and flexible) was subdivided into two groups to form four groups of subjects, viz., (a) rigid-external (b) rigid-internal, (c) flexible-external and (d) flexible-internal. There were 30 subjects in each group. Half of the subjects of each of the four groups served under experimental condition (superficial organization) and other half served under control condition (semantic organization). In this way, eight groups were formed having 15 subjects in each group.

The data were analyzed for clustering by semantic categories (semantic organization), for clustering by association with other words presented on the same colour (superficial organization) and for word recall with the help of t-test and analysis of variance.
The results clearly revealed that (1) rigid subjects encode superficial perceptual features of the list more extensively than flexible subjects in immediate cued recall only whereas flexible subjects encoded semantic categories of the lists more extensively than their rigid counterparts in both immediate and delayed cued recall; (2) external and internal subjects did not differ with respect to superficial organization but internal subjects encoded semantic categories of the list more extensively than those of external subjects in both immediate and delayed cued recall; (3) rigid subjects showed poorer immediate as well as delayed cued recall than their flexible counterparts; (4) external subjects also exhibited poorer immediate and delayed cued recall than those of internal subjects; (5) the greater degree of semantic organization resulted in better list recall whereas higher levels of superficial organization led to decreased recall in both immediate and delayed cued recall; (6) all the interactional effects, except three factor interaction, were found significant in immediate cued recall whereas all the interactional effects except locus of control x type of organization were found insignificant in delayed cued recall; (7) the effects of cognitive rigidity, locus of control, and type of organization on the difference of immediate and delayed cued recall were found insignificant; (8) all the interactional effects, except cognitive rigidity x type of organization interaction, on the difference between immediate and delayed cued recall were also found
insignificant; (9) rigid subjects showed superior superficial organization than external subjects in immediate cued recall but they neither differ with respect to semantic organization nor with respect to recall performance in both immediate and delayed cued recall; (10) flexible and internal subjects also did not differ with respect to superficial and semantic organization either in immediate or in delayed cued recall. However, flexible subjects showed poorer recall performance than internal subjects under superficial organization condition but they did not differ with respect to recall performance under semantic organization condition in immediate and delayed cued recall. These findings were discussed in the light of the findings obtained by earlier investigators and in the light of the characteristics of cognitive activities of rigid and external subjects. The implications and suggestions for future research were also pointed out.
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1988
To

my parents
CERTIFICATE

Certified that the work entitled "An Experimental Study of Superficial and Semantic Organization in Immediate and Delayed Cued Recall in Relation to Locus of Control and Cognitive Rigidity" has been completed under my supervision by Mr. Khurshid Alam. The work is original and has been independently pursued by the candidate. It reports some interesting observations and contributes to the existing knowledge in the field of learning and memory.

I permit the candidate to submit the work for the award of the degree of Doctor of Philosophy in Psychology of the Aligarh Muslim University, Aligarh.

Saeeduzzafar
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KHURSHID ALAM
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CHAPTER - I

INTRODUCTION
INTRODUCTION

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;
Hunt & Elliot, 1980; Guenther, 1980; Nelson, 1979; Thomas & Bolton, 1979; Schvaneveldt & McDonald, 1981; Koriat & Melkman, 1981; Einstein & Hunt, 1980; Einstein, 1982; Ellis & Franklin, 1983; Agrawal & Misra, 1983; Hunt & Seta, 1984; Alam, 1986, 1988; Alam & Saeeduzzafar, 1987; Dixon, 1987). 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 primaril
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 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 contain 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, Kranke, 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, 1962; Rogoff, 1980; Orasanu, Lee and Scribner, 1979; Agrawal & 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; Kariate & 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 favorable 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 behaviour (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, & Feency (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 consequence 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 relevant 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
ance 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.
CHAPTER - II

REVIEW OF STUDIES
In the preceding chapter, it has been pointed out that organization, i.e. relation between to-be-remembered items, is a potent determinant of retention. Experimental studies of different types of organization have amply justified this view. Furthermore, it has also been demonstrated that certain personality variables (e.g. cognitive rigidity and locus of control) influence the process of organization and retention. In this chapter, we shall review some of the important studies that bear directly or indirectly on these problems. The chapter is, thus, divided into two sections. The first section deals with the review of the studies that demonstrate the influence of organizational factors on retention whereas the second section is devoted to the review of the relevant studies that throw light on the impact of certain personality variables, namely, cognitive rigidity and locus of control on the process of organization and retention.

SECTION-1

ORGANIZATION AND RETENTION

The first systematic study of the effect of categorical organization on retention was conducted by Bousfield (1953). He initiated a series of verbal learning experiments using categorical organization with 60-word list which was composed of 15 instances of each four categories, namely, animals, names,
vegetables, and professions (ANVP). The four categories were as close as possible on the basis of frequencies of occurrence per million of words in general. The mean frequencies of occurrence were the same for each category, and the ranges of these frequencies were approximately the same. The exemplars were randomly arranged into the presentation list and shown to the subject with instructions to free recall. The words were presented one by one in random order on slides at the rate of 3-seconds per word, and the 10-minutes were given in which subjects were asked to recall as many items as possible.

Bousfield observed that words belonging to the same category tended to cluster together in the subject's output. The recall sequences of the subjects indicated a greater-than-chance tendency to group the items in clusters containing members of the same category. The number of repetitions which a subject made in his recall was taken as a measure of clustering. A repetition was counted when a subject recalled two instances of the same category in succession. The number of items clustered together by chance was much smaller than that occurring due to the presence of categorical organization in the list.

In subsequent study, Bousfield and Cohen (1956) investigated the relationship between clustering and the number of categories in 40-word stimulus-lists. They conducted two separate experiments. A total of 150 students served in Exp. I and 160 subjects in the Exp.II which was a replication of the Exp.I. Three types of stimulus-word-lists were employed in Exp.I and
subjects were divided into three groups of 50 each so as to make a separate group for each type of stimulus-word list. List I comprised of two categories, namely, 20 male first names and 20 professions. List II comprised of four categories, namely, 10 male first names, 10 professions, 10 animals, and 10 vegetables. List III comprised of eight categories, namely, 5 male first names, 5 professions, 5 animals, 5 vegetables, 5 countries, 5 flowers, 5 carpenter's tools, and 5 trees. The mean frequency of each category was same in all lists. The words of each list were randomized and projected one by one on a screen at the rate of three-seconds. After the projection of the whole list subjects were asked to write down as many words as they could recall in the order in which the words occurred to them. A total of 10 minutes was given to each subject for recall. This procedure was followed for each of three stimulus-word list. Bousfield and his colleague found positive relationship between the number of categories and recall. Further, categorical intrusions were found consistently more frequent than the irrelevant intrusions.

In Exp.II, these investigators used four types of 40-words stimulus lists. The subjects were divided into four groups so as to make a separate group for each type of stimulus-word list. The subjects in Group I were given the two-category list A; Group II, the two-category list B; Group III, the four-category list; Group IV, the eight-category list. The procedure of the Exp.II was similar with that of Exp.I, except that subjects of
Exp.II had previously taken part in another study of clustering. Thus, subjects of Exp.II were sophisticated in the sense that they had previous experience about the study of clustering. Bousfield and Cohen compared the performances of the subjects of the first experiment with the performance of the subjects of the second experiment. They found that subjects in Exp.II as compared to Exp.I showed general superior recall and general superior clustering. They also reported positive relationship between the number of words recalled and the number of categories of stimulus list for Exp.I and a negative relationship for Exp.II. It was argued that this difference was due to the fact that the subjects of Exp.II has previously been exposed to a study which required the recall of stimulus-words in lists comprising either four or six categories whereas subjects of Exp.I lacked this experience. However, the results of both the experiments showed better clustering beyond chance expectation.

Bousfield's explanation of clustering is not straightforward but it is somewhat equivalent to the view that subjects remember the category names and simply generate exemplars accordingly. However, they cannot do this in an uncontrolled way because there are usually very few words given out by the subject which did not occur in the presentation list. This suggests that subjects are able to distinguish between category exemplars which did occur in the list from those which did not. Bousfield and Cohen suggested that clustering proceeds by a mediational process, for instance, if subject had forgotten the
item 'dog' but recalls the item 'cat' correctly. They argued that the correct recall of item 'cat' activates the category ANIMAL, which in turn leads him to retrieve the item 'dog'. The direct association between categorical names may also account for categorical clustering. The words belonging to a given category are probably more strongly interassociated than are noncategorized groups of words, for example, recall of 'cat' may lead to recall of 'dog' by direct association without recourse of mediation via activation of ANIMAL.

Associative organization in recall was first investigated by Jenkins and Russell (1952). They constructed lists for free recall by selecting stimulus-response pairs from the Kent-Rosanoff word list and randomized the order of presentation of all the items in the list so that the pair did not occur together. They used a list of 48-words which consisted of 24 highly associated word pairs such as TABLE-CHAIR, MAN-WOMAN, BLACK-WHITE, HIGH-LOW and so on. The words were randomized and the list was checked to avoid the contiguous appearance of any pair of words in the forward stimulus-response order. The word list was presented to two groups of subjects. First group consisted of 39 students of an introductory class in laboratory psychology while group second comprised of 62 students of an advanced class in the psychology of individual differences. These two classes were chosen for independent replication. The subjects were asked to remember the words as many as possible in any order and an immediate recall test was given. The results
of the recall test were analyzed for (a) the number of responses, (b) the number of forward association, (c) the number of reverse associations, and (d) the number of arbitrary, non-systematic pairs.

Each occurrence of a stimulus word which was followed immediately by its response word was called a forward association. Each response word which was followed immediately by its stimulus word was called a reverse association. Arbitrary pairs were defined as those instances in which a stimulus word was followed immediately, not by its own response word but by response word of the pair succeeding it (e.g., TABLE-WOMAN MAN-HILL, etc.). Jenkins and Russell found that the average number of words recalled by each subject was 24 and more than 50 per cent of these words were recalled in associated pairs. Both groups showed a highly significant tendency to recall the kent-Rosanoff pairs together and in the stimulus response sequence. Reversed associations (recall in the response-stimulus sequence) occurred significantly more than chance pairings but significantly less than the forward sequence (recall in the stimulus-response sequence). However, both forward and reverse associations occurred significantly more frequently than arbitrary associations. In this way, a high degree of associative organization was observed by Jenkins and Russell in recall protocols. Jenkins and Russell did not use a control group in this experiment. This shortcoming was, however, overcome in later studies conducted by the same authors. In one
such study, Jenkins, Mink and Russell (1958) systematically varied the strength of the relationship between word pairs in a list. Four groups of subjects were given different lists of Kent-Rosanoff stimuli and their primary responses from word-association norms. The response communality for the pairs in list I was 71%, that is, 71% of the subjects in a free association task made the same response when the stimulus word was presented—these were highly related word pairs such as MAN-WOMAN, SLOW-FAST and HIGH-LOW and so on. While response communality of lists II, III and IV were 47%, 30% and 14%, respectively. The pairs of Kent-Rosanoff stimuli and primary responses were randomly arranged in each list and were presented at a 1-second rate. Jenkins et al. (1958) found that recall of the four lists depended upon the strength of the associative relationship between word pairs. The average numbers of words recalled were 19, 18, 17 and 14 for different strength of word-pair lists, respectively. Thus, it was concluded that associative organization facilitates recall. Associative clustering, the tendency to recall the two members of each pair in succession, also increased with higher interpair associative strength.

The method, used by Jenkins and Russell for assessing the associative strength of pairs, measured intrapair associative strength of each pair and ignored the possibility that words in different pairs might have inter-pair associative strengths, for example, LOUD-SOFT and PIANO-NOISE may have not only strong intra-pair association but may also have strong inter-pair association. Thus, it is possible that recalling the LOUD-SOFT
pair may help in recalling PIANO-NOISE pair. This argument was expressed strongly by Deese (e.g., Deese, 1959, 1961, 1965). Deese calculated an index of Associative Strength which provides an indication of the associative strengths between all words in the list.

Deese constructed 18 different lists of 15 words each and computed their interitem associative strength. Associative frequencies were obtained from a sample of 50 subjects. A different group of 48 subjects then studied and recalled each list. The obtained recall scores highly correlated with the index of interitem associative strength ($r = .88$). The more the items of a list tended to elicit each other, the better was recall of the list. Deese also reported that the stronger the interitem associations were, the fewer recall intrusions occurred ($r = -.48$). He found that the number of items recalled increased as the index increased, and the two measures were more closely related than recall and the interpair measure of associative strength.

Similarly, Cohen, Bousfield, and Whitmarsh (1957) compiled normative data of 400 subjects for the frequency of occurrence of items in response to 43 specific categories (e.g., FISH, SHIP, INSECT etc.). The subjects were asked to write down the first four specific instances they could think of for each category. The responses for each category were then tabulated accordingly to the frequency with which they occurred. For example, TROUT, BASS, and PERCH were the three most frequent responses on the
FISH category, with frequencies of 174, 124, and 101, respectively. TURTLE, SOLE, and CLAW were examples of low frequent responses of this category. Using these taxonomic norms, Bousfield, Cohen, and Whitmarsh (1958) obtained lists of words with high- and low-frequencies of taxonomic occurrence. They used these norms to investigate category clustering and compared a highly organized list containing 15 frequent responses in each of four categories with those of low organization list containing 15 infrequent responses in each of the four categories. For instance, the item 'DOCTOR' is an example of a strong associate and 'DITCHDIGGER' is an example of weak associate in the norms to the category, PROFESSION. These words were presented in random order. It was found that recall of highly organized list was better, and clustering was more pronounced than words of low organized list. Thus it appears that high-frequency category members are recalled better and clustered more than low-frequency category members.

More or less the same results were also found by Cofer, Bruce, and Reicher (1966). They performed three experiments. Experiment I compared block and random presentation for lists composed of high-and low-frequency associates, and investigated delayed recall with and without an immediate recall. Exp.II was a pilot study of the effect of exposure intervals, and employed a 1-second and a 3-seconds exposure duration for high-frequency associates which were randomly presented. Exp.III compared block and random presentations for lists composed of
high-and low-frequency associates. This experiment partially replicated Exp.I, and also employed three intervals (1-2- and 4-second) for all conditions and thus it replicated and extended Exp.II. Using the Cohen et al. (1957) taxonomic norms as base, these investigators selected high- and low-frequency words to form categorized lists. Two basic lists of 40-words each for the three experiments were used. One high-frequency (HF) list composed of 10 highest frequency associates from each of the four categories such as names of occupations, weapons, four legged animals, and articles of clothing, was used. While low-frequency (LF) list was composed of 10 low-frequency associates from each of the same four categories. The frequency range for HF list was from 16 to 369 occurrences and for the LF list was from 1 to 10 occurrences in the Connecticut norms. Lists were presented either blocked so that all instances of a category occurred consecutively or non-blocked so that the instances of all categories were in a mixed order. In blocked presentation, all the items from one category occurred first, then all from another, and so on. For randomized presentation, a randomized sequence was obtained from a table of random numbers and this sequence was used for the presentation of list members.

In all experiments subjects were shown a long list of words and asked to recall as many words as they could in any order. In all groups, except for the four delayed recall only groups in Exp.I, subjects recalled the list as soon as its single presentation was completed (immediate recall), having a 5-minutes internal (filled with a word-rating task in Exp.I and II and with a word-classification task in Exp.III) after which there
was a second written recall test again of 5-minutes duration (delayed recall). In the four delayed recall only groups of Exp.I, the immediate recall was omitted, and as soon as list presentation was completed, the subjects were engaged in word rating task. They worked on it for 10.5 minutes and then recalled the list. In this way a test of free recall was given either immediately or following a delay of about 10-minutes. The results indicated that clustering was higher with block presentation for both high-and low-frequency lists than with random presentation, though clustering was found slightly higher for high-frequency items. Word recall was also found higher under block presentation but only for high frequency list. It is, therefore, concluded that clustering and word recall increased with block presentation and when high frequency list was used. Cofer et al. (1966) also found that recall improved and clustering increased when the subjects were given more time to study each item. Moreover, immediate recall and slower presentation rates produced more clustering and better word recall.

Similarly, Dallett (1964) conducted five experiments to examine the effects of number of categories with blocked and randomized lists in free recall. Exp.I explored recall as a function of number of categories (1,2,3,4, and 6) in a 12 items "blocked" list, in which all members within a given category were contiguous. Exp.II examined the same range of categories in a 12-item randomized list. Dallett found superior recall and superior clustering with blocked lists than with randomized
lists. Since performance of the subjects was found generally superior with blocked lists and worse with randomized lists, Exp.III was designed to see whether the findings of Exp.I and II could be duplicated when subjects had before them a list of the categories to aid in category identification during presentation and as an aid to category recall while they were recalling the items. This extra information improved performance in the 6-category condition, but not in the 2- or 4-category conditions. Finally, Exp.IV and V were designed to explore the effects of number of categories (2, 4, 6, 8, and 12) in 24-word lists. Exp.IV and V yielded decreasing recall as a function of number of categories.

The overall results indicated superior recall and better clustering with blocked lists than with random lists. Clustering was found to be maximal with blocked list when number of categories were four, for both lengths of list. This maximum clustering is probably largely responsible for the fact that the effects of the order variable are most apparent with an intermediate number of categories. Thus, it appears that clustering in recall is markedly affected by whether or not the list is presented in blocked and random order. Furthermore, clustering was not affected by ordering at an intermediate level of number of categories in both 12-word and 24-word list.

The studies reviewed in the preceding paragraphs clearly demonstrated the organized nature of free recall. These studies employed materials which were categorically or associatively
related. However, there is considerable body of evidence (e.g. Tulving, 1962; Bousfield, Puff, and Cowan, 1964) for clustering in the recall of lists containing seemingly unrelated words, even when experimenter has intentionally thwarted the presence of an organizational base within the list. Stimulus list is comprised of 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. The subject is more or less free to organize the words in any way he wishes. The subject may impose his own organization upon input material which is not organized in learning and hence may improve his recall. Such type of subjective organization was studied by Tulving (1962) who found that subjective organization occurs even in the learning of a list of unrelated words. Tulving assumed that organization is reflected by the occurrences of the same sequences of items in recall on successive trials. He used a list of sixteen words which were not related to each other in meaning. The list was presented at a 1-second rate per word in different serial orders on each of sixteen trials. After each trial, a 90-seconds recall period was given, during which subject write down as many words as he could recall in any order. Tulving found that the number of items recalled increased over trials. Furthermore, the amount of subjective organization as measured by an index based on the repetition of sequences from trial to trial, also increased over trials. He also observed that the subject was imposing his own organization to aid recall. The particular organization adopted by different
subjects was found to be similar. Thus, it appears that organization was inherent in the materials presented, and the subjects discovered rather than created the subjective organization.

Similarly, Tulving (1966) performed some interesting experiments in order to demonstrate that one learns to recall because material is organized subjectively. In one of his experiments, two groups of 12 subjects were asked to learn the same list of 22 nouns. These two groups differed only with respect to the treatment which they received immediately before the learning of the experimental words. The experimental group which had prior experiences were shown experimental list consisting 22 nouns. The list was shown 6 times on a memory drum and the subjects were asked to read the words as they appeared on the drum. While control group subjects, who had no prior experience, read a list of 22 nouns for the same number of trials. Free recall performance was found identical for the two groups of subjects. On the first trial the mean recall score of prior-experience group was 10.4 while mean recall score of no prior-experience group was 9.2 and the difference between these two means was found insignificant. Though statistically insignificant, prior-experience group had a little advantage over the no-prior-experience group in mean number of words recalled on first trial but from the second trial no difference in the performance of these two groups was found. It is, thus, evident from the above result that more repetition does not
recall facilitate free learning when well-integrated items are used.

Tulving in his another experiment demonstrated that inappropriate organization can even inhibit learning performance. He used two groups, each group comprised of 24 subjects. The two groups of subjects were given a list of 9-words to recall. After learning the 9-word list, all subjects were given 12-learning trials with a second list of 18-words. In one condition the second list was composed of new words. While in the other condition the second list comprised of 9 words already learned which were randomly mixed with 9 new words. Thus, in this group subjects had 12 free-recall trials with half of the list at the beginning of learning of the final list. It was found that prior learning of a part of the list of unrelated words had little facilitating effect on the learning of the whole list. The past-learning group showed superior recall upto the 7 trials but after 7 trials the subjects who learned a completely new list surpassed the former group. The results revealed that inappropriate organization interfere with the learning. Tulving argued that the subjects who already learned half part of the list were unwilling to modify non-optimal subjective units acquired during part-learning and thus this inappropriate organization inhibited learning performance.

However, Mandler and Pearlstone (1966) conducted an experiment which showed the importance of subjective organization for free recall. The purpose of their study was to study free Vs constrained conceptualization. All subjects were given a
deck of 52 cards on which word was printed. They were asked to sort these cards into 2 to 7 categories according to any system they wished. They were also told that they would be given sorting trials with the same deck of cards until they achieved a stable organization, that is, until they sorted the cards in the same way twice in a row. This system of sorting cards was called free concept-utilization task by Mandler and Pearlstone in which subjects could use any basis for sorting the cards but some stable system had to be achieved, e.g., sorting the cards in the same way twice in a row. On the other hand, second group of subjects was given a constrained conceptualization task in which subjects were required to sort the 52 cards according to an experimenter defined scheme. But each subject of this group was yoked with a free subject in order to equate the difficulty of the sortings made by the free and constrained groups. After reaching the criterion of two identical sortings, each subject of both groups was asked to recall as many words as possible which they had just sorted.

Mandler and Pearlstone found that though the free subjects needed fewer trials to reach a stable sorting than the constrained subjects but subjects of the both groups recalled an equal number of words. So there was no difference in the recall performance of the subjects of two groups. The constrained subjects took twice trials to reach at stable organization, i.e., sorting the cards in exactly the same way twice in a row. Thus constrained subjects had twice as many sorting trials and hence twice as
many opportunities to learn the list, but they were able to recall only 20 words just as the free subjects. It is, therefore, not the number of learning trials which is most important for free recall but the level of organization which is achieved on these trials. Subjects of the both groups reached the same sorting criterion and hence their recall performance was identical, although one of the group needed twice as many trials to reach criterion than the other.

Somewhat recently Koriat and Melkman (1981) examined the possibility of consistant individual differences in style of clustering in free recall and also related these differences to styles of organizations reflected in other tasks such as word-association, object-sorting, and word-matching. A list of 33 words was constructed which could be grouped into 11 mutually exclusive conceptual categories, or into 11 mutually exclusive associative categories, each category consisting of three words. Fifty-seven subjects were participated in the experiment which was conducted in two sessions. In the first session subjects were administered the memory procedure and the word-matching test. In the second session they were administered the word-association and object-sorting tests.

In the first session each subjects was tested individually. He was told to learn a list of words, each word appearing on a separate card. The words were presented by manually displaying the cards one at a time at a rate of approximately two second per word. When presentation was completed, the subject was handed
over a blank sheet and was asked to write his name on top of it (to reduce recency effects), and to list in a single column as many words as he could remember in any order within 90 seconds. The recall sheet was collected after this test of retention. This procedure was repeated for seven trials. Before each trial, the cards were thoroughly shuffled with the restriction that the first and last cards in any trial did not occupy either of the two extreme positions in the subsequent trial. Upon completion of the memory task, subjects were asked to rate on a five-point scale the extent to which they made use of imagery in attempting to recall the words. Following this subjects were administered word-matching test in which they were asked to choose for each pivot word the response word judged to be the most strongly related to it.

The second session of the experiment was conducted after 2 to 3 days in which subjects were tested in small groups. The word association test was administered first with the instruction to respond with the first word that comes to mind. The object-sorting test followed. The subjects were given a sheet containing the list of 50 words, and was instructed to sort the words into groups in a way that 'seems most natural, most logical, and most comfortable' to him. He was also told that he was free to shift words around until he achieved a satisfactory grouping.

After completion of sorting task, all the materials were collected and an unexpected recall test was administered. The subject was handed over a sheet of blank paper and was asked to
write down within two minutes as many words as he could remember from sorting list.

Koriat & Melknan (1981) found that the number of words recalled was more strongly related to associative clustering than to conceptual clustering. Although, both conceptual and associative clustering increased as trials progressed, the associative clustering was more prevalent than conceptual clustering. It was also observed that recall performance of the subjects was more strongly related to associative than to conceptual clustering. That is, associative clustering facilitated recall more than did conceptual clustering.

The review of the above studies clearly demonstrated that 'organization' is an important determiner of retention. There is, however, substantial body of evidence to suggest that like organization, 'retrieval cues' also have facilitative effect on retention. In the following paragraphs we will review some of the important studies that bear directly or indirectly on this issue.

A current emphasis in human memory research is on the processes by which to-be-remembered materials are stored and retrieved. Although the experimental and theoretical approaches to these problems are rather diverse, one frequently used method has been the cued-recall paradigm. It has been established by several investigators that retrieval cues or reminders, especially if they are put into memory along with the to-be-
remembered events, are important aids to memory (Tulving & Pearlstone, 1966; Tulving & Osler, 1968; Thomson & Tulving, 1970; Tulving and Thomson, 1973; Lauer & Sroby, 1976). Retrieval cues have been shown to enhance recall performance when presented at input along with the to-be-remembered words in a list of unrelated words and provided as retrieval cues at output. Tulving says that the cues are effective in bringing about retrieval because they supply the plan by which they are to be stored. Thus, it appears that retrieval cues greatly facilitate recall performance. However, retrieval cues are effective only if they are present at both input and output phases of the task. Provision of the cue under only input or output has detrimental effect on retention; recall under these conditions is worse than when no cues at all are given (Tulving & Osler, 1968).

Tulving performed a series of experiments to test the conditions under which retrieval cues are effective in aiding recall. In first of these, Tulving and his colleague (Tulving & Pearlstone, 1966) constructed lists of 12, 24 and 48 words containing categories of one, two, and four words in each. In this way they varied the number and size of the categories presented to different groups of subjects. Items in each category were grouped together and each group of items was preceded by its category name. The lists were read to subjects and the subjects were told to memorize the words, except for the category names which did not need to be memorized. For the
recall test, half of the subjects were asked to write as many words as they could remember on a blank sheet of paper, while the other half of the subjects were given a recall sheet with all of the category names printed on it. After that a second recall attempt was made in which all subjects were given recall cues. The results of the 48-item list which consisted of 12 categories of 4 words each revealed that subjects recalled about 30 words in cues condition while they could recall only 20 words in no-cued condition. Moreover, subjects who received no recall cues on the first test were given recall cues on their second attempt and thus they were able to recall about 28 items. This additional recall was due to cues provided at the second recall attempts. It was found that subjects who were cued with the category names recalled more words than the unaided subjects. There was a general superiority of cued condition over no-cued condition. Thus, Tulving and his colleague concluded that subjects, who were cued with category names, recalled more words than the non-cued condition. Since both groups were treated in exactly the same way right upto the point of recall, it might be concluded that they went about memorizing the words in similar ways; the difference in recall scores must have been due to the help given by the category names in retrieving the words from memory. Tulving argued that the words which were retrieved only when the cue was supplied must have been stored in memory, that is, they were available in memory but not accessible. They become accessible when some help was given.
The difference in overall recall performance of the two groups in Tulving and Pearlstone's experiment was entirely due to the fact that the unaided group retrieved fewer categories than the cued group. For example, subjects on the average recalled words from 11.4 categories when they were given cues but they were able to recall words from 7.3 categories when no cue was given. Thus, it appears that the improved recall in Tulving and Pearlstone's cue condition was entirely due to better category recall.

In subsequent study, Tulving and Osler (1968) conducted an experiment in which they had tried to test the conditions under which retrieval cues are effective in improving recall performance. In this experiment, the subjects were asked to recall 24-word lists. These words were shown one at a time either alone or together with a retrieval cue which was a weak associate of the to-be-remembered word. For the recall test, half of the subjects were given the retrieval cues and half were not. One group of subjects were given an additional word printed above on each to-be-remembered word in small letters, subjects were told not to remember these additional words. These additional words were all weakly associated with the word to-be-remembered and served as cues at recall. The second group of subjects were given no cue words during presentation of the list. Tulving and his colleague found that retrieval cue facilitated free recall if and only if they were present both at the time of storage and at the time of recall, that is, cues were only
effective if they were present at both input and output phases of the task. Provision of the cue under only input or output was found detrimental because recall under these conditions was even worse than when no cues at all were given. The lowest performance of all groups occurred when cue was present at recall and was different from that given at presentation, or no cue was given at presentation but a cue was given at recall. These results clearly demonstrated that cues are only effective and facilitate recall if they are present both at the time of storage and at the time of recall. Thus, they concluded that cues must be present at both storage and retrieval in order to be effective in improving recall performance.

Similarly, Thomson and Tulving (1970) performed three experiments to identify the conditions under which cues are effective. More specifically, the purpose of these experiments was to evaluate two theoretical views from which explanations of the operation of retrieval cues in event memory can be derived: the associative continuity and encoding specificity hypotheses. The associative continuity hypothesis predicts that recall in presence of strong normative associatives, not seen in the input list, should be considerably higher than recall in noncued condition, while the encoding specificity hypothesis predicts no difference.

In Exp.I, they presented two lists of 24 to-be-remembered (TBR) words, together with either weak or strong cue words to subjects for study and subsequent recall on a single trial. The
mean normative strength of association between cues and TBR words, in both lists, was 42% for strong cues and 1% for weak cues. The weak and strong cues and their corresponding TBR words used in this experiment were as follows: train, white, BLACK; Knife, meat, STEAK, lamp, dump, STUPID; hand, women MAN; blow, ice, COLD and so on. Three input conditions were used which were combined factorially with four output conditions to yield 12 different experimental treatment conditions. The input conditions used were (a) the TBR words were presented alone (Input cond. O), (b) each TBR word was accompanied by a weakly associated cue word (Input Cond. W), and (c) each TBR word was accompanied by a strongly associated cue word (Input cond. S). The output conditions were :(a) noncued recall of TBR words (output cond.0), (b) recall of TBR words in presence of weakly associated cue words (Output cond.W), (c) recall of TBR words in presence of strongly associated cue words (Output cond S), and (d) free recall of both TBR and cue words (Output cond.FR). All subjects were tested under these output conditions. They were given practice list prior to the experimental lists which consisted of 24 proper nouns such as names of ocean, rivers, countries, cities, and politicians. After that the 24 TBR words were shown on a TV screen at the rate of 2 seconds per word and subjects were asked to recall in recall booklets. The subjects were given 5 minutes for recording the recall. It was found that the presence of strong cues at output facilitated retrieval of TBR words, both under the condition where TBR words alone were shown in the input list and the condition where the
cues accompanied TBR words at input. Weak cues presented at output also facilitated retrieval of TBR words, provided that the same cues had accompanied TBR words at input. But weak cues presented at output did not facilitate recall of TBR words when they had not been presented at input. Finally, the results of Exp. I revealed that strong associative cues present at output facilitated recall of TBR words even when the TBR words had been accompanied by different weak cues at input, but this facilitative effect was smaller than the facilitative effect of strong cues at output following no cues or strong cues at input.

The last finding contradicts the respective merits of the encoding specificity and associative continuity hypotheses. The strict interpretation of the encoding specificity says that recall under cond. W-S should not have been higher than under cond. W-O. Similarly, the strict interpretation of associative continuity hypothesis says that recall under cond. W-S should have been as high as in cond. O-S. The results of Thomson and Tulving's Exp. I clearly do not favour these positions but this pattern of results lie somewhere between the two extremes predicted from two points of view. That is why Thomson and Tulving conducted Exp. II to verify encoding specificity hypothesis. In this experiment subjects were tested with four successive lists, each containing 24 TBR words. The two lists of 24 TBR words and their corresponding cue words constructed for Exp. I were used as lists 3 and 4 whereas two additional lists of 24 words and weak cues were prepared from two sets of free associative norms (Bilodeau & Howell, 1965; Riegel, 1965) to serve as
lists 1 and 2 in this experiment. Each list was presented or e. TBR words and each cue-TBR word pair was presented at the rate of 3 seconds on a closed-circuit TV screen. TBR word was either occurring alone (Input cond. O) or accompanied by a weakly associated cue word (Input cond. W). Recall of TBR words was tested either in absence of any cues (Output cond. O), or in presence of weakly associated cues (Output cond. W), or in presence of strongly associated cue words (Output cond. S). Three minutes, were given to subjects for written recall test on each list. Subjects were asked to record their responses in booklets. In this way the procedure of Exp.II was identical with that of Exp.I with respect to each important features except that (a) no practice list was given and (b) each subject was tested with four successive lists. Thomson and his colleague found that strong cues facilitated recall under conditions where no cues were given at recall test and subjects were left free to subjectively encode the TBR words. However, identical strong cues completely failed to facilitate recall when the TBR words were presumably encoded specifically with respect to their accompanying weak cues.

The results of the Exp.II seems to be consistent with the implications of the encoding specificity hypothesis, and inconsistent with the associative continuity hypothesis. It might be argued that strong cues failed to facilitate recall in the W-S conditions in Exp.II for reasons other than encoding specificity. For example, it could be assumed that subjects in the W-W conditions developed a set to respond to retrieval cues with weak associates. If this set persisted when strong
cues were provided in the critical W-S conditions, subjects could not have responded with strong associates of these cues as correct TBR words. This confusion prevented them from taking maximum advantage of stored information about TBR words at the time of recall test. Thomson & his colleague, therefore, conducted Exp.III to get rid of this confusion in which they used a mixed list paradigm. The two lists of 24 words previously used in Exp.I constituted the two sets of list 3 in this experiment. Four other lists of 24 TBR words and cues were prepared from the association norms (Bilodeau & Howell, 1965; Riegel, 1965) to serve as the first two lists. Each list contained 24 TBR words, one half of them accompanied by weak cues and the other half by strong cues, both at input and test. The subjects were shown a short practice list of four TBR words before the three experimental lists were presented. Each cue-TBR word was presented on the closed-circuit TV screen for 3 seconds. In presentation of list 3, half of the cues appeared with the TBR words in the input list and half were new but related words. The two types of cues were identified for subjects by being presented on columns headed "Old" and "New". The subjects were given as much time as they wanted for the written recall test but they took not more than 3 minutes for recall. The overall pattern of results clearly revealed that strong cues at output produced a sizable facilitation in recall when no cue at input was given (cond.O-S). But strong cues presented at recall in cond. W-S were not effective in facilitating recall performance, i.e., strong cues present at output
with weak cues at input produced striking loss in recall. These results favoured the encoding specificity hypothesis: when subjects were induced to encode TBR words with respect to weak cues at input, strong cues introduced at output failed to facilitate recall and thus these results rules out the associative continuity hypothesis.

In a similar study, Lauer and his colleague (1976) examined the effects of alphabetic organization on the acquisition and delayed retention of semantically similar words. They constructed three 20-name learning lists having 5, 10, and 20 different initial letters from the Battig-Montague (1969) taxonomical category of girl's first name. For the 5-letters list, there were 5 names beginning with each of 5 letters such as B, D, J, L, and S. The 10-letter list had 2 names beginning with each of these 5 letters plus letters C, G, H, M, and P. These 10 letters along with 10 other letters like A, E, F, I, K, N, R, T, V, and W were each used for 1 name in the 20-letter list. The mean taxonomic frequencies of the 5-, 10- and 20 letter lists were 39.60, 40.20, and 40.60, respectively. All names were closely comparable in length ranging from five to seven letters. These lists of 20 girl's first name having either 5, 10, or 20 different initial letters were presented to the subjects. They were presented to the criterion of 18/20 correct, either with or without first letter cues. All subjects were tested for 1 wk. delayed recall with alphabetic cues present or absent for half of each group. Both simultaneous and
and successive presentation were used for all the three lists having 5-, 10-, and 20-letter. In successive presentation of cued learning, the capitalized first letter of the name was presented in the upper left corner of the slide, and all names with the same initial letter were presented contiguously. But in uncued learning, names appeared without such cues. In simultaneous uncued presentation, all 20 names were presented in capitals on a single 2x2 slide in two 10-names columns. While for the 20-letters cued list, the initial letters were typed in capitals to the immediate left of the name. For recall tests, all cued learning subjects were given a sheet with initial letters in alphabetical order and an appropriate number of blank lines to the right of each letter. Uncued subjects were given no letter cues either during recall or list presentation. They were given sheet containing only 20 numbered blank lines. These cued and uncued recall sheets were also used for 1 wk. delayed recall tests. These subjects were tested after 1 wk. of original learning for cued or uncued retention instructions followed by two 1-minute written recall test. Lauer and his colleague found that cued learning conditions produced significantly better recall performance than uncued condition. Further, uncued learning led to much better delayed recall than cued learning. The overall results clearly revealed facilitative effects of alphabetical cues and blocking on the acquisition of a list of semantically similar words and the subsequent retardation of delayed retention following cued learning conditions.
Despite the marked advantages of alphabetical cues and blocking for original learning, uncued original learning produced more effective and deeper processing which resulted in superior delayed retention. Alphabetic cues facilitated delayed recall only if they were present at the time of the retention test irrespective of whether or not they had ever been presented before.

Recently Hunt & Seta (1984) examined the effects of category size and oriental task on category clustering, categories recalled, items per category recalled, free recall and cued recall. Two separate experiments were performed. In the experiment 1, 48 students served as subjects who were randomly assigned to one of two equal sized groups. The two groups were classified by orienting tasks, either category sorting (sorting) or pleasantness rating (rating). Both groups received the same list of words consisting of six categories, namely, musical instruments, clothing, fruits, countries, animals, and sports. These categories were selected from the Battig & Montague (1969) category norms. The categories were represented by a different number of instances, 16, 12, 8, 4, 2 and 1. The list also contained 16 buffer items, 8 at the beginning and 8 at the end to ensure that no category size was confounded with primacy and recency. These buffer items were drawn from the colours and professions categories.

The experiment was conducted under incidental memory instructions, i.e., the subjects were told that the task was
a scaling study to gather information about properties of words. The subjects, then, were given a deck of 59 cards of which 43 were target items and 16 buffer items. In the sorting conditions, subjects were asked to place each card in the appropriate category. In the rating condition, subjects were asked to rate each word's pleasantness on a 5-point scale ranging from very pleasant (1) to very unpleasant (5). Immediately after completion of the orienting task, a surprise 5-min. free recall test was administered. Following the free-recall test, subjects were given a sheet containing the category superordinates and were asked to recall. They were again given 5-min. for cued recall test.

The data were analysed for category clustering, number of categories recalled, items per categories recalled, free recall and cued recall. Hunt and Seta (1984) found that large categories were better recalled following a pleasantness rating task, and small categories were better recalled following a categorization task. Further, the combined recall of 4-and 2-item categories following the sorting orientation was superior to that following the rating orientation. Similarly, recall of 16-and 12-items categories was better following rating orientation. Large categories, as a whole, were perfectly recalled regardless of orienting activity. Clustering scores were markedly poor with fewer category size and the decline was most marked for rating task. It was also found that the average percentage of correct cued recall was inversely related to category size, e.g., the
2-item category was better recalled than the 16-item category. The inverse relationship between category size and cued recall was consistent across orienting tasks.

Hunt & Seta (1984) argued that the poor category recall following pleasantness orientation might have been caused by the number of categories rather than by category size. Thus they had reduced the number of categories in second experiment. In this experiment 48 subjects were randomly assigned to either category sorting & pleasantness rating. List consisting of three categories containing 24, 16 and 2 instances were used. The number of categories was thus reduced from six to three. As in Experiment 1, the average lag was constant across categories, and 8 buffer items from the colours and professions categories were presented at the beginning and end of the list. The procedure was the same as in the free recall portion of the first experiment.

The results obtained in Experiment II replicated the findings of Experiment I and extended the analysis to situations involving relatively small numbers of categories. It was again found that recall for large categories was best following pleasantness rating, and recall for small categories was best following category sorting. With small categories, both clustering and category recall were higher following the sorting task than following the rating task. Taking item per category recalled as an index of item-specific information, the number of items recalled from small categories was quite high regardless of orienting task.
Thus, given category access, the probability of retrieving specific item information was high with small categories, consistent with the assumption that small categories encourage item-specific encoding.

SECTION - II

PERSONALITY VARIABLES, ORGANIZATION, AND RETENTION

An important consideration which influenced the thinking of the present investigator to undertake the present research is the considerable body of evidence to suggest that cognitive rigidity is a potent determiner of learning and memory (e.g. Gaier, 1952; Polan, 1955; Akhtar & Sowaid, 1972; Imam, 1975; Rabindra Das, 1973; Khan, 1975; Mythili, 1978, 1982, 1984; Hasher & Zacks, 1979; Cosden, Ellis & Feency, 1979; Mythili, Kalpana & Krishna Rao, 1982; Alam, 1986; Alam & Saeeduzzafar, 1987). Although researchers have been very active concerning possible factors in rigidity, and efforts have been made to relate rigidity with anxiety, education, sex, caste, economic status, motivation, and goal setting behaviour, there are few experimental works available relating cognitive rigidity to conditions of learning, retention and recall. Moreover, a thorough survey of literature revealed that there is no adequate experimental work that may demonstrate the role of flexibility-rigidity in organizational processes and retention. However,
we shall review some of the studies in following paragraphs which bear directly or indirectly with the problem of the present study.

In a study on selected personality variables and learning processes, Gaier (1952) showed that there was a positive correlation between high rigidity and rote learning. After a long gap, Akhtar & Sowaid (1972) conducted an experiment on personality rigidity and incidental learning. They found that rigidity is negatively associated with incidental learning. They further reported that female subjects are more rigid than their male counterparts. In a similar study, Imam (1975) also found that rigidity has negative influence on incidental learning. Khan (1975) studied the effect of motivation on retention under condition of interference in relation to rigidity. In this study he attempted to determine the extent to which motivational variable can resist inhibitory effect of interpolated activity in a typical retroactive inhibition conditions and also related the resistance to RI with degree of rigidity which the individual brings to the learning situation. He found that rigid subjects recall better than non-rigid subjects, though the difference was not significant. He also reported that rigid subjects show greater resistance in maintaining the originally established habit in a typical RI condition.

Somewhat recently, Cosden, Ellis, and Feeney (1979) demonstrated poorer recall of rigid subjects than those of flexible subjects. They also examined the effect of cognitive flexibility
in recall with perceptual grouping tasks, and found that organizational processes involved in their task, were influenced by the individual level of cognitive flexibility. Subjects classified as rigid, on the basis of measures of cognitive flexibility-rigidity showed impaired recall. Rigid subjects were found to impose stereotypical representation upon incoming information and refrained from producing an assortment of hypothesis or strategy. Similarly, Hasher and Zacks (1979) suggested that rigidity in information processing is related to the inefficient use of effortful learning processes.

Recently, Chhaya (1985) examined the effects of rigidity-flexibility and sex of the subjects on Zeigarnik Effect, i.e. predominance of the recall of unfinished tasks. In this experiment she administered Rigidity-Flexibility Test (Ansari-Bhargava, 1958) on 200 undergraduate students of both sexes. She formed two extreme groups of rigid and flexible persons on the basis of scores obtained by them on RFT. The experiment was done individually. All the subjects were asked to perform eighteen tasks (six verbal, six numerical, and six performance). Interruption was introduced when the subject was about halfway through the task. The recall test was taken five minutes after finishing the tasks. She found rigidity-flexibility has strong effect on Zeigarnik Quotient. That is, the tendency to recall interrupted task was greater in rigid persons than the flexible one. She also found a non-symmetric but significant interactional effect between rigidity-flexible and sex of the subject in relation to Zeigarnik Effect.
Most recently, the present investigator (Alam, 1986) studied superficial and semantic organization in immediate and delayed cued recall in relation to cognitive rigidity-flexibility. He found that rigid subjects encoded superficial perceptual features of the list more extensively than their flexible counterparts under immediate cued recall test. On the contrary, flexible subjects encoded semantic categories of the list more extensively than those rigid subjects under both immediate and delayed cued recall test. Moreover, rigid subjects showed poorer recall performance than flexible subjects under immediate as well as delayed cued recall test. However, it was observed from the close inspection of the individual's recall protocols that some flexible subjects encoded superficial perceptual features of the list as extensively as encoded by rigid subjects. Although a considerable proportion of the flexible subjects showed significantly better recall performance than rigid subjects, certain subjects performed as poorly as rigid subjects under both immediate and delayed cued recall test. These observations make it clear that beside rigidity-flexibility, other personality variable might be responsible for superficial encoding and poorer recall even among flexible subjects. The present investigation is undertaken to explore this personality variable. Since some studies suggested that rigidity-flexibility might be related to other construct such as learned helplessness (Miller & Seligman, 1975) and locus of control (Hiroto, 1974; Misra, 1974; Leight and Ellis, 1981; Chaudhary, 1983, 1986), the personality
variable selected to explain somewhat unexpected aspect of colour clustering and poorer recall performance of flexible subjects, was that of locus of control.

The construct of locus of control has stimulated a considerable amount of research which has, on the whole, substantiated the concept's usefulness in several areas of psychology. This construct has extensively been studied in relation to the variables of age (Bialer, 1961; Lessing, 1969; Milgram, 1971; Kifer, 1975; Piers, 1977; Bachrach, Huesmann & Peterson, 1977), sex (Clifford & Cleary, 1972; Gruen, Korte, and Baum, 1974; Deaux, White & Farris, 1975; Maccoby & Jecklin, 1974; Deaux & Farris, 1977; Cooper, Burger & Good, 1981; Lyman, 1983), ethnicity (Battle & Rotter, 1963; Katz, 1967; Milgram, 1971; Shaw & Uhl, 1971; Biener & Gerard, 1975; Garza & Ames, 1974; Buriel & Rivera, 1980; Fry & Ghosh, 1980; Buriel, 1981), socio-economic status (Battle & Rotter, 1963; Nowicki & Strickland, 1973; Robinowitz, 1978; Bartel, 1971), anxiety (Ray & Katahn, 1968; Patton & Freitaz, 1977; Malinari & Khanna, 1981; Chaudhary, 1986), neuroticism (Agrawal & Walis, 1977; Morelli, Krotinges, and Moore, 1979; Wamback & Panackal, 1979), rigidity (Mishra, 1974; Chaudhary, 1983, 1986). However, we are concerned with those studies which relate external-internal locus of control orientation to such processes as acquisition of information, organization of verbal material, and retention. There is a substantial body of evidence to suggest that locus of control is a potent determiner of attention, perception, learning, memory
and organizational processes (Rotter, Seeman, Liverant, 1962; Seeman, 1963; Seeman & Evans, 1962; Rotter, 1954, 1966, 1979; Phares, 1968; Lefcourt & Wine, 1969; Pines & Julian, 1972; Williams, 1972; Pines, 1973; Wolk & DuCette, 1974; Lefcourt, 1976; Cohen & Lefcowitz, 1977; Colwick, 1977; Sanders, Halcomb, Fray & Owens, 1976; Tyler, Hertel, McCallum & Ellis, 1979; Ellis & Franklin, 1983). In the following paragraphs, we shall review some of the studies which bear directly or indirectly to these problems.

As pointed out in chapter I, the first study linking locus of control orientation and cognitive activity was conducted by Seeman & Evans (1962). This study was basically derived from a sociological emphasis on alienation in which Seeman & Evans (1962) used a 12-items measure of powerlessness to predict knowledge about a disease among suffers of that disease. They matched groups of internal and external subjects, hospitalized in a T.B. hospital, on their socio-economic status and hospital experiences. They found that internals had more objective information concerning their illness than externals. Internals as compared to externals were also rated by members of the hospital staff as having more knowledge of their illness and were less satisfied with the information they received in the ward.

In subsequent study, Seeman (1963) studied prisoners in a reformatory and investigated their retention of various kinds of information. In this study, intelligence and the novelty of the stimulus material to be learned were kept constant. Seeman
presented materials related to correctional matters to a sample of reformatory inmates. Three kinds of information, namely, (a) the present informatory setting (b) factors related to achieving successful parole and (c) long-range prospects for a non-criminal career, were presented to the prisoners and retention of these informations was assessed after six weeks. The essential prediction was that inmates scoring low in externality would show superior retention of the parole material, since this material most clearly implied the possibility and value of personal control, but they would not show better recall of less goal relevant types of knowledge. The findings clearly demonstrated that inmates low in externality recalled significantly more parole relevant information than inmates high in externality. However, there were no differences between internals and externals in retention of incidental reformatory information \( r = -.16, \text{n.s.} \) and long-range opportunity information \( r = -.09, \text{n.s.} \), suggesting that internals were superior in recall only when information was relevant to personal goals.

On the basis of the above results, Seeman concluded that individual's sense of powerlessness governs his attention, learning and retention. Following Seeman's (1963) study, several investigators have published research findings that bear further upon the hypothesized relation of locus of control with learning and memory. In one such study, Phares (1968) examined the effect of internal-external control on utilization of information for decision making and on subsequent retention. The major purpose
of his study was to demonstrate that internals were more effective in the utilization of information than externals. The hypothesis of greater utilization of material by internals as opposed to externals was based on presumed construct properties of internal-external dimensions and the findings of previous researches (e.g. Seeman and Evans, 1962; Seeman, 1963; and Davis & Phares, 1967). Accordingly, it was hypothesized that internals, having a higher generalized expectancy that reinforcements follow as a function of their efforts, should better utilize information since they would be likely to see correct utilization as a pathway toward reinforcement. Externals on the other hand, possessing the generalized expectancy that their own efforts were not crucial in the attainment of reward, should make relatively poorer efforts at the utilization of information for decision making.

Phares administered I-E scale to 214 male students enrolled in general psychology classes. Out of 214 subjects, 13 internal experimental and 11 internal control subjects (scores from 19 to 23) and 10 external experimental and 12 external control subjects (scores from 0 to 12) were selected for experiment. Ten bits of information were presented about each of the four different people. The informations included such things as religion, hobby, father's occupation etc. The material was presented by turning over each card, at the rate of one per second. After presentation of the last card, subject was asked to write down all the characteristics that he could remember. If any mistakes
or omissions occurred, the procedure was repeated until one perfect trial. Afterwards, the next set of 10 cards for a different person was presented and the whole procedure was repeated. In this way ten bits of information about each of the four persons were presented to the criterion of one perfect recall trial. Following this procedure, all subjects were brought back after a period of seven days and were presented a task, the solution of which required the utilization of the material they had learned previously. The task presented was a folder in which ten occupations, names of the eight girls and 10 bits of information about each of the four persons were listed. The subjects were asked to decide who of eight girls, and which of ten occupations, were best suited to each of the four men. Financial rewards were offered for correct matchings, and subjects were asked to list the reasons of decisions of their matches. After the subject listed his last reason, the experimenter collected these papers and then asked him to write down on a separate piece of paper all the characteristics of each of the four men that he could remember. This was a retention measure of the material he learned a week ago. For control subjects, the procedure was identical except that upon the subject's return after seven days, he was given a retention test but no utilization measure was taken.

The obtained results demonstrated no significant difference between internal and external experimental subject with respect to number of trials needed to learn the material. Likewise internal and external in the control group did not differ. However,
regardless of I-E orientation, control subjects took significantly greater number of trials to learn than did experimental subjects. The finding was rather puzzling since there were no apparent procedural differences and no obvious sampling differences. However, different experimenters ran the control and experimental group and this may account for the result.

The measure of utilization of information consisted of the number of reasons given by each subject for making decisions about the matching of male with female and occupation. Internals were found to give significantly more reasons for matching than externals. Similarly, internals gave more than three times as many correct reasons as externals for justifying their social and occupational matchings when only correct reasons were counted. Both measure of utilization of information, thus, indicated quite convincingly that internals utilize information in better way than externals though both acquired the information to the same level of proficiency. But internals and externals did not differ substantially in retention measure, i.e. total number of items recalled. However, in terms of items correctly recalled, there was a difference in favour of internals at approximately .08 level of significance. The ratio of correct items recalled to total number of items retained was significantly greater for internals than externals.

It was argued that since the retention measure came after the utilization phase of the experiment, the latter phase may have provided cues that affected retention scores. Thus it is
doubtful that the retention measures can be considered independent of utilization measure.

Similarly, Pines (1973) tested the hypothesis of an association between locus of control orientation and source of information dependence. He examined the performance of 120 undergraduate girls on six trials of a free recall memory task as a function of variations in the time available to recall the stimulus words (3 minutes versus 2 minutes) and the presence or absence of an observing audience. Dependent variables used in this experiment were organization of the verbal material and measures of retention. This experimental paradigm permitted investigation of important parameters of information-processing activity, notably the storage and retrieval of information from memory. A list of 22 nouns of Thorndike-Lorge (1944) frequency of 14-16 per million was presented auditory by a tape recorder at the rate of 2-second to each subject. Following the completion of presentation, S was asked to recall the words in any order. The S was allotted either 3 minutes or 2 minutes of recall time on each trial.

In this experiment an observing audience was either present or absent during the recall period of each trial. In the "observer-present" condition the experimenter walked behind the subjects during the recall period of each trial, pausing for a few seconds to look at the recall protocol of each subject as though noting some aspect of her performance. The subjects were not informed before the experiment that the experimenter would
be observing their performance in this way. This "observer-present" condition was considered to act an additional cue or incentive to intensify the enactment of those covert cognitive processes necessary for successful recall performance. In the "observer-absent" condition, during the recall period of each trial the experimenter causally strolled to and stood by the doorway, in full view, attempting to pay little or no attention to the subjects.

Three estimates of retention were made. First, recall, the average number of words recalled correctly on each trial, was measured. Second, intertrial retention, which is the average number of words recalled in common on two successive trials (Trial n and Trial n+1), was calculated. The third retention estimate was intratrial retention; the average number of words recalled on the second of the two successive trials but not on the first (word recalled on Trial n+1 but not on Trial n). The degree of organization present in the subject's recall protocol was quantitatively assessed with the help of the formula developed by Mandler & Dean (1969) for assessing subjective organization, i.e., words recalled in adjacent positions in the same order on two successive trials was divided by the number of words recalled in common on those two trials minus one.

The first hypothesis that the internal's information processing activity (subjective organization) would vary more as a function of successive encounters with the task material (trials) than the external's, was confirmed. The internal subjects showed
an increasing subjective organization performance as trials progressed from .09 on Trial 2 to .23 on trial 6, while the external's subjective organization scores showed little systematic increase with trials, being about the same on trial 2 (.15) and on trial 6 (.19). The main effect of observer manipulation was also found significant. Subjects in the 'observer-present' condition produced a higher mean subjective organization score than the subjects in the 'observer-absent' condition.

The second hypothesis predicted that the presence of an observing audience acts as a social cue for increased cognitive activity, with the result that the externals show greater facilitation of memory performance in the presence of such observation than in its absence. This effect was not expected to occur for the internal subjects. Consistent with this expectation, the presence of an observing audience was associated with improved intertrial retention by the externals in the 2-minute recall time condition on Trials 4, 5, and 6, with no significant effect observed for the external's retention. However, no significant effect of the observer variable was found for internal subjects in either recall time condition. Irrespective of external and internal groups, recall performance and intertrial retention were significantly higher in 'observer-present' than 'observer-absent' condition, but only with 2-minute of recall time and then only on later trials.

Further, statistical analysis of mean value differences clearly indicated that the internal's recall performance was
significantly better in the 3-minute recall condition than in the 2-minute condition on Trials, 1, 2, 4 and 5, while for the externals the additional moment of recall time resulted in significantly better performance only on Trial 6. This interaction effect of recall time, locus of control, and trials on recall performance was also observed with the intertrial retention measure, but only when no observer was present. In absence of an observer, additional recall time significantly improved the internal's retention on all trials, with such improvement in the external's performance being confined to Trials 5 and 6. In the presence of an observer, the recall time manipulation had no significant effect for either the internals or the externals.

On the basis of the above results it may be concluded that these findings provided empirical support to the predicted relationship between locus of control orientation and source of information dependence but the conditions of the experiment were not clear, as to illustrate the basis for the proposed association of these two conceptual variables. It was not clear whether or not the acquired differences in information search and processing activity were the product of locus of control orientation. Another serious shortcoming of this experiment was that the experimenter served as an observer while he was also present in 'observer-absent' condition for instructions and other information. Thus the audience manipulation through experimenter was not proper since he was actually present in both 'observer-absent' and 'present' conditions.
Wolk and DuCette (1974) conducted two separate experiments in which locus of control orientation and the interactional influences of task explication and task difficulty were used as predictors of intentional performance and incidental learning. In Experiment I, 61 students (42 females and 29 males) were administered the Internal-External Scale developed by Rotter (1966) before two weeks to the actual experiment. This experiment consisted of a two-part incidental learning involving both a noncompeting (Part 1) and a competing (Part 2) intentional tasks. In Part 1, the subjects were given a fictitious story about a town situated in the Midwest. They were instructed to read the story looking for typographical errors that they were to circle. The story contained approximately 700 words and there were a total of 75 possible typographical errors. All of the subjects were given 5 minutes to read the story. After 5 minutes, the story was collected and subjects were given a test of retention in which they were asked to recall the names, dates, incidents and other salient aspect of the story. Subjects were given as long time as they needed for the test. Thus, the subjects were assessed for the intentionally perceived (typographical errors) as well as for incidentally perceived material (story content). When this test was completed, the subjects were given the original story again and told to memorize the dates contained in it which were 13 in number. They were given only 2 minutes to complete this task. This provided a second measure of intentional learning. When this time was over,
subjects were asked to recall the dates, and were also asked to remember the names contained in the story (also 13 in number). This task provided a second measure of incidental learning. The data, thus, were analyzed for four scores of each subject, namely, (a) the intentional task score in Part 1 (i.e., total number of typographical errors found), (b) the incidental learning in part 1 (i.e., the recall of the material), (c) the intentional performance in Part 2 (i.e., the number of dates recalled), and (d) the incidental learning in part 2 (i.e., the number of names recalled).

Wolk and DuCette found that internal subjects showed significantly better performance on both intentional and incidental learning measures. Internal subjects found more typographical errors, recalled more story content, recalled more dates and names than their external counterparts. In further analysis, internals showed significantly better performance at incidental learning, this superiority increased when the intentional task was a competitive one (Part 2).

The Pearson Product-Moment Coefficient of correlation was also computed between intentional and incidental learning scores of internals and externals. Intentional and incidental learning were strongly related for internals (r = .080 and .58) but were weakly related for externals, (r = .09 and .06). Wolk and DuCette replicated these results in a second experiment in which they studied two task dimensions, namely, task difficulty and cue explication with greater methodological control over the factor.
of repeated rehearsal or overlearning. They hypothesized, based on the findings of Experiment 1, that internal subjects would demonstrate higher levels of intentional performance and incidental learning than external subjects across conditions of task difficulty and cue-explication. Further, the differences between internals and externals would increase as the task become more difficult and instructions about the task become more vague. Lastly, there would be positive relationship between intentional performance and incidental learning for internal subjects than for external subjects.

These hypothesis were tested by using 2x2x2 analysis of variance (Locus of control x Cue explication x Task difficulty) with repeated measures on the last factor. The subjects in this experiment consisted of 140 students (76 females and 64 males). The assessment of locus of control orientation and the division of sample into externals and internals were identical to study 1. Two stories were specially designed for this study with the following characteristics: Each was composed of four paragraphs of seven sentences with an average of 170 words per paragraph. The themes and tested incidental learning of each story were kept divergent to eliminate any interference effect of one story with another. Story A concerned the history and discovery of a fictitious miracle drug. The test of incidental learning was the retention of specific examples of seven categories of items presented in the story (e.g., individual's names and occupations). A total of 36 examples of these categories were
dispersed by having 9 present in each paragraph. Story B was concerned with the settlement of a western town. This story also contained seven categories. The numbers of examples and pattern of dispersement were identical to story A. There were 20 typographical errors in each paragraph. For each of the passage used, two levels of difficulty were presented to the subjects. Low difficulty task was defined as a normal series of sentences in a paragraph. High task difficulty was defined as follows: Each paragraph of the passage had its seven sentences randomly sequenced. Within each sentence words were randomly dispersed. The result was a passage with extremely low-order contextual relationships between sentences and words.

Cue-explication dimension defined the degree to which the subject was instructed in regard to the incidental learning. In the high-cue-explication condition, the subjects were instructed, in addition to the search for typographical errors, to anticipate a test of some aspect of the story. This condition was presumed to add significance to the irrelevant aspects of the task without destroying the incidental nature of the learning involved. The subjects received either the high- or low-cue-explication condition on a random basis.

In this experiment both recall and recognition measures were employed. Therefore, following each story, the subjects were presented with a grid having the seven categories of the elements listed and were asked to list as many of the examples of these categories as they could remember. The subjects were
given as much time as was needed, although they never took more than six minutes. Following this, the subjects were presented a list of the seven categories of elements that had appeared in the story. Under each category, 12 examples were presented among which were the actual examples that had been present in the story as well as alternatives that were not present. For each categories the subjects were told how many words had actually appeared in the story (this was either 5 or 6) and were asked to circle only that number for their choices but not more. The subjects were given as much time as they needed.

The ANOVA clearly demonstrated significant main effects of locus of control, task difficulty and cue explication on intentional performance and incidental learning. The internal subjects found significantly more errors than the external subjects across task dimension conditions. Similarly, subjects given low-cue-explication condition found more errors than those given high-cue-explication condition. Internal subjects performed at the same level regardless of degree of cue explication, while the external subjects showed higher level of intentional performance under low-cue-explication as opposed to the high-cue-explication condition.

The two measures of incidental learning, i.e., recall and recognition indicated a number of reliable findings. The main effect for the recall measure indicated that the internal subjects learned significantly more of the examples of the categories than the external subjects but the main effect of
task difficulty was found insignificant. Recognition test showed that internal subjects across all of the other conditions retained significantly more of the content of the stories than the external subjects. Subjects under low-task difficulty condition recognized more of the examples than the subjects under high task difficulty condition. Comparisons of means revealed that the internal subjects as compared to the external subjects had higher recognition scores under the low-explication condition than the high-explication condition. Further more, coefficient of correlation indicated significant positive relationship between intentional and incidental performance of internal subjects. On the contrary, there was absence of significant relationship between intentional and incidental performance of external subjects.

On the basis of the above findings, Wolk & Ducette (1974) concluded that internals were more perceptually sensitive, inquisitive, curious, and efficient processors of information than externals. On the contrary externals possessed less active perceptual attentive system and consequently they failed to use this system efficiently as compared to internals, specially under condition of ambiguity.

A number of researches have also demonstrated that locus of control is a major determinant of academic achievement (Chance, 1972; Crandall, 1973; Messer, 1972; Kifer, 1975; Hjelle, 1970; Prociuk & Breen, 1973, 1974, 1975, 1977; Nelson, Knight, Kagan & Gumbiner, 1980; Stipek & Weisz, 1981;
Dhaliwal & Sidhu, 1984; Agrawal & Misra, 1986; Young & Sorr, 1986; Misra, 1987). In one such study, Prociuk & Breen (1977) examined the relationship between internal-external locus of control and information-seeking in a college academic situation. It was predicted that internals would demonstrate greater search of information relevant to the completion of academic course requirements than externals. 76 students, served as subjects, were administered the Rotter I-E Scale (1966). On the basis of the scores, subjects were classified into internal and external groups. The evaluation format for the Psychology course consisted of two examinations and a common-topic term paper. The subjects were given a set of eight study questions. The examinations consisted of two questions from the set which were selected immediately prior to the test period. In preparation of study questions and term papers, all students were encouraged to consult with the instructor and teaching assistant. Such consultation was intended to provide source materials and answer to general questions. A consultation record was maintained of all students who sought such information throughout the 12-week semester.

Prociuk & Breen recorded a total of 61 consultations throughout the 12-week semester, out of which 43 were initiated by internals. It was found that internals sought information more actively than externals. Since it was possible that few internals seeking information frequently had accounted for the greater number of consultations, a further analysis was calculated which indicated that out of the 34 students who sought
information during the semester, 23 were internals. This analysis again revealed that greater number of internals requested for course-relevant information than the externals. Further, final course grades of each subjects were examined to determine whether internals used obtained information more effectively than externals. The comparison of final course grades showed that internals obtained significantly higher course grades than external but no significant difference in the final course grade of those internals and externals who did not seek information was found. Prociuk & Breek, thus, concluded that internals more actively searched and acquired information relevant to their academic situations and were likewise more successful at remembering such information than their counterparts i.e. externals. Similarly, in a major review of the literature concerning locus of control and academic performance, Stipek & Weisz (1981) concluded that locus of control was correlated with both achievement test performance and grades. They also noted that in most cases a positive relationship between internal locus of control and achievement existed even after the effects of IQ were controlled.

Recently, Young & Shorr (1986) studied locus of control in relation to age, sex, ethnicity, SES, and academic achievement in school going children. The following hypotheses were proposed and tested (1) Older children would be more internal than younger children (2) females would be more internals than males (3) whites would be more internal than blacks and Mexican Americans (4) Middle and Upper SES children would be more
internal than lower SES children (5) SES would be more powerful correlate of locus of control than ethnicity (6) internal locus of control would be positively correlated with academic achievement.

The sample consisted of 1899 children (651 fourth, 649 fifth and 599 seventh-grade students), of which 1639 were whites, 51 were blacks, and 209 were Mexican Americans. The children participating in the govt's free and reduced-price lunch programme were classified as members of lower SES families while those not receiving the free lunch were classified as residing in middle to upper SES families. The locus of control orientation was assessed by the Academic Achievement Accountability Questionnaire (AAA) developed by Clifford & Cleary (1972). The total Battery Scale score from the California Achievement Test (Level 14, Form C) was used for fourth-grade children and the complete Battery Scale Score from the Stanford Achievement Test was used for fifth and seventh grade students. The Intermediate Level 1 Battery (Form A) and Advanced Battery (Form A) were used for fifth and seventh grade student, respectively. The AAA and achievement tests were administered in classroom situation by teacher and school counselor.

Consistent with the hypotheses, it was found that greater internality was positively associated with age, sex, and academic achievement. The whites and middle to upper SES children were also found more internality oriented than black and low SES children. The most important finding of the study was the moderate
correlation in all grades between greater internal locus of control and academic achievement even when the effects of sex, ethnicity and SES were controlled. It appears from this finding that locus of control is an important predictor of educational achievement. Thus Young & Shorr (1986) suggested that efforts should be made to identify those classroom behaviours that promote an internal locus of control.

Most recently, Misra (1987) investigated the role of locus of control and self-concept on academic achievement. A stratified sample of 120 students, comprising of boys and girls equal in number were used as subjects. Locus of control scale (Nowicki-Strickland, 1973) and self-concept scale (Rastogi, 1979) were administered to 120 students of both sexes to measure their locus of control orientation and conceptual components of self-concept. The construct includes abilities, self-confidence, self-acceptance, and worthiness. Responses were scored from highly positive to highly negative (5-1) and vice-versa. Each student was also rated by his or her teacher on a five-point scale and their academic performance was assessed on the basis of the total marks obtained at half-yearly and annual examinations. The data were analysed with the help of inter correlation to find coefficient of correlation among the different measures. It was found that internal locus of control and high self-concept were positively associated with academic performance. Students having high self-confidence, self-acceptance and worthiness were highly correlated with teacher's rating and
academic performance. Furthermore, the relationship between locus of control, self-concept, and academic measures as a function of sex showed that boys were more internally oriented with high self-concept in comparison to girls. Internal boys thus showed higher self-concept and high academic performance than their girl counterparts.

A study, more pertinent to the problem of the present research, was conducted by Ellis & Franklin (1983) to determine the effects of the presence of both semantic and superficial features of word lists on recall and clustering and also to determine the role of a personality variable, locus of control, in the manner by which subjects organized material in free recall. They conducted two experiments to verify these issues. The first issue was examined in Exp.I and both issue were examined in Exp.II. In Exp.I, 73 subjects were shown a randomized list of 16 familiar nouns; four were names of professions, four were names of types of buildings, four were types of food, and four were varieties of animals, with instructions to remember the words as best as they were able. The list was shown at the rate of 3 seconds per word for four presentation. Half of them were given an immediate test of free recall whereas remaining half were tested after a 10-minute delay interval.

Three treatment conditions and an immediate versus delayed retention test were employed. The three conditions consisted of an experimental group and two control groups. In the experimental condition, the subjects were shown the list of
16 words colour-blocked; i.e., the first four words in the list were presented over a red background, the next four over a green background, the next four over a yellow background, and the final four over a blue background. On the other hand, the control subjects were shown the same word list as did the experimental subjects with one change, i.e., these subjects were shown the word list with a single colour background. For example, one fourth of the control subjects were shown words with a red background, one fourth over a green background, one fourth over a green background, one fourth over a yellow background, and final fourth over a blue background. This control condition allowed for clustering by semantic categories but did not allow for clustering by colour whereas the experimental condition allowed for both options. The second control group was introduced to control the distinctiveness effect by presenting most of the items over a single colour background. Each subject was asked to recall as many words in writing as possible. Ellis and Franklin found no reliable difference among groups under the immediate recall condition but experimental subjects showed poorer recall as compared to control subjects in delayed recall. Similarly, they found no difference among groups in semantic clustering during immediate recall. But semantic clustering by experimental subjects was also found poorer than that of control subjects. Further, experimental subjects overall clustered more by colour than control subjects, however, there was no significant difference between these two groups. The greater influence of superficial encoding at immediate than at delayed recall suggests
that clustering by colour is a relatively transitory phenomenon.

In Exp. I, Ellis and Franklin found ceiling effect in immediate free recall arising from the brevity of the list and the frequency with which it was presented. Therefore, the list was lengthened in Exp. II from 16 to 24 words and the frequency of presentation reduced from four to three presentation. The Exp. II was designed to investigate the role of locus of control predisposition in processing information and also examined the effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall. Subjects were randomly assigned to either the experimental or control condition by drawing half the subjects for each condition from the internal pool and half from the external pool. The procedure for presentation and testing was the same as for Exp. I except that presentation frequency was reduced from four to three trials, and control condition II was eliminated since no difference was found between two control groups. When given an option to encode both semantic and superficial features, subjects with an external locus of control orientation encoded the superficial features of the list more extensively than internals, in addition with this option externals showed poorer free recall. When only semantic cues were presented no difference 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 while higher level 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 and Franklin (1983) emphasized that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially was equally present for internals and externals, the externals were much more susceptible to superficial organization and showed significantly less recall. These findings were discussed in the light of attentional-discrimination hypothesis. However, there may be an alternative explanation for the results obtained by Ellis & Franklin (1983). It may be possible that subjects with external locus of control were inefficient in the use of effortful learning processes such as organization and consequently they organized the list using less effective perceptual features. Since it has been established that efficient use of effortful learning processes is related to cognitive rigidity (Tyler et al. 1979; Hasher & Zacks; & Leight & Ellis, 1981), the findings of Ellis & Franklin may be explained in terms of cognitive rigidity-flexibility.

It may also be noted that in Ellis and 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, Franks, Morris & Stein, 1979). Therefore, it is plausible to assume that a different patterns of results would be obtained if a different retention test is used in which colours and categories names may be presented as retrieval cues. These hypotheses were recently tested by the present investigator (Alam, 1986 & Alam & Saeeduzzafar, 1987). They examined the effects of semantic and superficial perceptual features of word lists on recall and clustering in immediate and delayed cued recall and also determined the role of a personality variable, cognitive rigidity-flexibility, in the manner by which subjects organized materials in immediate as well as in delayed cued recall. Eighty undergraduate students (40 rigid and 40 flexibles) of Aligarh Muslim University served as subjects in the experiment. They were randomly selected from 300 students on the basis of their scores on a Hindi Adaptation of Gough-Sanford Rigidity Scale (Ali, 1975). Half of the each group of rigid and flexible subjects served under experimental condition (superficial organization) and other half of the subjects served under control condition (semantic organization). Subjects were tested individually for semantic organization and superficial organization under both immediate and delayed cued recall test, according to their random group assignment. A randomized colour blocked list of 16 words was presented to experimental subjects for four trials at the rate of 2-second per word through electrically operated memory drum. The words of the list were written over four different colour background to provide superficial basis of
organization. The first four words in the list were written over a red background, the next four over a green background, the next four over a yellow background, and the final four over a blue background. The same randomized list of 16 words belonging to four categories, viz., animals, furnitures, professions and vehicles was presented to control subjects for four presentation. Immediately after fourth presentation, names of the categories under control condition and the names of colour under experimental condition were given as cues and the subject was asked to write down in any order as many words as they could recall within 3 minutes. In this way subject was tested for immediate cued recall. Then a retention interval of 10 minutes was given during which subject remained engaged in reading some unrelated materials. This was done to control rehearsal of the material. At the end of retention interval, names of categories or colours, depending on the conditions, were given as cues and the subjects again was asked to write down in any order as many words as they could recall within 3-minute. Thus subject was tested for delayed cued recall.

Alam (1986) and Alam & Saeeduzzafar (1987) found that subjects having rigid personality disposition encoded superficial perceptual features of the list more extensively than those of flexible subjects under both immediate and delayed cued recall test, though a significant difference was not found under delayed cued recall test. The finding that rigid and flexible subjects did not differ significantly under delayed cued recall test indicates that clustering by colour is a
transitory phenomenon. On the contrary, flexible subjects encoded semantic features of the list more extensively than rigid subjects under both immediate and delayed cued recall test. Furthermore, rigid subjects showed poorer word recall across all conditions than their flexible counterparts. Recall performance was also found better with semantic clustering than with colour clustering. It was, thus, concluded that rigidity has detrimental effect on retention of verbal material. It was argued that this rigidity of cognitive processes might be related to other constructs which have been associated with depressed mood (Leight & Ellis, 1981) learned helplessness (Miller & Seligman, 1975) and external locus of control (Hiroto, 1974; Leight & Ellis, 1981; Chaudhary, 1983, 1986). Further research was, therefore, suggested to explore relation between rigidity and other explanatory constructs such as learned helplessness, depressed mood, and external locus of control with respect to organization and recall performance.

The present study is, therefore, designed to investigate relationship between rigidity and locus of control and their relative impact on organization and retention. More specifically, this research is undertaken to compare the mode of organization and recall performance of rigid subjects with those of externally oriented subjects and also to compare the organization strategy and recall performance of flexible subjects with those of internally oriented subjects. Moreover, it is also of great interest to investigate whether subjects having an external locus
of control would encode 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 examine whether subjects having an internal locus of control orientation would encode semantic features of the list more extensively than externals even when names of the categories are presented as retrieval cues. It is also interesting to study organization and recall performance of externals and internals under both immediate as well as delayed cued recall conditions where names of colours or semantic categories are presented as retrieval cues. If external's organizational strategy was relatively ineffective due to the particular testing procedure (free recall with no instruction as to how to organize the list) used by Ellis & Franklin, then it may be assumed that under cued recall conditions external's organizational strategy should become as effective as that of internal's and consequently there should not be any marked difference in recall performance of these subjects.

Finally, we would also explore whether or not individual differences in these personality traits (e.g. locus of control and cognitive rigidity) 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 organization (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.
CHAPTER III

METHOD AND PROCEDURE
METHODS AND PROCEDURE

As mentioned in the preceding chapters, the present research is designed to examine the effects of the presence of both semantic and superficial perceptual features of word lists on organization and on its subsequent retention and also to examine the role of two important personality variables, viz., locus of control and cognitive rigidity, in the manner by which subjects organize material in immediate and delayed cued recall. More specifically, this research is undertaken to answer the following questions:

1. Does cognitive rigidity-flexibility have differential effect on superficial and semantic organization of the material in immediate cued recall?
2. Does cognitive rigidity-flexibility have differential effect on superficial and semantic organization of the material in delayed cued recall?
3. Does external-internal locus of control have differential effect on superficial and semantic organization of the material in immediate cued recall?
4. Does external-internal locus of control have differential influence on superficial and semantic organization of the material in delayed cued recall?
5. Does cognitive rigidity-flexibility have differential effect on immediate cued recall?
6. Does external-internal locus of control have differential effect on immediate cued recall?
7. Do superficial and semantic organization have differential influence on immediate cued recall?

8. Does cognitive rigidity-flexibility have differential effect on delayed cued recall?

9. Does external-internal locus of control have differential effect on delayed cued recall?

10. Do superficial and semantic organization have differential effect on delayed cued recall?

11. Do cognitive rigidity and flexibility have differential effect on immediate and delayed cued recall?

12. Do external and internal orientation have differential effect on immediate and delayed cued recall?

13. Do superficial and semantic organization have differential effect on immediate and delayed cued recall?

14. Do rigid and externally oriented subject differ with respect to mode of organization and recall performance in immediate and delayed cued recall?

15. Do flexible and internally oriented subjects differ with respect to mode of organization and recall performance in immediate and delayed cued recall?

16. Is there any interactional effect of cognitive rigidity and locus of control on immediate and delayed cued recall?

17. Is there any interactional effect of cognitive rigidity and type of organization on immediate and delayed cued recall?

18. Is there any interactional effect of locus of control and type of organization on immediate and delayed cued recall?
19. Is there any interactional effect of cognitive rigidity, locus of control and type of organization on immediate and delayed cued recall?

20. Is there any interactional effect of cognitive rigidity and locus of control on the difference of immediate and delayed cued recall?

21. Is there any interactional effect of cognitive rigidity and type of organization on the difference of immediate and delayed cued recall?

22. Is there any interactional effect of locus of control and type of organization on the difference of immediate and delayed cued recall.

23. Is there any interactional effect of cognitive rigidity, locus of control, and type of organization on the difference of immediate and delayed cued recall?

**EXPERIMENTAL DESIGN**

To answer the above questions, a 2x2x2 factorial design was used in which eight groups of subjects learned a list of 16 common words belonging to four categories, viz., animals, furnitures, professions, and vehicles, having either a semantic or superficial perceptual features for organizing list of words in immediate as well as delayed cued recall. The design of the experiment may be presented diagrammatically as follows:
DIAGRAMMATIC DESIGN OF THE EXPERIMENT

**Group-I**

**Rigid-External Subjects**

Received four trials on randomized colour-blocked list of 16 words belonging to four categories.

Immediately after learning trials, names of the colours and categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes. Thus they were tested for immediate cued recall.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the colours and categories were given as cues and Ss were asked to write down as many words as possible within 3 minutes. Thus Ss were tested for delayed cued recall.

**Group-II**

**Rigid-External Subjects**

Received four trials on randomized list of 16 words belonging to four categories.

Immediately after learning trials, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

**Group-III**

**Rigid-Internal Subjects**

Received four trials on colour-blocked list of 16 words belonging to four categories.

Immediately after learning trials, names of the colours and categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the colours and categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

**Group-IV**

**Rigid-Internal Subjects**

Received four trials on randomized list of 16 words belonging to four categories.

Immediately after learning trials, names of the categories were given as cues and Ss were asked to write down in any order as many words as possible within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the categories were given as cues and Ss were asked to write down as many words as possible within 3 minutes.

**Group-V**

**Flexible-External Subjects**

Received four trials on randomized colour-blocked list of 16 words belonging to four categories.

Immediately after learning trials, names of the colours and categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the colours and categories were given as cues and Ss were asked to write down as many words as possible within 3 minutes.

**Group-VI**

**Flexible-Internal Subjects**

Received four trials on randomized list of 16 words belonging to four categories.

Immediately after learning trials, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

**Group-VII**

**Flexible-Internal Subjects**

Received four trials on colour-blocked list of 16 words belonging to four categories.

Immediately after learning trials, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the categories were given as cues and Ss were asked to write down as many words as they could recall within 3 minutes.

**Group-VIII**

**Flexible-Internal Subjects**

Received four trials on randomized list of 16 words belonging to four categories.

Immediately after learning trials, names of the categories were given as cues and Ss were asked to write down in any order as many words as possible within 3 minutes.

10 minutes retention interval during which Ss remained engaged in reading unrelated light materials.

Immediately after 10 minutes interval, names of the categories were given as cues and Ss were asked to write down in any order as many words as possible within 3 minutes.
In order to form eight groups of subjects mentioned above, a Hindi version of G-S Rigidity Scale (Ali, 1975) was administered on 400 undergraduate male students of Aligarh Muslim University, randomly selected from the Faculties of Arts and Social Sciences. This Hindi version of rigidity scale adopted by Ali (1975) consist of 21 items with forced choice response alternatives of 'Yes' and 'No' type. The split-half reliability of the translated version of scale is .74 and the scale correlated significantly with California F scale ($r = .58$) with which it was conceptually related. On the basis of scores obtained by the subjects two extreme groups, namely, rigid and flexible, were formed. The subjects securing a score above Q3 (i.e. 16) were classified as rigid while those securing a score below Q1 (i.e. 12) were categorized as flexible. On this basis 125 rigid and 125 flexible subjects were selected. A Hindi version of Liverant & Rotter's I-E Scale (Hasan, 1974) was given to both of these groups in classroom situations to measure their externality on an integer scale from zero (very internal) to 23 (very external). The I-E scale is composed of 29 items including 6 fillers, each of which requires the subjects to choose one of the two statements with which he agrees more. These statements make reference to matters of social and political as well as personal relevance. The subjects whose scores were from 0 to 9 were classified as internals and those securing 10 or above were designated as externals. The reliability as estimated by three methods, namely, the split-half, the Kuder-Richardson, and the test-retest method, as found to be .65 to .79,
.69 to .73 and .55 to .83 respectively in different samples. On the basis of the scores obtained by the subjects, each group (i.e. rigid and flexible groups) was subdivided to form four groups, namely, (a) rigid-external, (b) rigid-internal, (c) flexible-external and (d) flexible-internal. There were 30 subjects in each group. Half of the subjects of each of the four groups served under experimental condition (superficial organization) and the other half served under control condition (semantic organization). In this way eight groups were formed. These were (1) rigid-external with superficial organization (2) rigid-internal with superficial organization (3) rigid-external with semantic organization (4) rigid-internal with semantic organization (5) flexible-external with superficial organization (6) flexible-internal with superficial organization (7) flexible-external with semantic organization and (8) flexible-internal with semantic organization. Each group comprised of fifteen subjects.

In the experimental condition, the subjects saw the list of 16 words colour-blocked, i.e. the first four words of the list were presented over a red background, the next four over a green background, the next four over a yellow background, and the last four over a blue background. The purpose of this procedure was to provide a superficial, semantically irrelevant basis for processing the list, namely, colour. Thus, in addition to the ever-present semantic basis for encoding (i.e. semantic categories), the experimental subjects had an alternative coding
option based on the superficial list characteristic, i.e., colour. By providing subjects with this option, it was expected that they would be inclined, to some extent, to encode the to-be-remembered words by association with their appropriate colour, and thus "colour-cluster" in immediate as well as delayed cued recall. Furthermore, it was assumed that this type of encoding would compete with and suppress semantic encoding by categories.

In the control condition, instead of presenting words over the background of varying colours, the subjects were shown same word list with a single colour background. Thus in control condition subjects were allowed to cluster by semantic categories but were not allowed to cluster by colour.

The learning and test sequence for each group of subjects was as follows: First a ready signal was given to the subject, then a randomized list of 16 common words was presented for four trials by means of electrically operated memory drum. The words were presented one by one, each appearing in the aperture for two seconds at a regular interval of two seconds in between two exposures. At the end of fourth trial, names of the categories or names of the colours were given as cues and subject was asked to write down as many words as possible in any order within 3-minutes. In this way, subject was tested for immediate cued recall. After the immediate cued recall test, a retention interval of 10-minutes was given to the subject,
though he was not informed of it, during which he remained engaged in reading some unrelated light material. This was done to control the rehearsal of the task material. At the end of 10-minutes retention interval, names of the categories (viz., animals, furnitures, professions and vehicles) or names of the colours (viz., red, green, yellow, and blue) were again given as cues and subject was asked to write down as many words as possible in any order within 3-minutes. Thus the subject was tested for delayed cued recall. For half of the subjects of each group, a randomized colour-blocked list of 16 words was presented, i.e. each four words in the list were presented over different four colour backgrounds, namely, red, green, yellow and blue and names of the categories and colours were given as cues in immediate as well as delayed cued recall test. For other half of the subjects, a randomized list of 16 words was presented over a single colour background and names of the categories, viz., animals, furnitures, professions and vehicles, were given as cues in immediate as well as delayed cued recall test. Thus, it yielded sixteen observations on eight groups of subjects for each of the two measures of the dependent variable-immediate and delayed cued recall.

In short, a 2x2x2 factorial design in which one task variable (organization of material) and two personality variables (cognitive rigidity & locus of control) each varying in two ways, was used in this experiment. The two values of task variable were (a) superficial organization and (b) semantic organization.
The two values of cognitive rigidity were (a) rigid and (b) flexible; and locus of control was varied by selecting (a) internal and (b) external subjects. Thus there were eight groups of subjects each was tested for immediate as well as delayed cued recall which yielded sixteen observations on eight groups of subjects for each of the two measures of dependent variable.

**Stimulus Material & Apparatus**

The stimulus material and apparatus employed in this experiment were (a) a randomized categorical and colour blocked lists of 16 words and (b) electrically operated memory drum.

The lists consisted of 16 familiar words. Out of 16 words, four were names of four legged animals, four were names of types of furnitures, four were types of professions and four were varieties of vehicles. The words of each list ranged from five to eight letters. These four categories were choosen from Battig & Montague's (1969) categorical norms such that, each category contained at least four items which were clearly members of only one of the designated categories. Moreover, each word of the four categories was of equal difficulty. Having selected the words, they were randomized in the following way. Firstly, all the 16 words were written on a separate
paper sheets of equal size. These sheets were repeatedly shuffled in a box and then were drawn one by one. The original items, thus randomized, occurred in the following serial order to make up the list of stimulus words:

CHAIR, HORSE, SCOOTER, ELEPHANT, CLERK, RICKshaw, DOCTOR, TRUCK, LAWYER, STOOL, BICYCLE, TIGER, BOOKCASE, TABLE, CAMEL, ENGINEER.

In this way a randomized categorical list of 16 words was prepared. This list was presented for four trials to the subjects where they had an opportunity to organize the to-be-remembered words semantically. But for the superficial organization condition, the same word list was presented over four different colour backgrounds. The first four words in the list were written over a red background, the next four over a green background, the next four over a yellow background, and the final four over a blue background. The words were selected against any prominent association with any of the colours used as background during word presentation. For example, words associated with red, such as apple, were avoided. In this way, the background colour for each word was a superficial list characteristic and not evocative of some meaningful aspect of the word itself. Thus, a randomized colour-blocked list of 16 words was prepared. The two randomized
list used in the present experiment are given as below:

<table>
<thead>
<tr>
<th>Randomized List</th>
<th>Randomized colour-blocked List</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAIR</td>
<td>Red</td>
</tr>
<tr>
<td>HORSE</td>
<td>Background</td>
</tr>
<tr>
<td>SCOOTER</td>
<td></td>
</tr>
<tr>
<td>ELEPHANT</td>
<td></td>
</tr>
<tr>
<td>CLERK</td>
<td></td>
</tr>
<tr>
<td>RICKSHAW</td>
<td>Green</td>
</tr>
<tr>
<td>DOCTOR</td>
<td>Background</td>
</tr>
<tr>
<td>TRUCK</td>
<td></td>
</tr>
<tr>
<td>LAWYER</td>
<td></td>
</tr>
<tr>
<td>STOOL</td>
<td>Yellow</td>
</tr>
<tr>
<td>BICYCLE</td>
<td>Background</td>
</tr>
<tr>
<td>TIGER</td>
<td></td>
</tr>
<tr>
<td>BOOKCASE</td>
<td></td>
</tr>
<tr>
<td>TABLE</td>
<td>Blue</td>
</tr>
<tr>
<td>CAMEL</td>
<td>Background</td>
</tr>
<tr>
<td>ENGINEER</td>
<td></td>
</tr>
</tbody>
</table>

The apparatus used in this experiment was an electrically operated memory drum in which timing device was so adjusted as to allow each word to be exposed for two seconds at a regular interval of two second in between two exposures.
**Subjects**

120 undergraduate male students of Aligarh Muslim University, Aligarh served as subjects in this experiment. They were selected from a large sample of students on the basis of their scores on Hindi adaptation of GSR Scale (Ali, 1975) and I-E Scale (Hasan, 1974) which has already been mentioned under the heading "Experimental Design". On the basis of the scores, four groups, namely, rigid-internal, rigid-external, flexible-internal and flexible-external, were formed. Half of the subjects of each group served under experimental condition (superficial organization) and other half served under control condition (semantic organization). Thus eight groups were formed each having fifteen subjects.

**Procedure**

All the 120 subjects were tested individually and all the eight groups were run simultaneously, i.e. first subject was tested from the first group, second subject was tested from group II, third was tested from group III, fourth was tested from group IV ........ and ninth subjects was tested from group I and so on. In this way, assignment of groups to condition took place prior to the subject's appearance in the laboratory. The apparatus with two randomized lists pasted on it was placed in the research laboratory of the department of Psychology, A.M.U., Aligarh. As the subject entered, he was seated comfortably on a chair facing the apperture of the memory drum and he
was given a paper sheet for recording his recall performance. Following instructions were given to him for learning and recalling the words of the list.

"I am going to present you a randomized list of few common words one by one through electrically operated memory drum. Each word of the list will appear in the apperture of the memory drum for two seconds at a regular fixed interval of two seconds in between two exposures. The list will be presented for four trials. After last word of the fourth trial, I will give names of the colours and the names of the categories and you would be required to write down in any order as many words as possible within 3 minutes. You are, therefore, required to see each word carefully and try to remember as many words as possible. Are there any questions"?

According to the instructions given above each subject was tested, irrespective of his group assignment, under immediate as well as delayed cued recall condition.

The data obtained were tabulated groupwise and were statistically treated by using analysis of variance and t-test to draw necessary inferences.
CHAPTER IV

ANALYSIS OF DATA AND INTERPRETATION OF THE RESULTS
ANALYSIS OF DATA AND INTERPRETATION OF THE RESULTS

As mentioned in the preceding chapter, a 2x2x2 factorial design with two personality variables, namely, cognitive rigidity and locus of control and one task variable, namely, type of organization, each varying in two ways was employed in the present study. There were eight groups of subjects, viz.,

1. rigid-external with superficial organization
2. rigid-internal with superficial organization
3. rigid-external with semantic organization
4. rigid-internal with semantic organization
5. flexible-external with superficial organization
6. flexible-internal with superficial organization
7. flexible-external with semantic organization
8. rigid-internal with semantic organization

These eight groups of subjects were individually tested under immediate as well as delayed cued recall. Thus there were sixteen possible observations of the two values of each of the three independent variables (i.e. cognitive rigidity, locus of control, and type of organization) for each of the two measures of dependent variable (i.e. immediate and delayed cued recall test).

The data were analyzed for clustering by semantic categories (i.e. semantic organization) for clustering by superficial perceptual features of the list (superficial organization) and for word cued recall with the help of t-test and analysis of variance was also used to see the differential effect of each independent variable on immediate and delayed cued recall.
Table 1: Showing superficial and semantic organization scores obtained by four groups of subjects in immediate cued recall test.

<table>
<thead>
<tr>
<th>No. of subjects</th>
<th>Rigid External condition</th>
<th>Rigid Internal condition</th>
<th>Flexible External condition</th>
<th>Flexible Internal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>11</td>
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<tr>
<td>7.</td>
<td>9</td>
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<td>10</td>
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<td>8.</td>
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<td>10</td>
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<td>9.</td>
<td>9</td>
<td>11</td>
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<td>10.</td>
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<td>11.</td>
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<td>12.</td>
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<td>13.</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>14.</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>15.</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>152</td>
<td>147</td>
<td>160</td>
</tr>
<tr>
<td>Mean</td>
<td>10.00</td>
<td>10.13</td>
<td>9.80</td>
<td>10.67</td>
</tr>
</tbody>
</table>
The raw scores of superficial and semantic organization obtained by four groups of subjects in immediate cued recall test are given in Table-1 and their mean superficial organization and mean semantic organization scores as well as t-values are given in Table-2(a) and 2(b) respectively.

The present research, as mentioned in the preceding chapter, was designed to examine the effect of cognitive rigidity-flexibility on superficial and semantic organization of the material in immediate cued recall. Thus in order to answer the first question relating to the main objective of the present research, the mean superficial organization scores obtained by rigid and flexible subjects in immediate cued recall were compared by using t-test which are given in Table 2(a).

Table 2(a): Showing mean superficial organization scores obtained by rigid and flexible subjects in immediate cued recall and significance of difference.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>9.90</td>
<td>0.803</td>
<td>4.08</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>Flexible</td>
<td>8.96</td>
<td>0.998</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is evident from Table-2(a) that the mean superficial organization score obtained by rigid subjects (9.90) is markedly
higher than the mean superficial organization score obtained by flexible subjects (i.e. 8.96) and the difference between the two means is statistically significant \( t = 4.08, P < .01 \) at .01 level of confidence. Since mean superficial organization score obtained by rigid subjects is much higher than the mean superficial organization score obtained by flexible subjects, it may be concluded that rigid subjects encode superficial perceptual features of the list more extensively than the flexible subjects in immediate cued recall.

Similarly, the mean semantic organization scores obtained by rigid and flexible subjects in immediate cued recall were also compared which are reported in Table-2(b).

Table-2(b): Showing mean semantic organization scores obtained by rigid and flexible in immediate cued recall and significance of difference.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean semantic organization</th>
<th>S.D.</th>
<th>( t )-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>10.4</td>
<td>0.855</td>
<td>5.88</td>
<td>( P &lt; .01 )</td>
</tr>
<tr>
<td>Flexible</td>
<td>12.4</td>
<td>1.687</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table-2(b) clearly reveals that the mean semantic organization score obtained by flexible subjects (i.e. 12.4) is higher than the mean semantic organization score obtained by rigid subjects (i.e. 10.4). The \( t \)-value is 5.88 which is statistically
Table 3: Showing superficial and semantic organization scores obtained by four groups of subjects in delayed cued recall test.

<table>
<thead>
<tr>
<th>No. of samples</th>
<th>Rigid External</th>
<th>Rigid Internal</th>
<th>Flexible External</th>
<th>Flexible Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
<td>Experimental</td>
<td>Control</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>11</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>11</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>138</td>
<td>147</td>
<td>131</td>
<td>156</td>
</tr>
</tbody>
</table>
significant at .01 level of confidence. The result leads us to conclude that flexible subjects encode semantic categories of the list more extensively than rigid subjects. It appears that rigid subjects are intrinsically deficient in semantic processing of the material.

In order to answer the second question, the mean superficial organization and semantic organization scores obtained by rigid and flexible subjects in delayed cued recall are also compared by using t-test. The raw scores of superficial and semantic organization as obtained by four group subjects in delayed cued recall are given in Table-3. The mean superficial and semantic organization scores obtained by rigid and flexible subjects are reported in Table-4(a) and 4(b), respectively.

Table-4(a): Showing mean superficial organization scores obtained by rigid and flexible in delayed cued recall and significance of difference

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>8.96</td>
<td>0.998</td>
<td>1.12</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>Flexible</td>
<td>9.23</td>
<td>0.895</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We find in Table-4(a) that mean superficial organization score obtained by rigid subjects (i.e. 8.96) is slightly lower than the mean superficial organization score obtained by flexible
subjects (i.e. 9.23) and the difference between the two means fails to reach any conventional level of significance. The t-value is 1.12 which is insignificant indicating no reliable difference between mean superficial organization scores of rigid and flexible subjects. We may, therefore, conclude that rigid and flexible subjects do not differ with respect to superficial organization of the material in delayed cued recall.

The mean semantic organization scores obtained by rigid and flexible subjects in delayed cued recall were also compared. The mean semantic organization scores as obtained by these two group of subjects and t-value are presented in Table-4(b).

Table-4(b): Showing significance of difference between mean semantic organization scores of rigid and flexible subjects in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>10.10</td>
<td>0.844</td>
<td>2.95</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.06</td>
<td>1.573</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is apparent from Table-4(b) that the mean semantic organization score of flexible subjects (M=11.06) is markedly higher than the mean semantic organization score of rigid subjects (M=10.10). The t-value is 2.95 which is statistically significant at .01 level of confidence. Since the mean semantic
organization score of flexible subjects is much higher than the mean semantic organization score of rigid subjects, it may safely be concluded that flexible subjects encode semantic categories of the list more extensively than rigid subjects in delayed cued recall too.

The present research, as mentioned in the preceding chapter, is also undertaken to determine the differential effect of external and internal locus of control orientations on superficial and semantic organization in immediate as well as delayed cued recall. In order to answer the third question pertaining to the above objective, mean superficial organization scores obtained by external and internal subjects and mean semantic organization scores obtained by external and internal subjects in immediate cued recall are compared with the help of t-test as shown in Table-5(a) and 5(b).

Table-5(a): Showing mean superficial organization score obtained by external and internal subjects in immediate cued recall and significance of difference.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>9.40</td>
<td>1.069</td>
<td>.23</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>Internal</td>
<td>9.46</td>
<td>0.972</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table-5(a) the mean superficial organization scores obtained by external (M=9.40) and internal subjects (M=9.46)
are more or less the same. The t-value is 0.23 which is insignificant. We may, therefore, conclude that external and internal subjects do not differ with respect to superficial organization of the material in immediate cued recall.

The mean semantic organization scores obtained by external and internal subjects in immediate cued recall are also compared. The mean semantic organization scores and t-value are given in Table-5(b).

Table-5(b): Showing mean semantic organization scores obtained by external and internal subjects in immediate cued recall and significance of difference.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>10.50</td>
<td>0.937</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>12.23</td>
<td>1.831</td>
<td>4.67</td>
<td>P&lt;.01</td>
</tr>
</tbody>
</table>

It is evident from Table-5(b) that the mean semantic organization score of internal subjects (i.e. 12.23) is considerably higher than the mean semantic organization score (M=10.50) of external subjects (i.e. 10.50) and the difference between the two means is statistically significant (t = 4.67, P<.01). The result leads us to conclude that internal subjects organized the information using semantic categories of the list more extensively than those of external subjects in immediate cued recall.
To find out the effect of external and internal locus of control orientations on superficial and semantic organization in delayed cued recall, mean superficial and semantic organization scores obtained by external and internal subjects and their t-values are computed which are presented in Table-6(a) and 6(b).

Table-6(a): Showing significance of difference between mean superficial organization of external and internal subjects in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>9.30</td>
<td>1.095</td>
<td>1.60</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>Internal</td>
<td>8.90</td>
<td>0.884</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table-6(a) reveals that the mean superficial organization score of external subjects (i.e. 9.30) is slightly higher than the mean superficial organization score (M=8.90) of internal subjects (i.e. 8.90) but the difference between the two means fails to reach at any conventional level of significance. The t-value is 1.60 which is insignificant indicating no difference between external and internal subjects with respect to superficial organization in delayed cued recall. Though not significant, there is, however, a trend to the effect that externals encode information with superficial features of the material more extensively than internals in delayed cued recall.
The mean semantic organization scores of external and internal subjects in delayed cued recall and t-value are given in Table-6(b).

Table-6(b): Showing significance of difference between mean semantic organization scores obtained by external and internal subjects in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>9.96</td>
<td>0.828</td>
<td>4.13</td>
<td>$P &lt; .01$</td>
</tr>
<tr>
<td>Internal</td>
<td>12.20</td>
<td>1.453</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The mean semantic organization score obtained by internal subjects as shown in Table-6(b) is 12.20 and the mean semantic organization score obtained by external subjects is 9.96. The mean semantic organization score of internals is higher than the mean semantic organization score obtained by externals and the difference between the two means is statistically significant ($t = 4.13, P < .01$). Since the mean semantic organization score of internal subjects is reliably higher than the mean semantic organization score of external subjects, it may be concluded that internal subjects organize material more extensively by semantic categories of the list than their counterparts i.e. externals in delayed cued recall test.

The overall results reveal that rigid subjects encode superficial perceptual features of the task (i.e. colour clustering)
more extensively than their flexible counterparts in both immediate and delayed cued recall, though they do not differ significantly in delayed cued recall. Flexible subjects, on the other hand, encode semantic categories of the list (i.e. semantic clustering) more extensively than those of rigid subjects in both immediate and delayed cued recall. Furthermore, external subjects do not differ with those of internal subjects in immediate as well as delayed cued recall test with respect to superficial organization of the material. Though not statistically significant, external subjects show higher superficial organization in delayed cued recall. On the contrary, internal subjects show reliably better semantic organization than their external counterparts in both immediate and delayed cued recall.

One of the main objective of the present research, as indicated in the preceding chapter, is also to determine the differential effect of cognitive rigidity-flexibility, locus of control, and type of organization on immediate and delayed cued recall. For this purpose the word recall scores obtained by the eight groups of subjects are statistically treated by using 2x2x2 analysis of variance. Thus F ratios were calculated separately for immediate and delayed cued recall.

The word recall scores obtained by eight groups of subjects in immediate cued recall are reported in Table-7(a), their mean recall scores in Table-7(b), and F ratios in Table-7(c).
Table-7(a): Showing recall scores obtained by eight groups of subjects in immediate cued recall test.

<table>
<thead>
<tr>
<th>No. of samples</th>
<th>Rigid</th>
<th></th>
<th>Flexible</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
<td>Experimental</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>condition</td>
<td>condition</td>
<td>condition</td>
<td>condition</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>11</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>10</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>11</td>
<td>14</td>
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</tr>
<tr>
<td>10</td>
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</tr>
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<td>11</td>
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</tr>
<tr>
<td>12</td>
<td>13</td>
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<td>10</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
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<td>10</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>15</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>172</strong></td>
<td><strong>174</strong></td>
<td><strong>171</strong></td>
<td><strong>180</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>11.46</strong></td>
<td><strong>11.60</strong></td>
<td><strong>11.40</strong></td>
<td><strong>12.0</strong></td>
</tr>
</tbody>
</table>
Table-7(b): Showing mean recall scores obtained by eight groups of subjects under immediate cued recall test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Experimental condition</th>
<th>Control condition</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>11.43</td>
<td>11.80</td>
<td>11.615</td>
</tr>
<tr>
<td>Flexible</td>
<td>10.60</td>
<td>13.60</td>
<td>12.10</td>
</tr>
<tr>
<td>External</td>
<td>10.86</td>
<td>12.06</td>
<td>11.46</td>
</tr>
<tr>
<td>Internal</td>
<td>11.16</td>
<td>13.33</td>
<td>12.24</td>
</tr>
</tbody>
</table>

Mean 11.01 12.69

Table-7(c): Summary of ANOVA for immediate word recall scores

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of square</th>
<th>df</th>
<th>Mean square</th>
<th>F ratios</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Rigidity(CR)</td>
<td>7.01</td>
<td>1</td>
<td>7.01</td>
<td>5.11</td>
<td>P&lt;.05</td>
</tr>
<tr>
<td>Locus of control(LOC)</td>
<td>18.41</td>
<td>1</td>
<td>18.41</td>
<td>13.43</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>Type of organization(TO)</td>
<td>85.01</td>
<td>1</td>
<td>85.01</td>
<td>62.05</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>CR x LOC</td>
<td>11.40</td>
<td>1</td>
<td>11.40</td>
<td>8.32</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>CR x TO</td>
<td>52.00</td>
<td>1</td>
<td>52.00</td>
<td>37.95</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>LOC x TO</td>
<td>7.00</td>
<td>1</td>
<td>7.00</td>
<td>5.10</td>
<td>P&lt;.05</td>
</tr>
<tr>
<td>CR x LOC x TO</td>
<td>1.87</td>
<td>1</td>
<td>1.87</td>
<td>1.36</td>
<td>P&gt;0.05</td>
</tr>
<tr>
<td>Error:Within treatments</td>
<td>153.90</td>
<td>112</td>
<td>1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>336.60</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
F ratio for variation in rigidity-flexibility, as shown in Table-7(c), is 5.11 which is statistically significant at .05 level of confidence. The result suggests that cognitive rigidity and flexibility have differential effect on immediate cued recall. Ignoring locus of control and organization variables, we find in Table-7(b) that the mean of the means recall score obtained by rigid subjects is 11.61 which is markedly lower than the mean of the means recall score obtained by flexible subjects, i.e. 12.10. It is, therefore, concluded that cognitive rigidity has more pronounced detrimental effect on immediate cued recall than flexibility. In other words rigid subjects show poorer immediate cued recall than flexible subjects.

Table-7(c) also reveals that the F ratio for variation in external-internal locus of control orientations is 13.43 which is highly significant at .01 level of confidence. The result shows that external and internal orientation have differential effect on immediate cued recall. Disregarding cognitive rigidity and organization variables, the mean of the means recall score, as shown in Table-7(b), of external subjects is 11.46 and the mean of the means recall score of internal subjects is 12.24. Since the mean of the means recall score obtained by external subjects in immediate cued recall is significantly lower than the mean of the means recall score obtained by internal subjects, it may, safely, be concluded that external locus of control orientation has more pronounced adverse effect on
immediate cued recall than internal locus of control orientation. That is, external subjects show poorer immediate cued recall than internal subjects.

F ratio for variation in organization, as shown in Table-7(c), is 62.05 which is highly significant at .01 level. The result suggests that the type of organization (semantic or superficial organization) adopted by the subjects has differential effect on immediate cued recall. Disregarding cognitive rigidity and locus of control variables, we find in Table-7(b) that the mean of the means recall score with superficial organization is 11.01 and the mean of the means recall score with semantic organization is 12.69. Since the mean of the means recall score with superficial organization (i.e. experimental condition) is much lower than the mean of the means recall scores with semantic organization (i.e. control condition) in immediate cued recall, it may, therefore, be concluded that recall performance of the subjects, irrespective of their personality dispositions, is poorer with superficial organization than with semantic organization in immediate cued recall test.

The interactional effect of cognitive rigidity and locus of control orientation (Table-7c) on immediate cued recall is highly significant (F = 8.32, df = 1/119, P < .01) indicating dependency of the effect of cognitive rigidity on locus of control and vice-versa. The interactional effect is also presented graphically (Figure 1.0) which too indicates the existence of
INTERACTION: COGNITIVE RIGIDITY X LOCUS OF CONTROL ON IMMEDIATE CUED RECALL

![Graph showing the interaction between cognitive rigidity and locus of control on immediate cued recall](image)
significant interactional effect between the two variables on immediate cued recall.

In figure 1.0 the two values of locus of control orientations (i.e. external and internal) are shown on the horizontal axis. The mean recall scores obtained by the four groups are presented on the vertical axis: point No. 1 is the mean recall score \( M = 11.53 \) for the rigid-external subjects; point 2 is the mean recall score for the external subjects (i.e. 11.30); point 3 is the mean recall score for rigid-internal subjects (i.e. 11.70) and point 4, is the mean recall score for flexible-internal subjects \( M = 12.79 \). The line that connects point 1 and 3 represents the recall performance of rigid subjects; half of them were externals and half were internals. The line through points No. 2 & 4 represents the recall performance of flexible subjects; half of them were externals and remaining half were internals.

The two lines drawn in figure 1.0 are not parallel rather they cross each other suggesting the existence of interaction between cognitive rigidity and locus of control. The same conclusion may be drawn by comparing differences in mean recall scores obtained by four groups of subjects. These differences are given in Table-8(a).
Table-8(a): Showing mean recall scores obtained by four groups of subjects and differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>External</th>
<th>Internal</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>11.53</td>
<td>11.70</td>
<td>0.17</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.39</td>
<td>12.79</td>
<td>1.40</td>
</tr>
<tr>
<td>Differences</td>
<td>0.14</td>
<td>1.09</td>
<td></td>
</tr>
</tbody>
</table>

It is evident from Table-8(a) and figure 1.0 that the difference between mean recall scores of rigid-external and rigid-internal is 0.17 which is much smaller than the difference between flexible-external and flexible-internal subjects (i.e. 1.40). Similarly the difference between rigid-external and flexible-external (i.e. 0.14) is also not similar to the difference between rigid-internal and flexible-internal subjects (i.e. 1.09). Since these differences are not same, we may conclude that an interaction exists between cognitive rigidity and locus of control on immediate cued recall.

The interactional effect of cognitive rigidity and type of organization is also significant ($F = 37.95, df = 1/119, P < .01$). The result shows that an interaction exists between cognitive rigidity and type of organization. The result is presented graphically in Figure 1.1.
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON IMMEDIATE CUED RECALL

Figure 11
In figure 1.1, the two values of the type of organization (i.e. superficial and semantic organization) are shown on the horizontal axis and the mean immediate cued recall scores on the vertical axis. The line connecting points 1 and 3 represents mean recall scores obtained by rigid subjects; half of them served under superficial organization and other half served under semantic organization condition. Similarly, the line that connects points 2 and 4 shows mean recall scores obtained by the flexible subjects; half of them served under superficial organization and the remaining half served under semantic organization condition. As shown in figure 1.1, the two lines are not parallel rather they cross each other indicating that interactional effect of rigidity-flexibility and type of organization exists on immediate cued recall. The same conclusion may also be drawn by comparing the differences in mean recall scores obtained by rigid and flexible subjects who served under both superficial and semantic organization conditions. These differences are given in Table-8(b).

Table-8(b): Showing mean recall scores obtained by rigid and flexible subjects under superficial and semantic organization conditions in immediate cued recall and differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Superficial organization</th>
<th>Semantic organization</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>11.43</td>
<td>11.80</td>
<td>0.37</td>
</tr>
<tr>
<td>Flexible</td>
<td>10.59</td>
<td>13.59</td>
<td>3.00</td>
</tr>
<tr>
<td>Difference</td>
<td>0.84</td>
<td>1.79</td>
<td></td>
</tr>
</tbody>
</table>
A close examination of figure 1.1 and Table-8(b) clearly demonstrates that the difference between mean recall scores of rigid under superficial organization condition and rigid under semantic organization condition is 0.37 which is markedly lower than the difference between the mean recall scores of flexible under superficial organization condition and flexible under semantic organization condition (i.e. 3.00). Similarly, the difference between the mean recall scores of rigid under semantic organization condition and flexible under semantic organization is 1.79 which is much higher than the difference between the mean recall scores of rigid under superficial organization condition and flexible under superficial organization condition (i.e. 0.84). Since the magnitude of the above mentioned differences is not the same, it may, therefore, be concluded that the interactional effect of cognitive rigidity and type of organization on immediate cued recall does exist.

F-ratio for interaction between locus of control orientation and type of organization is 5.10 which is also statistically significant at .05 level of confidence. The result indicates that there is an interactional effect of locus of control and type of organization on immediate cued recall. This interaction is illustrated through figure 1.2 in which the two values of the type of organization (i.e. superficial and semantic organization) are shown on the horizontal axis and the mean recall scores on the vertical axis. The lines connecting points 1 and 3 and points 2 and 4 represent mean recall scores.
INTERACTION: LOCUS OF CONTROL X TYPE OF ORGANIZATION ON IMMEDIATE CUED RECALL

Figure 1.2 —
of external and internal group of subjects, respectively; half of the subjects of each group served under superficial organization condition and other half served under semantic organization condition. These two lines, as can be seen in figure 1.2, are not parallel indicating significant interactional effect. Moreover, the magnitude of the difference, as given in Table-8(c), between the mean recall scores of external and internal subjects under superficial organization condition and semantic organization condition are markedly different.

These results lead us to conclude that interactional effect between locus of control and type of organization on immediate cued recall exists.

Table-8(c): Showing mean recall scores of external and internal subjects under superficial and semantic organization conditions and the differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Superficial organization</th>
<th>Semantic organization</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>10.86</td>
<td>12.06</td>
<td>1.20</td>
</tr>
<tr>
<td>Internal</td>
<td>11.16</td>
<td>13.33</td>
<td>2.17</td>
</tr>
</tbody>
</table>

By turning our attention to Table-7(c), we find that the interactional effect of cognitive rigidity, locus of control, and type of organization on immediate cued recall is insignificant ($F = 1.36, df = 1/119; P = NS$). To examine the nature of the
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON IMMEDIATE CUED RECALL

EXTERNAL

MEAN RECALL SCORES

16
12
8
4
0

superficial organization

X1 rigid
X2 flexible

X4
X3

semantic organization

TYPE OF ORGANIZATION

Figure 1-3 (a)—
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON IMMEDIATE CUED RECALL

Figure 1.3(b) —
interaction of cognitive rigidity \( x \) locus of control \( x \) type of organization, we have considered the cognitive rigidity \( x \) type of organization interaction for each level of locus of control orientation, as shown in Table-8(d).

Table-8(d): Showing two-way table of means for cognitive rigidity and type of organization for each level of locus of control

<table>
<thead>
<tr>
<th>Groups</th>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superficial organization</td>
<td>Superficial organization</td>
</tr>
<tr>
<td>Rigid</td>
<td>11.46</td>
<td>11.40</td>
</tr>
<tr>
<td>Flexible</td>
<td>10.26</td>
<td>10.93</td>
</tr>
<tr>
<td></td>
<td>11.60</td>
<td>12.00</td>
</tr>
<tr>
<td></td>
<td>12.53</td>
<td>14.44</td>
</tr>
</tbody>
</table>

The graphs for rigid and flexible subjects against type of organization for external locus of control are shown in Figure 1.3(a) and graphs for rigid and flexible subjects against type of organization for internal orientation are shown in Figure 1.3(b). It is evident from Figure 1.3(a) and 1.3(b) that the interaction between cognitive rigidity and type of organization for each of the two levels of locus of control orientation are of the same forms indicating lack of interaction among three variables. Thus it may be concluded that there is no interactional effect of cognitive rigidity, locus of control, and type of organization on immediate cued recall.

In order to study the differential effect of each independent variable on delayed cued recall, the word recall scores
Table-9(a): Showing recall scores obtained by eight groups of subjects in delayed cued recall test.

<table>
<thead>
<tr>
<th>No. of samples</th>
<th>Rigid External</th>
<th>Rigid Internal</th>
<th>Flexible External</th>
<th>Flexible Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control condition</td>
<td>Experimental</td>
<td>Control condition</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>14</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>13</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>12</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td>11</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>165</strong></td>
<td><strong>173</strong></td>
<td><strong>160</strong></td>
<td><strong>185</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>11.0</strong></td>
<td><strong>11.53</strong></td>
<td><strong>10.66</strong></td>
<td><strong>12.33</strong></td>
</tr>
</tbody>
</table>
obtained by the eight groups of subjects in delayed cued recall were also analyzed by using 2x2x2 analysis of variance. The word recall scores obtained by the eight groups of subjects, their mean recall scores, and F ratio are reported in Table-9(a), 9(b) and 9(c), respectively.

Table-9(b): Showing mean recall scores obtained by eight groups of subjects under delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Experimental condition</th>
<th>Control condition</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>10.83</td>
<td>11.93</td>
<td>11.38</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.13</td>
<td>12.96</td>
<td>12.04</td>
</tr>
<tr>
<td>External</td>
<td>11.16</td>
<td>11.73</td>
<td>11.44</td>
</tr>
<tr>
<td>Internal</td>
<td>10.80</td>
<td>13.16</td>
<td>11.98</td>
</tr>
<tr>
<td>Mean</td>
<td>10.98</td>
<td>12.44</td>
<td></td>
</tr>
</tbody>
</table>

Table-9(c): Summary of ANOVA for word recall scores obtained by the subjects under delayed cued recall.

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of square</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive rigidity (CR)</td>
<td>13.33</td>
<td>1</td>
<td>13.33</td>
<td>12.34</td>
<td>P &lt; .01</td>
</tr>
<tr>
<td>Locus of control (LOC)</td>
<td>8.53</td>
<td>1</td>
<td>8.53</td>
<td>7.89</td>
<td>P &lt; .01</td>
</tr>
<tr>
<td>Type of organization (TO)</td>
<td>64.53</td>
<td>1</td>
<td>64.53</td>
<td>59.75</td>
<td>P &lt; .01</td>
</tr>
<tr>
<td>CR x LOC</td>
<td>2.70</td>
<td>1</td>
<td>2.70</td>
<td>2.50</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>CR x TO</td>
<td>4.03</td>
<td>1</td>
<td>4.03</td>
<td>3.73</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>LOC x TO</td>
<td>24.30</td>
<td>1</td>
<td>24.30</td>
<td>22.50</td>
<td>P &lt; .01</td>
</tr>
<tr>
<td>CR x LOC x TO</td>
<td>3.31</td>
<td>1</td>
<td>3.31</td>
<td>3.06</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>Error:Within treatment</td>
<td>121.64</td>
<td>112</td>
<td>1.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>242.37</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A perusal of Table-9(c) reveals that F ratio for variation in cognitive rigidity is 12.34 which is significant at .01 level. The result suggests that rigidity and flexibility have differential effect on delayed cued recall. Ignoring locus of control and type of organization, we find in Table-9(b) that the mean of the means recall scores of rigid subjects is 11.38 and the mean of the means recall scores of flexible subjects is 12.04. Since the mean of the means recall scores obtained by the rigid subjects is markedly lower than the mean of the means recall scores of the flexible subjects, it may be concluded that cognitive rigidity has more pronounced detrimental effect on delayed cued recall than flexibility.

F ratio for variation in locus of control, as shown in Table-9(c), is 7.89 which is significant at .07 level. The result indicates that external and internal locus of control orientation have differential effect on delayed cued recall. Disregarding cognitive rigidity and type of organization variations, the mean of the means recall scores of external subjects (M = 11.44), as shown in Table-9(b), is much lower than the mean of the means recall scores of internal subjects (M = 11.98). It is, therefore, concluded that external subjects show significantly poorer recall performance than their internal counterparts under delayed cued recall test.

F ratio for type of organization variation is 59.75 which is statistically significant at .01 level of confidence (Ref. Table-9c). It suggests that the type of organization
(i.e. superficial and semantic organization), adopted by the subjects, has differential influence on delayed cued recall. Disregarding cognitive rigidity and locus of control variables, we find in Table-9(b) that the mean of the means recall scores under superficial organization condition \((M = 10.98)\) is much lower than the mean of the means recall scores under semantic organization condition \((M = 12.44)\). The result indicates that the subjects under superficial organization condition, irrespective of their personality dispositions, show poorer recall performance than the subjects under semantic organization in delayed cued recall test.

Table-9(c) reveals that the F ratio for interactional effect of cognitive rigidity and locus of control on delayed cued recall is 2.50 which is insignificant. The result suggests that there is no interactional effect between cognitive rigidity and locus of control on delayed cued recall. The result is presented graphically in Figure-2.0. In Figure 2.0, the two values of locus of control orientation (i.e. external & internal) are shown on the horizontal axis and the mean recall-recall scores on the vertical axis. The line connecting points 1 and 3 represents mean recall scores of rigid subjects; half of them were external and other half were internal. The line that connects points 2 and 4 represents mean recall scores of flexible subjects; half of them were external and remaining half were internals. The two lines drawn in Fig.2.0 are approximately parallel indicating lack of interaction between cognitive rigidity
INTERACTION: COGNITIVE RIGIDITY X LOCUS OF CONTROL ON DELAYED CUED RECALL

Figure 2.0 —
and locus of control on delayed cued recall. The same conclusion may be drawn by comparing differences in mean recall scores obtained by the four groups of subjects, namely, rigid-external, rigid-internal, flexible-external and flexible-internal subjects in delayed cued recall. These differences are presented in Table-10(a).

Table-10(a): Showing mean recall scores obtained by the four groups in delayed cued recall and differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>External</th>
<th>Internal</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>11.26</td>
<td>11.49</td>
<td>0.23</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.63</td>
<td>12.48</td>
<td>0.83</td>
</tr>
<tr>
<td>Difference</td>
<td>0.37</td>
<td>0.97</td>
<td></td>
</tr>
</tbody>
</table>

It is evident from Table-10(a) that the difference between the mean recall scores obtained by rigid-external and rigid-internal is more/less the same as the difference between the mean recall scores obtained by flexible-external and flexible-internal subjects. Moreover, we find in Table-10(a) the same pattern when we compare the differences in the other direction.

Similarly, the interactional effect of cognitive rigidity and type of organization on delayed cued recall is also not significant. The F ratio, as given in Table-9(c), for interaction between rigidity x type of organization is 3.73 which fails
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON DELAYED CUED RECALL

Figure 2-1—
to reach at any conventional level of significance \( P > 0.05 \). The result is presented graphically in Figure-2.1.

In Figure 2.1, the two values of type of organization, that is, superficial organization and semantic organization, are shown on the horizontal axis and the mean recall scores on the vertical axis. The line connecting points 1 and 3, represents the mean recall scores of rigid subjects, half of them served under superficial organization and other half under semantic organization conditions. The line through points 1 and 2 represents the mean recall scores of flexible subjects; half of the subjects served under superficial organization and remaining half served under semantic organization conditions. These two lines are nearly parallel showing lack of interaction between cognitive rigidity and type of organization. The mean recall scores plotted in Fig.2.1 are specified in the cells of the Table-10(b).

Table-10(b): Showing mean recall scores obtained by rigid and flexible subjects under superficial and semantic organization conditions and the differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Superficial organization</th>
<th>Semantic organization</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>10.83</td>
<td>11.93</td>
<td>1.10</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.13</td>
<td>12.96</td>
<td>1.83</td>
</tr>
<tr>
<td>Difference</td>
<td>0.30</td>
<td>1.03</td>
<td></td>
</tr>
</tbody>
</table>
Table-10(b) shows that the difference between mean recall score of rigid and flexible subjects under superficial organization (i.e. 0.30) is not much different from the difference between the mean recall score of rigid and flexible subjects under semantic organization (i.e. 1.03). Similarly, the differences in other direction are also nearly the same (i.e. 1.10 and 1.83) indicating lack of interaction between cognitive rigidity and type of organization. We may, therefore, conclude that the interaction between cognitive rigidity and type of organization does not exist on delayed cued recall.

F ratio for interaction between locus of control and type of organization is 22.5 (Ref. Table-9c) which is highly significant at .01 level of confidence. The result clearly reveals that there is an interactional effect of locus of control and type of organization on delayed cued recall. The result is presented graphically in Fig.2.2 and the mean recall scores plotted in the figure are presented in the cells of Table-10(c).

In Figure 2.2, the two values of type of organization (i.e. superficial and semantic organization) are shown on the horizontal axis and the mean recall scores are presented on the vertical axis. The line that connects point 1 and 3 represents the recall performance of the external subjects, half of them served under superficial organization condition and other half served under semantic organization condition. The line through points no. 2 and 4 represents the mean recall performance of the
INTERACTION: LOCUS OF CONTROL X TYPE OF ORGANIZATION ON DELAYED CUED RECALL

Figure 2.2 —
internal subjects, half of them served under superficial organization condition and remaining half served under semantic organization condition. The two lines, as shown in Fig. 2.2, are not parallel rather they cross each other indicating the existence of interaction between locus of control and type of organization on delayed cued recall.

Table-10(c): Showing mean recall scores obtained by external and internal subjects under superficial and semantic organization conditions and the differences in their mean recall scores.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Superficial organization</th>
<th>Semantic organization</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>11.16</td>
<td>11.73</td>
<td>0.57</td>
</tr>
<tr>
<td>Internal</td>
<td>10.79</td>
<td>13.16</td>
<td>2.37</td>
</tr>
<tr>
<td>Difference</td>
<td>0.37</td>
<td>1.43</td>
<td></td>
</tr>
</tbody>
</table>

Table-10(c) clearly reveals that the difference between the mean recall scores of external and internal subjects under superficial organization condition (i.e. 0.37) is markedly lower than the difference between mean recall scores of external and internal subjects under semantic organization condition (i.e. 1.43). The same conclusion may also be drawn by comparing differences in the other direction, i.e. 0.57 and 2.37 are much different. The result leads us to conclude that there is an interactional effect of locus of control and type of organization on delayed cued recall.
F-ratio for cognitive rigidity x locus of control x type of organization interaction is 3.06 which is statistically not significant (P > .05). To examine the nature of the interactional effect of cognitive rigidity, locus of control, and type of organization on delayed cued recall, we have considered the cognitive rigidity x type of organization interaction for each level of locus of control orientation (i.e. external and internal) separately as shown in Table-10(d), Fig. 2.3(a), & 2.3(b).

Table-10(d): Showing two-way table of means for cognitive rigidity x type of organization for each level of locus of control.

<table>
<thead>
<tr>
<th>Groups</th>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superficial organization</td>
<td>Semantic organization</td>
</tr>
<tr>
<td>Rigid</td>
<td>11.00</td>
<td>11.53</td>
</tr>
<tr>
<td>Flexible</td>
<td>11.33</td>
<td>11.93</td>
</tr>
</tbody>
</table>

The graphs for rigid and flexible subjects against type of organization for external locus of control are shown in Fig. 2.3(a) and graphs for rigid and flexible subjects against type of organization for internal locus of control orientation are shown in Fig. 2.3(b). Since the interaction between cognitive rigidity x type of organization, as evident from Fig. 2.3(a) & 2.3(b), for each of the two levels of locus of control (i.e. external and internal) are nearly similar, we may conclude that
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON DELAYED CUED RECALL

EXTERNAL

**Figure 2.3(a)** —
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON DELAYED CUED RECALL

Figure 2.3(b) —
the interactional effect of cognitive rigidity, locus of control, and type of organization on delayed cued recall does not exist.

The present research, as mentioned in chapter II, was also designed to determine the differential effect of each independent variable, namely, cognitive rigidity, locus of control, and type of organization on immediate and delayed cued recall. For this purpose F ratios were calculated for the difference between immediate and delayed cued recall scores.

To calculate the F ratios for the difference between immediate and delayed cued recall scores, a difference between immediate cued recall scores and delayed cued recall scores for each group under corresponding conditions was obtained. In order to eliminate minus-plus algebraic signs a constant 4 was added to each difference.

The difference between immediate cued recall scores and delayed cued recall scores and their mean scores are given in Table-11.0 and Table-12(a) respectively. The summary of analysis of variance (F ratios) for the difference is reported in Table-12(b).
Table-11: Showing difference between immediate and delayed cued recall scores for each of the four groups under corresponding conditions.

<table>
<thead>
<tr>
<th></th>
<th>Rigid</th>
<th></th>
<th>Flexible</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
<td>External</td>
<td>Internal</td>
<td></td>
</tr>
<tr>
<td>EC</td>
<td>Ct 4</td>
<td>CC</td>
<td>Ct 4</td>
<td>EC</td>
<td>Ct 4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>-1</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>7</td>
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<tr>
<td>1</td>
<td>5</td>
<td>-1</td>
<td>3</td>
<td>-3</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>-1</td>
<td>3</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>-2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>-2</td>
<td>2</td>
<td>-1</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>-1</td>
<td>3</td>
<td>-2</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>-2</td>
<td>2</td>
<td>-2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>-2</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 67 61 71 55 44 69 60 70
Mean 4.47 4.07 4.73 3.67 2.93 4.60 4.0 4.67

EC = Experimental condition; CC = Control condition; Ct 4 = Constant 4
Table-12(a): Showing mean of the difference between immediate and delayed cued recall scores for each of the eight groups of subjects.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Experimental condition</th>
<th>Control condition</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>4.60</td>
<td>3.87</td>
<td>4.24</td>
</tr>
<tr>
<td>Flexible</td>
<td>3.47</td>
<td>4.63</td>
<td>4.05</td>
</tr>
<tr>
<td>External</td>
<td>3.70</td>
<td>4.33</td>
<td>4.02</td>
</tr>
<tr>
<td>Internal</td>
<td>4.37</td>
<td>4.17</td>
<td>4.27</td>
</tr>
<tr>
<td>Mean</td>
<td>4.04</td>
<td>4.25</td>
<td></td>
</tr>
</tbody>
</table>

Table-12(b): Showing ANOVA for the difference of immediate and delayed cued recall scores.

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of square</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Rigidity(CR)</td>
<td>1.01</td>
<td>1</td>
<td>1.01</td>
<td>0.43</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>Locus control (LOC)</td>
<td>1.88</td>
<td>1</td>
<td>1.88</td>
<td>0.79</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>Type of organization(TO)</td>
<td>1.41</td>
<td>1</td>
<td>1.41</td>
<td>0.59</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>CR x LOC</td>
<td>3.01</td>
<td>1</td>
<td>3.01</td>
<td>1.28</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>CR x TO</td>
<td>27.08</td>
<td>1</td>
<td>27.08</td>
<td>11.47</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>LOC x TO</td>
<td>5.21</td>
<td>1</td>
<td>5.21</td>
<td>2.21</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>CR x LOC x TO</td>
<td>0.21</td>
<td>1</td>
<td>0.21</td>
<td>0.08</td>
<td>P &gt; 0.05</td>
</tr>
<tr>
<td>Error: Within treatments</td>
<td>264.78</td>
<td>112</td>
<td>2.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>304.59</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A perusal of Table-12(b) clearly reveals that the F ratio for variation in cognitive rigidity-flexibility is 0.43 which is insignificant. The result shows that rigidity-flexibility has no differential effect on immediate and delayed cued recall. Disregarding locus of control and type of organization variables, we find in Table-12(a) that the mean of the means recall score of rigid subjects (M = 4.24) is slightly higher than the mean of the means recall score of flexible subject (M = 4.05). The difference between the two means is too small to be statistically significant. We may, therefore, conclude that cognitive rigidity does not affect immediate and delayed cued recall differentially. However, the means for the two groups suggest that rigid subjects perform slightly better in immediate cued recall than in delayed cued recall, whereas flexible subjects perform slightly better in delayed cued recall than in immediate cued recall, though the differences are statistically insignificant. To be more clear, we may note here that delayed cued recall scores were subtracted from immediate cued recall scores and a constant of 4 was added in each difference. Thus the minimum difference between immediate and delayed cued recall scores would be 4. A larger difference would show facilitative effect on immediate cued recall and adverse effect on delayed cued recall. On the contrary, smaller difference would reveal detrimental effect on immediate cued recall but facilitative effect on delayed cued recall.

F ratio for variation in locus of control orientation is 0.79 (Table-12b) which fails to reach at any conventional level
of significance ($P > .05$) indicating insignificant differential
effect of external-internal locus of control orientations on
immediate and delayed cued recall. Ignoring cognitive rigidity
and type of organization variables, the mean of the means recall
score of external subjects, as shown in Table-12(a), is 4.02
and the mean of the means recall score of flexible subjects is
4.27. The difference between the two means is negligible.
Though not statistically significant, the mean of the means
recall scores of the two groups show that the recall performance
of the external subjects is poorer in immediate cued recall
test than in delayed cued recall test. Internal subjects, on
the other hand, exhibit better recall performance in immediate
cued recall test than in delayed cued recall test.

Table-12(b) also shows that the differential effect of
the type of organizations on immediate and delayed cued recall
is also not significant ($F = .02, \text{df} = 1/119, P > .05$). The
result indicates that the type of organization (superficial &
semantic organization), adopted by the subjects, has no differen­
tial effect on immediate and delayed cued recall. Ignoring
cognitive rigidity and locus of control variables, we find in
Table-12(a) that the mean of the means recall scores under
superficial organization is 4.04 and the mean of the means
recall score under semantic organization is 4.25. Since the
difference between the two means is negligible, it may safely
be concluded that superficial and semantic organizations have
no differential effect on immediate and delayed cued recall.
It is also evident from Table-12(b) that the interactional effect of cognitive rigidity and locus of control on the difference of immediate and delayed cued recall is insignificant ($F = 1.28, df = 1/119, P > .05$). It indicates that no interaction exists between cognitive rigidity and locus of control orientation on the difference of immediate and delayed cued recall.

The interactional effect of cognitive rigidity and type of organization is significant. $F$ ratio for interaction between cognitive rigidity and type of organization is 11.47 which is highly significant at .01 level of confidence. The result shows that interactional effect between cognitive rigidity and type of organization on the difference of immediate and delayed cued recall does exist which indicates dependency of the effect of cognitive rigidity on type of organization and vice-versa. The significant interaction between cognitive rigidity and type of organization is also presented graphically (Figure 3).

In Figure 3, the two type of organization (i.e. superficial and semantic organization) are shown on the horizontal axis. The mean recall scores obtained by the four groups are presented on the vertical axis. The line connecting points 1 and 3 represents mean recall scores obtained by rigid subjects; half of them served under superficial organization condition and other half served under semantic organization condition. Similarly, the line through points 2 and 4 represents the recall
INTERACTION: COGNITIVE RIGIDITY X TYPE OF ORGANIZATION ON THE DIFFERENCE OF IMMEDIATE AND DELAYED CUED RECALL SCORES

Figure 3.0
performance of flexible subjects, half of them served under superficial organization condition and remaining half served under semantic organization condition. The two lines, as shown in Figure 4, are not parallel rather they cross each other indicating that the interaction between cognitive rigidity and type of organization exists on the difference of immediate and delayed cued recall.

F ratio for interaction between locus of control and type of organization, as shown in Table-12(b) is 2.21 which is insignificant. The result suggests that there is no interactional effect of locus of control and type of organization on the difference of immediate and delayed cued recall. Similarly F ratio for interaction among cognitive rigidity, locus of control, and type of organization is 0.08 which is also statistically insignificant (P>.05). The result shows that the interactional effect of cognitive rigidity x locus of control x type of organization on the difference between immediate and delayed cued recall does not exist.

As mentioned in chapter II and chapter III (Question No.14 & 15), the present research is also purported to compare the organizational strategies and recall performance of rigid subjects with those of external subjects and of flexible subjects with those of internal subjects in both immediate and delayed cued recall. For this purpose, the mean superficial and semantic organization scores obtained by rigid and external
subjects in immediate and delayed cued recall were compared with the help of t-test, which are given in Table-13 and Table-14, respectively.

Table-13: Showing comparison of mean superficial and semantic organization scores obtained by rigid and external subjects in immediate cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization score</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean semantic organization scores</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>9.90</td>
<td>0.80</td>
<td></td>
<td>10.4</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.08</td>
<td></td>
<td></td>
<td>P&lt;.05</td>
</tr>
<tr>
<td>External</td>
<td>9.40</td>
<td>1.07</td>
<td></td>
<td>10.5</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P&gt;.05</td>
</tr>
</tbody>
</table>

It is evident from Table-13 that the mean superficial organization score \(M = 9.90\) obtained by rigid subjects is markedly higher than the mean superficial organization score \(M = 9.40\) obtained by external subject and the difference between the two means is statistically significant at .05 level of confidence \(t = 2.08, P<.05\). It is, therefore, concluded that rigid subjects are more susceptible to superficial perceptual features (i.e. colour organization) of the list than those of external subjects in immediate cued recall. On the contrary, the mean semantic organization score obtained by rigid subjects, as shown in Table-13, is 10.4 and the mean semantic organization score obtained by external subjects is 10.5. The
t-value for these two mean is 0.43 which is insignificant. The result leads us to conclude that rigid and external subjects do not differ with respect to semantic organization.

The mean superficial and semantic organization scores obtained by rigid and external subjects in delayed cued recall and their significance of differences are reported in Table-14.

Table-14: Showing comparison of mean superficial and semantic organization scores of rigid and external subjects in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization scores</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean semantic organization scores</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>8.96</td>
<td>0.99</td>
<td>1.25</td>
<td>10.10</td>
<td>0.84</td>
<td>0.83</td>
</tr>
<tr>
<td>External</td>
<td>9.30</td>
<td>1.09</td>
<td></td>
<td>9.96</td>
<td>0.83</td>
<td></td>
</tr>
</tbody>
</table>

Table-14 reveals that the mean superficial organization score (M = 9.30) obtained by external subjects is slightly higher than the mean superficial organization score (M = 8.96) obtained by rigid subjects. The t-value is 1.25 which fails to reach at conventional level of significance (t = 1.25, P > .05). Thus we may conclude that the external and rigid subjects do not differ with respect to superficial organization. In other words, both groups of subjects are equally susceptible to superficial
organization in delayed cued recall. So far as semantic organization is concerned, we find in Table-14, that the mean semantic organization score obtained by rigid subjects is 10.10 and the mean semantic organization score obtained by external subjects is 9.96. The t-value is 0.66 which is insignificant. On the basis of the mean semantic organization score obtained by rigid and external subjects and their t-value, it may safely be concluded that rigid and external subjects do not differ with respect to semantic organization in delayed cued recall. It appears that rigid subjects encode semantic features of the list as extensively as that of external subjects in delayed cued recall.

The mean recall scores obtained by rigid and external subjects under experimental condition (superficial organization) and control condition (semantic organization) in immediate and delayed cued recall were also compared with the help of t-test, the summary of which is presented in Table-15 and Table-16, respectively.

Table-15: Showing comparison of mean recall scores obtained by rigid and external subjects under superficial and semantic organization in immediate cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean recall scores with superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean recall scores under semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>11.43</td>
<td>1.45</td>
<td>1.67</td>
<td>11.80</td>
<td>1.32</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P&gt;.05</td>
<td></td>
<td></td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>External</td>
<td>10.86</td>
<td>1.16</td>
<td></td>
<td>12.06</td>
<td>1.39</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table-15 the mean recall score obtained by rigid subjects under superficial organization condition is 11.43 and the mean recall score obtained by external subjects under the same condition is 10.86. The t-value is 1.67 which is insignificant. The result leads us to conclude that rigid and external subjects do not differ in their recall performance under superficial organization condition. So far as recall performance under semantic organization condition is concerned, we find in Table-15, that the mean recall score obtained by rigid subjects is 11.80 and the mean recall score obtained by external subjects is 12.06 and the t-value is 0.75 which is insignificant. Since the difference between the two means is negligible and its corresponding t-value is statistically insignificant, it may be concluded beyond any doubt that rigid and external subjects do not differ in their recall performance under semantic organization condition too. In short, the results have demonstrated that rigid and external subjects do not differ in their recall performance whether they served under superficial organization condition or under semantic organization condition.

Similarly, the mean recall scores obtained by rigid and external subjects under superficial and semantic organization conditions in delayed cued recall and t-values are given in Table-16.
Table-16: Showing comparisons of mean recall scores obtained by rigid and external subjects under superficial and semantic organization condition in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean recall scores under superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean recall scores under superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid</td>
<td>10.83</td>
<td>1.08</td>
<td>1.32</td>
<td>11.93</td>
<td>1.25</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P&gt;.05</td>
<td></td>
<td></td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>External</td>
<td>11.16</td>
<td>0.87</td>
<td></td>
<td>11.73</td>
<td>1.26</td>
<td></td>
</tr>
</tbody>
</table>

It is apparent from Table-16 that the mean recall score obtained by rigid subjects under superficial organization condition is 10.83 and the mean recall score obtained by external subjects under the same condition is 11.16. The t-value is 1.32 which is statistically insignificant. The result indicates that rigid and external subjects do not differ significantly with respect to their recall performance under superficial organization condition in delayed cued recall.

We also find in Table-16 that the mean recall score obtained by rigid subjects under semantic organization condition is 11.93 and the mean recall score obtained by flexible subjects under the same condition is 11.73. The t-value is 0.62 which is insignificant indicating no reliable difference between the mean recall scores obtained by rigid and external subjects under semantic organization condition in delayed cued recall.
In order to examine whether or not flexible and internal subjects differ with respect to their superficial and semantic organization scores in immediate and delayed cued recall, the mean superficial and semantic organization scores obtained by flexible and internal subjects in immediate as well as delayed cued recall were compared by employing t-test. The results are presented in Table-17 and Table-18 respectively.

Table-17: Showing comparisons of mean superficial and semantic organization scores obtained by flexible and internal subjects in immediate cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean superficial organization scores</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean semantic organization scores</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>8.96</td>
<td>0.99</td>
<td></td>
<td>12.40</td>
<td>1.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
<td></td>
<td>0.36</td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>Internal</td>
<td>9.46</td>
<td>0.97</td>
<td></td>
<td>12.23</td>
<td>1.83</td>
<td></td>
</tr>
</tbody>
</table>

Table-17 shows that the mean superficial organization score obtained by flexible subjects is 8.96 and the mean superficial organization score obtained by internal subjects is 9.46. The t-value is 2.0 which is not significant (P>.05). The result lead us to conclude that flexible and internal subjects do not differ with respect to superficial organization in immediate cued recall. Similarly, the mean semantic organization score obtained by flexible subjects as shown in Table-17 is 12.40
and the mean semantic organization score obtained by internal subjects is 12.23. The t-value is 0.37 which is insignificant. Since the difference between the two means is quite negligible and its corresponding t-value is statistically insignificant \((t = 0.37, P > 0.05)\), it may be concluded that flexible and internal subjects do not differ with respect to semantic organization in immediate cued recall.

The mean superficial and semantic organization scores obtained by flexible and internal subjects in delayed cued recall and their significance of difference are given in Table 18.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Superficial organization scores</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean Semantic organization scores</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>9.23</td>
<td>0.89</td>
<td>1.44</td>
<td>11.06</td>
<td>1.57</td>
<td>0.36</td>
</tr>
<tr>
<td>Internal</td>
<td>8.90</td>
<td>0.88</td>
<td></td>
<td>11.20</td>
<td>1.45</td>
<td></td>
</tr>
</tbody>
</table>

It is evident from Table-18 that the mean superficial organization score obtained by flexible subjects \((M = 9.23)\) is slightly higher than the mean superficial organization score obtained by internal subjects \((M = 8.90)\). The t-value, however,
is 1.44 which is statistically insignificant (P > .05). The result, therefore, indicates that flexible and internal subjects do not differ significantly with respect to superficial organization in delayed cued recall. Similarly, the mean semantic organization score, as shown in Table-18, obtained by flexible subjects is 11.06 and the mean semantic organization score obtained by internal subjects is 11.20. The t-value is 0.36 which is statistically insignificant. The result reveals that flexible and internal subjects also do not differ with respect to semantic organization in delayed cued recall.

The mean recall scores obtained by flexible and internal subjects under superficial and semantic organization conditions in immediate and delayed cued recall were also compared with the help of t-test, the summary of which is reported in Table-19 and Table-20 respectively.

Table-19: Showing comparisons of mean recall scores obtained by flexible and internal subjects under superficial and semantic organization in immediate cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean recall scores under superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean recall scores under semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>10.60</td>
<td>0.81</td>
<td>2.11</td>
<td>13.60</td>
<td>1.43</td>
<td>0.67</td>
</tr>
<tr>
<td>Internal</td>
<td>11.16</td>
<td>1.22</td>
<td>P &lt; .05</td>
<td>13.33</td>
<td>1.67</td>
<td>P &gt; .05</td>
</tr>
</tbody>
</table>
As evident from Table-19 that the mean recall scores obtained by flexible subjects under superficial organization condition \( (M = 10.60) \) is markedly lower than the mean recall score obtained by internal subjects \( (M = 11.16) \) under the same condition. The t-value is 2.11 which is statistically significant at .05 level of confidence. The result indicates that flexible subjects show poorer recall performance than those of internal subjects under superficial organization condition in immediate cued recall. So far as recall performance under semantic organization is concerned, we find in Table-19 that the mean recall score obtained by flexible subject is 13.60 and the mean recall score obtained by internal subjects is 13.33. The t-value is 0.67 which is insignificant \( (P> .05) \). Since the difference between the two means is too small to be statistically significant, it may be concluded that flexible and internal subjects do not differ in their recall performance under semantic organization condition in immediate cued recall.

The mean recall scores obtained by flexible and internal subjects under superficial and semantic organization conditions in delayed cued recall are reported in Table-20.
Table-20: Showing comparisons of mean recall scores obtained by flexible and internal subjects under superficial and semantic organization conditions in delayed cued recall.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean recall scores under superficial organization</th>
<th>S.D.</th>
<th>t-value</th>
<th>Mean recall scores under semantic organization</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>11.13</td>
<td>0.77</td>
<td>1.44</td>
<td>12.96</td>
<td>1.47</td>
<td>0.56</td>
</tr>
<tr>
<td>Internal</td>
<td>10.80</td>
<td>0.99</td>
<td>P&gt;0.05</td>
<td>13.16</td>
<td>1.29</td>
<td>P&gt;0.05</td>
</tr>
</tbody>
</table>

Table-20 shows that the mean recall score obtained by flexible subjects under superficial organization condition is 11.13 and the mean recall score obtained by internal subjects under the same condition is 10.80. The t-value is 1.44 which is insignificant (P>0.05) indicating no reliable difference between mean recall scores obtained by flexible and internal subjects under superficial organization condition in delayed cued recall. Similarly, the mean recall score obtained by flexible subjects, (M = 12.96) under semantic organization condition also does not differ significantly with that of mean recall score obtained by internal subjects (M = 13.16) under the same condition. The t-value is 0.56 which is insignificant (Ref. Table-20). The result clearly reveals that flexible and internal subjects do not differ in their recall performance under both superficial and semantic organization conditions in delayed cued recall.
In short, it has been demonstrated that flexible and internal subjects do not differ in their recall performance either under superficial organization condition or under semantic organization condition in delayed cued recall. It appears that flexible subjects encode superficial and semantic features of the list as extensively as encoded by internal subjects in delayed cued recall.

The discussion and implications of the results and suggestions for future research are given in the next chapter.
CHAPTER - V

DISCUSSION AND CONCLUSION
DISCUSSION AND CONCLUSION

The findings of the present research are as follows:

1. Rigid subjects encode superficial perceptual features of the list more extensively than the flexible subjects in immediate cued recall. Flexible subjects, on the other hand, encode semantic features of the list more extensively than the rigid subjects.

2. Rigid and flexible subjects do not differ with respect to superficial organization of the material in delayed cued recall. However, flexible subjects encode semantic categories of the list more extensively than rigid subjects in delayed cued recall.

3. External and internal subjects do not differ with respect to superficial organization of the material in immediate cued recall. Internal subjects, on the other hand, organize the information using semantic categories of the list more extensively than those of external subjects in immediate cued recall.

4. Like immediate cued recall, there is no difference between external and internal subjects with respect to superficial organization in delayed cued recall. Similarly, internal subjects encode semantic features of the list more extensively than externals in delayed cued recall.
5. Rigid subjects show poorer immediate cued recall than flexible subjects.

6. External subjects show poorer immediate cued recall than internal subjects.

7. Recall performance of the subjects, irrespective of their personality dispositions, is poorer with superficial organization than with the semantic organization in immediate cued recall.

8. There are interactional effects of cognitive rigidity x locus of control, cognitive rigidity x type of organization on immediate cued recall. However, there is no interactional effect among cognitive rigidity x locus of control x type of organization on immediate cued recall.


10. External subjects also show poorer recall than internal subjects in delayed cued recall.

11. Superficial organization of the material results in poorer recall performance than the semantic organization of the material in delayed cued recall.

12. All the interactional effects except locus of control x type of organization on delayed cued recall are statistically insignificant.

13. Cognitive rigidity-flexibility has no differential effect on immediate and delayed cued recall.
14. External-internal locus of control orientations have no differential effect on immediate and delayed cued recall.

15. Type of organizations (i.e., superficial and semantic organization) has no differential effect on immediate and delayed cued recall.

16. All the interactional effects except cognitive rigidity x type of organization on the difference of immediate and delayed cued recall are statistically insignificant.

17. Rigid subjects are more susceptible to superficial perceptual features of the list than those of external subjects in immediate cued recall. However, rigid and external subjects do not differ with respect to semantic organization in immediate cued recall.

18. In delayed cued recall, rigid and external subjects neither differ with respect to superficial organization nor with respect to semantic organization.

19. Rigid and external subjects do not differ in immediate cued recall either under superficial organization condition or under semantic organization condition.

20. Rigid and external subjects also do not differ in their delayed cued recall either under superficial organization condition or under semantic organization condition.

21. Flexible and internal subjects neither differ with respect to superficial nor with respect to semantic organization in immediate cued recall.
22. In delayed cued recall also flexible and internal subjects do not differ either with respect to superficial organization or with respect to semantic organization.

23. Flexible subjects show poorer recall performance than internal subjects under superficial organization but under semantic organization condition flexible and internal subjects do not differ in immediate cued recall.

24. In delayed cued recall, flexible and internal subjects do not differ in their recall performance either under superficial organization condition or under semantic organization condition.

The first two findings of the present research, i.e., rigid subjects encode superficial features of the list more extensively than the flexible subjects in immediate cued recall and they do not differ in delayed cued recall and that flexible subjects encode semantic features of the list more extensively than the rigid subjects in both immediate and delayed cued recall, though consistent with the findings recently obtained by Alam (1985), may be explained in terms of the nature of the cognitive rigidity-flexibility personality dispositions as well as in terms of the nature of the colour clustering.

As mentioned elsewhere rigid subjects, by their very nature, show the tendency to perseverate or resist to any change in mental sets, habits, beliefs, mode of thinking, and behaviour even when they are no longer appropriate. For this reason they
are not able to make efficient use of effortful learning processes (Tyler, Hertel, McCellum, and Ellis, 1979; Hasher and Zachs, 1979). Thus in experimental condition when given an option to encode both semantic and superficial features, rigid subjects might have concentrated on more obvious superficial perceptual features of the list (i.e. colour) and did not try to determine more effective and relevant way of organizing the information (i.e. semantic features of the list). Flexible subjects, on the other hand, by their nature, might be more efficient in the use of effortful processes such as organization and consequently they organize the list using more effective semantic features. Hence rigid subjects clustered more extensively by colour as compared to their flexible counterparts.

Under control condition where only clustering by semantic categories was possible, rigid subjects clustered less by semantic categories than flexible subjects. Here it may be recalled that the 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; Hasher & Zacks, 1979). Since rigid subjects as compared to flexible subjects were found to impose stereotypical representation upon incoming information and refrained from producing an assortment of hypotheses or strategies (Conden, Ellis & Feency, 1979), they are relatively less likely to be effective in reorganizing the incoming information and consequently they clustered less
by semantic categories than did the flexible subjects. These findings provide empirical support to the suggestion made by Hasher & Zacks (1979) and Leight & Ellis (1981) who suggested that rigidity in information processing is related to the inefficient use of effortful learning processes. Furthermore, these findings also provide empirical support to attentional-discrimination hypothesis proposed by Ellis and Franklin (1983) to account for differences between externals and internals in organizing the incoming informations. Our findings suggest that rigid subjects were readily distracted from more effective ways of encoding and organizing verbal information when given the opportunity to organize information according to superficial non-semantic categories. Rigid subjects were perhaps less effective in discriminating between semantic and less useful perceptual features of the list. Thus when presented words with a highly salient colour background which allowed for a simple mode of organization, rigids were more likely to seize upon this opportunity rather than search for more subtle semantic cues.

The fact that rigid and flexible subjects do not differ in superficial encoding at delayed cued recall suggest that clustering by colour is relatively a transitory phenomenon. This finding of the present research is in agreement with the findings obtained by Ellis & Franklin (1983) who have also demonstrated that clustering by colour is a transitory phenomenon.
The third and fourth findings of the present investigation, i.e., internal subjects organize the information using semantic categories of the list more extensively than those of external subjects in both immediate and delayed cued recall and that internals and externals do not differ with respect to superficial organization in immediate and delayed cued recall, are consistent with recent studies of individual differences in locus of control as they relate to cognitive processes. Numerous studies have suggested that internals make greater use of direct experience with problem material than do externals. Pines (1973), for example, has observed an orientation of internals towards actively seeking information for the solution of a problem which is greater than that evinced by externals. Wolk & Ducette (1974) has demonstrated that internals are more perceptually sensitive than externals. They have also reported that externals, relative to internals, possess a less active perceptual-attentive system and that the externals also fail to use this system as efficiently as possible, specially under the conditions of ambiguity. Similarly, Prociuk and Breen (1977) have found that internals are more active in seeking context-relevant information than are externals, and are likewise more successful at remembering such information. Thus the most general explanation of the finding in discussion lies in the original conception of the locus of control construct, namely, that externals are more ineffective than internals in distinguishing features of a task which portend reinforcement from those which do not. The failure to distinguish potentially
fruitful from fruitless or less optimal situations can obviously lead to the belief that what one does has little bearing upon one's fortunes. Thus when presented words with a highly salient colour background which allows for a simple mode of organization, externals are more likely to get satisfied with this opportunity rather than search for more effective semantic cues. This interpretation is consistent with the findings obtained by Seeman & Evans (1962), Seeman (1963), and Davis & Phares (1967) who have found that internals are more effective than externals in selectively remembering relevant information whereas externals fail to distinguish between relevant and irrelevant information.

These findings are also consonant with the findings obtained by Ellis and Franklin (1983) so far as semantic encoding is concerned. However, our findings with respect to superficial encoding done by externals and internals are inconsistent with the results obtained by Ellis and Franklin. These investigators have reported that internals encode the semantic features of the list more extensively than the externals whereas externals encode the superficial perceptual features of the list more extensively than the internals. We have also found that internals encode semantic features of the list more extensively than externals but we could not find any difference between externals and internals with respect to superficial encoding. This disparity in the results may simply due to the difference in testing conditions. It may be recalled that in Ellis & Franklin's study, subjects were given the option of organizing
information with both semantic and superficial perceptual features (i.e. 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 et al., 1979). It is reasonable to expect a different pattern of results if a different retention test is used in which colours and categories names are presented as retrieval cues. Thus we have presented names of the colours and categories as cues for organization and recall of the materials. The presence of these cues might have made the organization of the materials an easier task and we know that externals outperform internals on easier task (Juliau and Katz, 1968). Moreover, it has been found that internals show a preference for tasks in which high effort is a major determinant of outcome (Colwick, 1977). It may, therefore, be possible that presence of cues made internals to exert less cognitive effort and consequently encode the material without searching more relevant and effective features of the list. This mechanism may be responsible for the lack of difference between externals and internals with respect to superficial organization.

As stated in the preceding chapter, several investigators have regarded cognitive rigidity-flexibility, type of organization, and locus of control as potent determiners of learning and memory. The present research is, therefore, also designed to examine the differential effect of each independent variable on immediate and delayed cued recall. Thus in order to explain the findings no. 5 to 12 of the present investigation, we turn
our attention to Table-7(c) and 9(c). These Tables make it crystal clear that rigidity and flexibility have differential effect on immediate as well as delayed cued recall. It may be recalled from Tables 7(b) and 9(b) that the mean recall scores obtained by rigid subjects are markedly lower than the mean recall scores obtained by flexible subjects on both immediate and delayed cued recall tests. It was, therefore, concluded that rigidity as compared to flexibility has more pronounced adverse effect on immediate as well as on delayed cued recall. In other words, rigid subjects show poorer immediate and delayed cued recall than the flexible subjects. These findings are consistent with the results obtained by Cosden, Ellis & Feency (1979), and Hasher & Zacks (1979) who have demonstrated poorer recall of rigid subjects than those of flexible subjects. Cosden et al. (1979) have examined the effect of cognitive rigidity-flexibility in recall with perceptual grouping tasks and found that organizational processes involved in their task are influenced by the individual level of cognitive rigidity-flexibility. Further, they found that subjects classified as rigid on the basis of measures of cognitive rigidity-flexibility, showed impaired recall. Similarly, Hasher & Zacks (1979) and Leight and Ellis (1981) have reported that cognitive rigidity in information processing is related to the inefficient use of effortful learning processes. The results of the present study also provide partial support to the study conducted by Akhtar & Sowaid (1972) and Imam (1975) who have observed that rigidity has negative influence on incidental learning. Thus the findings of the
present research and also the findings obtained by Cosden et al. (1979) and Hasher & Zacks (1979) indicate that task-irrelevant cognitive activities associated with rigidity compete with task-relevant information for space in working memory. Since cognitive functioning associated with depression has been described as inflexible or rigid (Beck, 1967; Kovaes & Beck, 1978; Leight & Ellis, 1981), it is plausible to suggest that the poor memory associated with rigidity may be attributed to the inefficient use of effortful processes such as organization. This suggestion gains strength from the facts that the effects of rigidity in this study are somewhat analogous to the impaired recall of depressed subjects (Leight & Ellis, 1981). This rigidity of cognitive processes might be related to other explanatory constructs which have been associated with depressive psychological deficit such as learned helplessness (Miller & Seligman, 1975) and external locus of control (Hiroto, 1974; Misra, 1974; Leight & Ellis, 1981; Chaudhary, 1983,1986).

These findings are also consonant with the findings recently obtained by Alam (1986) and Alam & Saeeduzzafar (1987) who examined the effects of cognitive rigidity on immediate and delayed cued recall. These investigators have also found that rigid subjects show poorer recall performance than those of flexible subjects under immediate as well as delayed cued recall tests.

So far as the role of locus of control in immediate and delayed cued recall is concerned, we find in Table 7(b) & 7(c)
that external locus of control orientation has more pronounced
deterimental effect on both immediate and delayed cued recall
than internal locus of control orientation. That is, external
subjects show poorer immediate as well as delayed cued recall
than internal subjects. These findings of the present research
may be explained in terms of the characteristics of the cognitive
activity associated with external and internal orientations.
One of the most important characteristic of the cognitive
activity which distinguishes externals from internals is the
internals greater tendency to attend selectively to the relevant
aspect of the task at hand. The failure of selective attention
among externals is consistent with the findings obtained by
Sanders, Halcomb, Fray & Owen (1976) who found that internal
outperformed externals on a test of perceptual vigilance.
Secondly, the ability to engage a large proportion of the limited
capacity central processing system upon a particular task, which
has been described by Tyler, Hartel, 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 deter­
minant of later recall performance; greater effort leading to
higher recall. Since internal exert more cognitive effort, their
recall performance is expected to be better than those of
externals. Finally, internals as compared to externals are
considered as more highly motivated (Borland, 1975), more self-
confident (Neufeld, 1974) and try harder (Colwick, 1977; Agarwal
& Misra, 1986), one would, therefore, expect internals' recall
performance to be superior to external's across all conditions, irrespective of treatment. Our findings are consistent with these expectations and provide empirical support to the view that internals attend selectively to the relevant aspect of the task with greater cognitive effort and they are more inquisitive, curious, and efficient processors of information than are externals.

These findings of our research are also in agreement with the findings obtained by numerous investigators (Seeman & Evans, 1962; Seeman, 1963; Davis & Phares, 1967; Phares, 1968; Lefcourt & Wine, 1969; Pines, 1973; Wolk & Ducette, 1974; Sanders, Halcomb, Fray & Owens, 1976; Cohen & Lefcowick, 1977; Ellis & Franklin, 1983). These investigators have demonstrated that internals outperformed externals on various type of verbal and non-verbal tasks. Our findings also provide indirect support to the findings obtained by Young & Shorr (1986), Agrawal & Misra (1986) and Misra (1987) who have reported that internal locus of control is positively related to academic achievement.

Turning our attention to the results reported in Table 7(c) and 9(c), we find that colour and semantic organization have differential effect on immediate as well as on delayed cued recall. The mean recall scores under semantic organization condition, as shown in Table-7(b) and 9(b), are substantially higher than the mean recall scores under superficial organization condition in immediate and delayed cued recall. It is found that the recall performance of the subjects, irrespective of their personality
dispositions, under superficial organization condition is poorer than the recall performance under semantic organization condition in both immediate and delayed cued recall tests. The words presented over different colour backgrounds resulted in a suppression of clustering by semantic categories and reduced word recall.

These findings are consistent with the results obtained by Ellis & Franklin (1983) who reported that the degree of semantic organization is positively related to recall performance; in contrast, higher level of superficial organization is related to decreased recall. These results also provide indirect empirical support to the study conducted by Craik & LockLart (1972), Mascovitch & Craik (1976) and Hunt & Elliot (1980) who found that material processed at deeper, elaborated or more distinctive levels are more effectively encoded and retained than material encoded superficially.

There is an interactional effect of cognitive rigidity and locus of control on immediate cued recall but such interactional effect does not exist in delayed cued recall. In other words, rigid subjects who are also external show better immediate cued recall than flexible subjects who are also externally oriented but flexible subjects who are internally oriented show superior immediate cued recall than rigid subjects who are also internally oriented. That is, the effect of being flexible depresses performance for externally oriented subjects but facilitates performance for internally oriented subjects. The
difference in recall performance of rigid and flexible subjects depends on their locus of control orientation and vice-versa. In delayed cued recall, on the other hand, the recall performance of the subjects who are rigid and are flexible is essentially independent of their locus of control orientation. These findings reveal that cognitive rigidity and locus of control have independent effect on delayed cued recall but when these two variables are combined their effect disappears.

Similarly, an interactional effect of cognitive rigidity and type of organization is found in immediate cued recall but not in delayed cued recall. That is rigid subjects under superficial organization condition show better immediate cued recall than flexible subjects under the same condition. On the contrary, rigid subjects under semantic organization condition show poorer immediate cued recall than flexible subjects under semantic organization condition. In other words, the effect of being flexible depresses performance for superficial organization condition but facilitates performance for semantic organization condition. These results clearly demonstrate that rigid subjects cluster by colour while flexible subjects cluster by semantic features of the list. Since interactional effect does not exist in delayed cued recall, it becomes crystal clear that colour clustering by rigid subjects is a relatively transitory phenomenon.

It is interesting to note that we have found an interactional effect of locus of control and type of organization on both
immediate and delayed cued recall. That is external subjects under superficial organization condition show better immediate as well as delayed cued recall than internal subjects under the same condition. On the contrary, external subjects under semantic organization condition exhibit significantly inferior immediate and delayed cued recall performance than the internal subjects under same semantic organization condition. These results reveal that the effect of being internally oriented depresses performance for superficial organization condition but facilitates performance for semantic organization condition. On the basis of these results, it may be argued that externals cluster more by colour whereas internals cluster by semantic features of the material. Since an interactional effect between locus of control and type of organization exists in both immediate and delayed cued recall, it may safely be concluded that colour clustering by externals is not a transitory phenomenon. These findings also provide information regarding the cognitive activity of rigid and external subjects. More specifically, it has been found that colour clustering of rigid subjects declines on delayed test of retention while colour clustering of external subjects remains unaffected. Finally, we have not found interactional effect of cognitive rigidity, locus of control and type of organization on immediate as well as on delayed cued recall.

Another consideration which motivated the present investigator to undertake the present research, as mentioned in Chapter II & III, is to determine the differential effect of
each independent variable, i.e., cognitive rigidity, locus of control, and type of organization on the difference of immediate and delayed cued recall. Thus to discuss findings no. 13 to 16, we turn our attention to Table-12(a) & 12(b). The Table 12(b) clearly demonstrates that cognitive rigidity-flexibility has no differential effect on immediate and delayed cued recall. Though statistically insignificant, mean recall score of rigid subjects, as shown in Table 12(a), is slightly higher than the mean recall score of flexible subjects indicating that rigid subjects perform slightly better in immediate cued recall than in delayed cued recall whereas flexible subjects perform relatively better in immediate cued recall.

Similarly, locus of control has no differential effect on immediate and delayed cued recall. It may be recalled from Table-12(a) that the mean of the means recall scores obtained by external and internal subjects show that the recall performance of the external subjects is poorer, though statistically not significant, in immediate cued recall test than in delayed cued recall test. Internal subjects, on the other hand, exhibit better recall performance in immediate cued recall than in delayed cued recall.

Table-12(b) further reveals that colour and semantic organization also have no differential effect on immediate and delayed cued recall. Though statistically insignificant, a trend is found in favour of better immediate cued recall than delayed cued recall under semantic organization condition and better
delayed cued recall than immediate cued recall under superficial organization condition.

Moreover, all the interactional effect except cognitive rigidity and type of organization on the difference of immediate and delayed cued recall are insignificant. The interactional effect of cognitive rigidity and type of organization on the difference of immediate and delayed cued recall reveals that the difference between immediate and delayed cued recall for flexible subjects under superficial organization condition is lower than the difference in immediate and delayed cued recall for rigid subjects under the same superficial condition but the difference in immediate and delayed cued recall for flexible subjects under semantic organization condition is higher than the difference in immediate and delayed cued recall for rigid subjects under the same semantic condition.

These findings lead us to conclude that same processes operate in immediate and delayed cued recall which, in turn, favour the unitary system of human memory, i.e. STM-LTM continuum position. The findings are consistent with the findings obtained by Melton (1963) and Craik & Jacoby (1974) who have also demonstrated that same processes operate in short- and long-term memory.

It may be recalled that Ellis & Franklin (1983) examined the effect of having both a semantic and superficial perceptual category for organizing list of words in free recall, and also
examined the effects of a personality variable, locus of control, on susceptibility to superficial features. They found that subjects having external locus of control encoded the superficial perceptual features of the list more extensively and showed poorer free recall than internals. Alam (1986) and Alam & Saeeduzzafar (1987), on the other hand, have demonstrated that rigid subjects encoded superficial features and showed poorer cued recall than flexible subjects. An obvious question, therefore, arises whether or not external-internal and rigid-flexible subjects have similar characteristics of cognitive activity. More specifically, whether the organizational strategy adopted by external subjects and their recall performance are the same as that of rigid subjects and whether the organizational strategy and recall performance of internals are similar to flexible subjects. The present investigation also addressed to these issues. Findings number 17 to 24, as mentioned earlier, reveal that rigid subjects encode superficial features of the list more extensively than external subjects in immediate cued recall but they do not differ in delayed cued recall. They also do not differ with respect to semantic organization either in immediate or in delayed cued recall. Moreover, rigid and external subjects show more or less identical recall performance in immediate and delayed cued recall under both superficial and semantic organization conditions. On the other hand, flexible and internal subjects neither differ with respect to superficial nor with respect to semantic organization in both immediate and delayed cued recall. So far as recall performance in immediate
and delayed cued recall of flexible and internal subjects is concerned, the only difference in their recall performance is found in immediate cued recall under superficial organization condition, i.e., flexible subjects show poorer recall than internal subjects.

These findings lead us to postulate that externals and rigid subjects on the one hand, and internal and flexible subjects on the other, are similar in their cognitive functioning at least at the qualitative dimension. The cognitive processes of both type of individuals appear deficient, though the causes may be different. Thus it may be possible that externals encoded superficial features of the list more extensively due to their ineffectiveness in discriminating between semantic and less useful perceptual features. Rigid subjects, on the other hand, might have resorted to superficial organization due to their inefficient use of effortful learning processes and consequently they exceeded to externals in colour organization at least in immediate cued recall. This postulation is supported by Hiroto (1974) and Chaudhary (1983, 1985) who have reported that cognitive rigidity is positively related to external locus of control.

The overall findings of the present research have important implications for the role of personality and individual differences in processing information and memory. However, our results do not allow us to conclude whether or not the external and rigid subjects are unable to reject perceptual features, only that they
choose to select these features. Thus one interesting study would be to examine differences in cognitive rigidity-flexibility and internal-external orientations in information processing where the nonsemantic or perceptual dimension is completely confounded with conceptual category information. If the dimensions are redundant it would be interesting to see if rigids or externals still resort to more colour processing. Would Flexibles or internal even notice the colour? And would rigids or externals show much tendency to semantically organize the list?
SUMMARY
The study of organizational processes involved in learning of verbal items and their impact on memory has achieved special prominence in experimental psychology in recent years. Over the years there have been several, rather different, approaches to the problem of organization in memory. The term organization refers to the relations between to-be-remembered items. Bousfield (1953) defines organization "as the occurrence of sequences of related words presented in random orders for learning". Organization has also 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. Such organization occurs "when the output order of the item is governed by phonetic or semantic relations among the items or by subject's prior extra-experimental or intra-experimental acquaintance with the items constituting the list" (Tulving, 1968).

There are three paradigms which have frequently been used for the study of organization, namely, categorical organization, associative organization, and subjective organization. They differ primarily in the experimental treatment given for inducing clustering. The first two paradigms, i.e., categorical organization and associative organization, are similar in the sense that the basis of organization is determined by the experimenter.
Subjective organization, on the other hand, differs from the other two paradigms in that the basis of organization is not predetermined by the experimenter. Rather, the stimulus list is comprised of so called unrelated words, that is, a random sample of words in which the experimenter does not make any attempt to include words which are categorically or associatively related. However, most of the researches on organization in memory, including earlier studies of Bousfield, have been concerned with categorical organization based on semantic categories such as animals, bird, vegetables, professions, furnitures etc. and have demonstrated its facilitative effect on recall performance (Bousfield, 1953; Bousfield, & Bousfield, 1966; Robinson, 1966; Bousfield, & Cohen, 1953,1955,1956,1959; Bousfield, Puff & Cowan, 1964; Bousfield & Puff, 1964; Bruce & Reicher, 1966; Mandler, 1967,1972,1979; Oresanu, Lee & Scribner, 1979; Thomas & Bolton, 1979; Guenther, 1980; Koriate & Melkman, 1981; Ellis & Franklin, 1983; Agrawal & Misra, 1983; Hunt & Seta, 1984; Alam, 1986; Alam & Saeeduzzafar, 1987). These investigators by using categorical organization have reported that words belonging to the same category tend to cluster together in the subject's output which in turn facilitate the recall performance.

It has also been established that retrieval cues or reminders, specially if they are put into memory alongwith the to-be-remembered events, are important aids to memory (Dallett, 1964; Bilodeau, Fox & Blick, 1973; Tulving & Pearlstone, 1966; Earhard, 1967; Tulving & Osler, 1968;
Thomson & Tulving, 1970; Tulving & Thomson, 1973; Lauer, Sroby, & Battig, 1976; Mandler, 1979; Hunt & Seta, 1984; Alam, 1986). These researchers have observed that retrieval cues greatly facilitate recall performance. However, retrieval cues become more effective if they are present at both input and output phases of the task (Tulving & Osler, 1968; Lauer, & Sroby, 1976). Thus the researchers have documented the fact that retrieval cues like organization are also potent determiner of retention.

There is growing evidence that information is encoded more effectively if it is processed actively and effortfully and involves reorganization of the material (Ellis, Parente & Walker, 1974; Ellis, Parente, Grah & Spiering, 1975; Jacoby, 1978; Slamecka & Graf, 1978; Tyler, Hertel, McCallum & Ellis, 1979; Hasher & Zacks, 1979). Recently, Ellis and 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 a personality variable, i.e., locus of control, on the susceptibility to superficial features. When given an option to encode both semantic and superficial features, subjects with an external locus of control encoded superficial features more extensively than internals; in addition with this option, external showed poorer recall performance. Ellis & Franklin (1983) have proposed an "attentional-discrimination hypothesis" to account for the differences between externals and internals.
However, there may be an alternative explanation for the results obtained by Ellis and Franklin. It might be possible that subjects with an external locus of control were inefficient in the use of effortful learning processes such as organization and consequently they organize the list using less effective perceptual features. Since it has been established that inefficient use of effortful learning processes is related to cognitive rigidity (Tyler, Hertel, McCallum & Ellis, 1979; Hasher & Zacks, 1979; Leight & Ellis, 1981), the findings of Ellis & 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 considerable body of evidence to suggest that cognitive rigidity is an important determiner of retention. Cognitive rigidity has widely been used to refer to a tendency to perseverate or resist to any change in mental sets, habits, beliefs, mode of thinking and behaving even when they are no longer appropriate. It has been defined as "the inability to change one's set when the objective conditions demand it" (Rokeach, 1948), "as a tendency to perseverate and resist conceptual change, to resist the acquisition of new pattern of behaviour and to refuse to relinquish old and established patterns" (Shaie, 1955).

A through survey of literature reveals that a few studies have been conducted to examine the influence of cognitive rigidity as a personality variable on learning and memory.
Akhtar & Sowaid (1972) and Imam (1975), for example, found that rigidity is negatively associated with incidental learning. Cosden, Ellis, and Feeney (1979) demonstrated poorer recall of rigid subjects than those of flexible subjects, i.e., rigidity impaired recall. Similarly, Hasher & Zacks (1979) and Leight & Ellis (1981) observed that rigidity in information processing is related to the inefficient use of effortful learning processes. 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). These investigators have reported that the high and low rigid groups differed significantly in retroactive inhibition.

Recently, the present investigator (Alam, 1986; Alam & Saeeduzzafar, 1987) in a pilot study examined the effects of the presence of both superficial and semantic features of the lists on clustering in immediate and delayed cued recall, and also investigated the role of personality variable, cognitive rigidity, in the manner by which subjects organized material in both immediate and delayed cued recall. Alam (1986) and Alam & Saeeduzzafar (1987) found that rigid subjects encoded superficial perceptual features of the list more extensively than their flexible counterparts under both immediate and delayed cued recall tests. 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 tests. Further, rigid subjects showed poorer recall performance 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 poorer semantic organization and recall performance as that of rigid subjects. These observations suggest that beside rigidity-flexibility, some other personality variable may be responsible for superficial encoding and poorer recall of flexible subjects. The present research was undertaken to explore this personality variable. Since it has been suggested by several investigators that cognitive rigidity is positively related to other constructs such as learned helplessness (Miller & Seligman, 1975) and external locus of control (Hiroto, 1974; Leight & Ellis, 1981; Chaudhary, 1983, 1986), the personality variable selected to explain somewhat unexpected aspect of colour organization and poorer recall performance of flexible subjects, was that of locus of control.

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, person 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. Thus individuals having an internal locus of control subscribe to the view that individual's ability and effort and the reliance upon one's internal resources are the major determinants of performance. On the other hand, person with an external control orientation (externals), according to Rotter's social learning theory, are those who maintain the expectancy that reinforcement received are determined by factors beyond under their personal control such as fate, chance, social constraints, the complexities or unpredictability of the world.

The construct of locus of control, developed within the framework of Rotter's (1954, 1966) social learning theory, has stimulated a considerable amount of research which has, on the whole, substantiated the concept's usefulness in experimental psychology. A number of investigators have remarked that locus of control is an important predictor of cognitive processes such as attention, perception, learning, memory, and clustering (Seeman & Evans, 1962; Seeman, 1963; Rotter & Mulry, 1965; Davis, & Phares, 1967; Phares, 1968; Julian & Katz, 1968; Lefcourt & Wine, 1969; Lefcourt, Gronnerud, & McDonald, 1973; Pines, 1973; Pines & Julian, 1972; Williams & Stack, 1972; Lefcourt, 1972; Lefcourt, & Telegdi, 1971; Ducette & Wolk, 1973; Wolk & Ducette, 1974; Lefcourt, 1976; Phares, 1976; Sanders et al. 1976; Colwick, 1977; Cohen & Lefkowitz, 1977; Tyler et al. 1979; Rotter, 1979; Ellis & Franklin, 1983) and academic

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. In another study Seeman (1963) found that internals were more effective in selecting and retaining relevant information than externals. Phares (1968) also 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 & Wine (1969) reported that internals subjects were more likely to attend to cues which help to resolve uncertainties. In subsequent study, Lefcourt et al. (1973) observed that internals were more quicker at noticing changes in the condition about them and were also more quicker to respond to their perceptions than externals. Pines cited a number of studies suggesting that an orientation of internals towards actively seeking information for the solution of a problem is greater than that evinced by externals. Wolk and DuCette (1974) reported that internals did consistently better than externals on intentional as well as 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, thus, concluded that the externals, relative to internals, possessed a less active perceptual-attentive system and that they also failed to use this system efficiently. Procicuk and Breen (1977) also found that internals were more active in seeking context-relevant information than were externals, and were likewise more successful at remembering such information. Similarly, Cohen & Lefcowitz (1977) reported that internals performed better on an anagram task than did externals. Colwick (1977) observed that internal oriented subjects were apparently able to concentrate a larger proportion of their cognitive activity upon relevant aspects of the given task than were externals.

Ellis and Franklin (1983) found that external subjects were more susceptible to superficial processing and showed poorer recall than those of internal subjects. As demonstrated by Ellis and Franklin, externals were relatively inefficient in organizational strategy, such ineffectiveness in the external's organizational strategy may simply be due to the particular testing procedure used (free recall with no instruction as to how to organize the list). We expected different results if different retention test is used in which colours and categories names are presented as retrieval cues.

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 was 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). They found the results in expected direction. The 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 processes. 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; Leight & Ellis, 1981; Chaudhary, 1985, 1986). It, thus, appeared worthwhile to compare the organizational strategy and recall performance of rigid subjects with the organizational strategy and recall performance of externally oriented subjects and to compare the organizational strategy and recall performance of flexible subjects with those of internally oriented subjects. The present study was addressed to these issues. In short, the main objective of the present research was to examine the effects of the presence of both semantic and superficial perceptual features of word
lists on organization and on its subsequent retention and also to examine the effects of the two important personality variables, namely, cognitive rigidity and locus of control, on susceptibility to semantic and superficial perceptual category for organizing information in immediate and delayed cued recall.

Moreover, it was 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 the colours and semantic categories are presented as retrieval cues. Similarly, it was 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 also appeared interesting to study recall performance of external and internals under immediate as well as delayed cued recall conditions where names of colours or semantic categories are presented as retrieval cues. If external's organizational strategy was relatively ineffective due to the particular testing procedure used by Ellis & Franklin, 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 performance of externals and internals.
Finally we also explored whether or not individual differences in these personality traits (i.e. locus of control and cognitive rigidity) affects immediate and delayed cued recall differentially and was there any interactional effect of locus of control and cognitive rigidity on immediate and delayed cued recall? The patterns of preferred modes of organization (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.

A 2x2x2 factorial design in which one task variable (i.e. organization of material) and two personality variables (i.e. cognitive rigidity & locus of control) each varying in two ways, was used in this experiment. The two values of task variable were (a) superficial organization and (b) semantic organization. Cognitive rigidity was varied in two ways by selecting (a) rigid and (b) flexible subjects; and locus of control was varied by selecting (a) internal and (b) external subjects. Thus there were eight groups of subjects each was tested for immediate as well as for delayed cued recall which yielded sixteen observations on two measures of dependent variable.

In order to form eight groups of subjects, a Hindi version of G-S Rigidity Scale (Ali, 1975) was administered on 400
undergraduate male students of A.M.U., Aligarh. The subjects securing a score above Q3 (i.e., 16) were classified as rigid while those securing a score below Q1 (i.e., 12) were categorized as flexible. On the basis of the scores, two groups of subjects, namely, rigid and flexible were formed. There were 125 subjects in each group. Then Hindi version of Liverant & Rotter's I-E Scale (Hasan, 1974) was given to both of these groups in classroom situations to measure their externally on an integer scale from zero (very internal) to 23 (very external). The subjects whose scores were from 0 to 9 were classified as internals and those securing 10 or above were designated as externals. On the basis of their scores each group was subdivided into two. Thus four groups were formed, namely, rigid-external, rigid-internal, flexible-external, and flexible-internal. Each group consisted 30 subjects. Half of the subjects of each of the four groups served under experimental condition (superficial organization) and other half served under control condition (Semantic organization). In this way eight groups were formed. Each group comprised of fifteen subjects.

In the experimental condition, the subjects saw the list of 16 words colour-blocked, i.e., the first four words of the list were presented over a red background, the next four over a green background, the next four over a yellow background, and the last four over a blue background. In the control condition, instead of presenting words over the background of varying
colours, the subjects were shown same word list with a single colour background.

All the 120 subjects, irrespective of their group assignment, were tested individually under immediate as well as delayed cued recall tests and all the eight groups were run simultaneously, i.e., first subject was tested from the first group, second subject was tested from group II, third was tested from group III, fourth was tested from group IV ...... and ninth subjects was tested from group I and so on. The apparatus used in this experiment was an electrically operated memory drum in which timing device was so adjusted as to allow for each word to be exposed for two seconds at a regular interval of two seconds in between two exposures. Two stimulus lists, namely, a randomized categorical list of 16 words for semantic organization and a randomized colour-blocked list of the same 16 words for superficial organization, were employed in this experiment.

The data obtained were analyzed for clustering by semantic categories (i.e. semantic organization), for clustering by superficial perceptual features of the list (superficial organization) and word cued recall with the help of t-test, and analysis of variance was also used to see the differential effect of each independent variable on immediate and delayed cued recall. F-ratios were also calculated for the difference between immediate and delayed cued recall scores.
The main findings of the present research may be summarized as follows:

1. Rigid subjects encoded superficial perceptual features of the list more extensively than the flexible subjects in immediate cued recall. Flexible subjects, on the other hand, encoded semantic features of the list more extensively than the rigid subjects.

2. Rigid and flexible subjects did not differ with respect to superficial organization of the material in delayed cued recall. However, flexible subjects encoded semantic categories of the list more extensively than rigid subjects in delayed cued recall.

3. External and internal subjects did not differ with respect to superficial organization of the material in immediate cued recall. Internal subjects, on the other hand, organized the information using semantic categories of the list more extensively than those of external subjects in immediate cued recall.

4. Like immediate cued recall, there was no reliable difference between external and internal subjects with respect to superficial organization in delayed cued recall. However, internal subjects encoded semantic features of the list more extensively than externals in delayed cued recall.
5. Rigid subjects showed poorer immediate as well as delayed cued recall than their flexible counterparts.

6. External subjects exhibited poorer immediate and delayed cued recall than those of internal subjects.

7. Recall performance of the subjects, irrespective of their personality dispositions, was poorer with superficial organization than with semantic organization in immediate and delayed cued recall.

8. There were significant interactional effects of cognitive rigidity x locus of control, cognitive rigidity x type of organization, and locus of control x type of organization on immediate cued recall. However, there was no interactional effect among cognitive rigidity x locus of control x type of organization on immediate cued recall.

9. All the interactional effects except that of locus of control x type of organization on delayed cued recall were found statistically insignificant.

10. Cognitive rigidity flexibility had no differential effect on the difference of immediate and delayed cued recall.

11. External-internal locus of control orientations had no differential effect on immediate and delayed cued recall.

12. Type of organizations (i.e. superficial and semantic organization) had also no differential effect on immediate and delayed cued recall.
13. All the interactional effects, except that of cognitive rigidity x type of organization, on the difference of immediate and delayed cued recall were statistically insignificant.

14. Rigid subjects were more susceptible to superficial perceptual features of the list than those of external subjects in immediate cued recall. However, rigid and external subjects did not differ with respect to semantic organization in immediate cued recall. In delayed cued recall, rigid and external subjects neither differed with respect to superficial organization nor with respect to semantic organization.

15. Rigid and external subjects did not differ in immediate as well as delayed cued recall either under superficial organization condition or under semantic organization condition.

16. Flexible and internal subjects neither differed with respect to superficial nor with respect to semantic organization in immediate and delayed cued recall.

17. Flexible subjects showed poorer recall performance than internal subjects under superficial organization but they did not differ under semantic organization condition in immediate cued recall. However, in delayed cued recall flexible and internal subjects did not differ in their recall performance either under superficial organization or under semantic organization condition.
The first two findings of the present research were found to be consistent with the observations made by Tyler, Hertel, McCallum & Ellis (1979), Cosden, Ellis & Feency (1979), Leight & Ellis (1981), Alam (1986) and Alam & Saeeduzzafar (1987). These findings were explained in terms of the nature of cognitive rigidity-flexibility personality dispositions as well as in terms of the nature of the colour clustering. Furthermore, these findings also provided empirical support to "attentional-discrimination hypothesis" proposed by Ellis & Franklin (1983).

The third and fourth findings of the present investigation were in agreement with the results obtained by Davis & Phares (1967), Phares (1968), Pines (1973), Wolk & DuCette (1974), Prociuk & Breen (1977), Colwick (1977) and Ellis & Franklin (1983). The fifth finding, i.e., rigid subjects showed poorer recall performance than the flexible subjects in immediate and delayed cued recall, is consistent with the findings obtained by Akhtar & Sowaid (1972), Imam (1975), Cosden, Ellis, & Feency (1979) and Alam (1986).

The sixth finding of the present study, i.e., externals showed impaired immediate and delayed cued recall, was found to be consonant with the results obtained by numerous investigators (e.g. Seeman & Evans, 1962; Seeman, 1963; Davis & Phares, 1967; Phares, 1968; Lefcourt & Wine, 1969; Pines, 1973; Wolk & DuCette, 1974; Sanders, Halcomb, Fray & Owens, 1976; Cohen & Lefcowick, Ellis & Franklin, 1983). This finding also provide indirect support to the findings obtained by Dhaliwal & Sidhu (1984).

The seventh finding was found to be consistent with the results obtained by Ellis and Franklin (1983) and Alam & Saeeduzzafar (1983). These results also provided indirect support to the study conducted by Craik & Lockhart (1972), Moscovitch & Craik (1976) and Hunt & Elliot (1980).

All the interactional effects (findings No.8 & 9) on immediate and delayed cued recall were explained in the light of the findings already discussed. The findings Nos. 10, 11 and 12 were explained in terms of the same processes involved in immediate and delayed cued recall and were found to be consistent with the findings of Melton (1963) and Craik & Jacoby (1974) who also demonstrated that same processes operate in short- and long-term memory. Thus these findings of the present research favoured the unitary system of human memory, i.e. STM-LTM continuum position. All the remaining findings regarding the comparison between organizational strategies and recall performance of rigids and externals and of flexibles and internals were explained in terms of similarities in cognitive functioning of two types of personality correlates, i.e., cognitive rigidity and locus of control.

The overall findings of the present investigation demonstrated the implications for the role of personality and individual differences in the processing of information and its subsequent impact on memory. The findings also led us to suggest some promising issues for future research.
REFERENCES


HINDI ADAPTATION OF GSR\textsuperscript{a} SCALE
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SCORE

नीचे कुछ कथन दिए हुए हैं। जिसमें से प्रत्येक के सामने दो उपर दिखे हुए हैं। “हाँ ☑” तथा “नहीं ☐”।
आपको उल्लोट देने समय कुछ भी निकालना नहीं है, विभिन्न कथनों (Statements) को चयन करना है कि “हाँ ☑”
या “नहीं ☐” में से कौनसा उल्लोट आपकी व्यक्तिगतिक विशेषताओं (Personality characteristics) का कुछ करने के द्वारा कहीं सही सही प्राप्त करता है। अगर आपकी व्यक्तिगत (Personality) के अनुसार हो तो आप “नहीं ☐” के खाने में (☑)
का निशान लगाएं और यदि कथन व्यक्तिगत के अनुसार न हो तो “हाँ ☑” के खाने में (☑) का निशान लगाएं।

इस कथन की ध्यान रखने कि कोई भी कथन न छूटे। प्रत्येक कथन का उल्लोट अवधार दे और अन्य एक एक का प्रयत
करे। हम आपा करते हैं कि आपके सहीत से यह परिदृशय बनाने में सहाय हो जायेंगे।

कथन 1: आप आप अपना कार्य गुण करदें?

1. किसी कार्य को बाले यह कितना ही उल्लोट नहीं करता?

2. आप अपने अन्य व्यक्तियों के बारे में कहते?

3. मैं यह धारणा करता?

4. मैं कुछ नहीं करता?

5. मैं जिन लोगों को नहीं बताता?

6. मैं संगठन को नहीं बताता?

7. क्या मैं किसी कार्य को नहीं करता?

8. मैं किसी कार्य को नहीं करता?

9. मैं किसी कार्य को नहीं करता?

10. मैं किसी कार्य को नहीं करता?

11. मैं किसी कार्य को नहीं करता?

12. मैं किसी कार्य को नहीं करता?

13. मैं किसी कार्य को नहीं करता?

14. मैं किसी कार्य को नहीं करता?

15. मैं किसी कार्य को नहीं करता?

\textsuperscript{a}Gaugh Sanford Rigidity Scale.
( २ )

१६. नेटर साथ अभिकांत यह होता है कि मिन्नत का एक सबब एक पति, छुट्टी या यात्रा पर कई 
वित्त तक संपत्ति रहता है। """" """" """" """" """" हाँ □ नहीं □

१७. नेसर पढ़ने और कार्य करने का एक मित्रित कार्यक्रम है जिसका मैं निर्विवाद कप से 
भूलन करता हूँ। """" """" """" """" """" हाँ □ नहीं □

१८. बड़ी बुद्धि देने या दरबार में ताला बम्रह लगा देने के बाद मैं सामान्यतः इस बात का 
प्रभावित कर लेता हूँ कि मिने यह काम कर लिया हूँ या नहीं। """" """" """" """" हाँ □ नहीं □

१९. मैंने अपनी कोई प्रयास काम केवल उससे आगाम प्राप्त बनाए के लिये नहीं किया है। """" """" """" हाँ □ नहीं □

२०. मैं समझता हूँ कि मित्रित समय पर कार्य करना आत्मिक (स्वस्थिता) की सहायता है। """" """" """" """" हाँ □ नहीं □

२१. मैं अपने कपड़ों का सजावट का बहुत ध्मनि रखता हूँ। """" """" """" """" हाँ □ नहीं □

२२. मैं अपने शाम (सर्वोच्च) से अपने कपड़े पहनना तथा उत्तात्ता है यह सदैव एक सा 
रहता है। """" """" """" """" हाँ □ नहीं □

Thanks

Name................................. Roll No.................................

Hostel/Place................................. Date.................................
दोहराव ोतो का उदाहरण यह भला लगाता है कि हमारे समाज में घटित होने वाली महत्वपूर्ण घटनाएँ विभिन्न लोगों को विशेष प्रभावित करती हैं। इस दृष्टि के प्रश्न का प्रश्न में दो उधन 'अ' और 'ब' है।

प्रश्नों के प्रश्नों के साधारण में ये आपके वह दमन चुनना है जिस पर आपने अधिक विचार करना है जिसके अंतर्गत विश्लेषण नहीं है न कि वह दमन को विश्लेषण करते हैं न कि वह दमन जो कि आपकी तरफ से आपको चुनना वाली या वह दमन जिसके आप "सही" होना चाहिए करें।

प्रश्नों के उत्तर आपको अलग उत्तर के पर लिखना है। उत्तर का पर अपना नाम और अन्य सूचनाएँ भर दीजिए। फिर निर्देश को पूरी तरह पढ़िए।

प्रश्नों के उत्तर तात्पर्य रूप में सम्पूर्ण होती है। किंतु इसी एक प्रश्न पर बहुत समय न लगाइए। प्रश्नों के साधारण में एक रुप भरने का प्रयास करें।

प्रश्न का नम्बर उत्तर का पर मालूम करें। इसके साथ अपने नाम आप "अ" या "ब" जो निश्चित एक नीचे रोश की आप दीजिए।

हुए प्रश्नों के विषय में आपको यह प्रश्न होता है कि आप दोनों कथनों पर या दोनों में से किसी भी कथन पर विचार नहीं करते। ऐसी अवस्था में आप उस कथन को बहुत जिस पर आपके अपेक्षाकृत अधिक विकल्प है। प्रश्न का उत्तर स्वतंत्र लप से दीजिए और जो पहले उत्तर दिया है उसको अगले उत्तर पर प्रभावित होने न दीजिए।

नोटः इस पुस्तिका के पास आप कुछ न लिखिए।

1. चुड़ाई बच्चों इसलिए बिगड़ जाते हैं क्योंकि माता-पिता उन्हें बहुत अधिक दिखावें करते हैं।

2. चुड़ाई बच्चों इसलिए बिगड़ जाते हैं क्योंकि माता-पिता उनकी बहुत अधिक व्यक्तित्व के रूप में देकर है।

2. चुड़ाई बच्चों के जीवन की अनेक रूप प्रत्ययां का कारण हूआ आ लें उनका समाधाग्य है।

3. चुड़ाई बच्चों के समाधाग्य का कारण उनसे होने वाली गलतियाँ हैं।
3. हमें यूक होने का एक बड़ा कारण यह है कि लोग राजनीति में अधिक समय नहीं देते।

4. अब आते ही लोग वह समावेश प्राप्त करने का उद्देश्य जिले में किया जाएगा है।

5. यह दिशान्त कि अध्याय निर्धारण नहीं रहे वेश्यातीत है।

6. अब सफल नेता बनने में साहसिक का बहुत योग्य होता है।

7. अब वह लोग जो अपने को दूर रखने के पास करवाए जाएँगे में सफल नहीं होते।

8. अब मनोक जो व्यक्ति बनाने में साहसिक उद्देश्य योग्य होता है।

9. अब यह प्राप्त करने में नहीं होता है वह कोई रहेगा।

10. अब कहीं तहत तैयारी छोड़े दिन के लिए कोई भी परीक्षा दुरीं नहीं होती।

11. अब तपासता मिलना कठोर परिस्थिति पर निर्भर है, भारत का तब बहुत मामलों दिशा होता है या बिल्कुल नहीं।
12. जब यह घटना लागा तो ऐसा साधारण व्यक्ति भी सरकार के निर्णयों को प्रभावित कर सकता है।

13. जब में कोई योजना बनाता हूँ तो सुने कुछ बड़ी विधि-विधान रहता है तो मेरी योजना तक होनी।

14. यह लोगों में कोई भी अचार नहीं होती।

15. यह बहुत आनंद देते हैं यह योजना बनाना ठीक नहीं है क्योंकि बहुत सी धीरें अंधे या बुरे भाग्य पर निर्भर होती है।

16. लोगों से काम करना लेना: इस बात पर निर्भर है कि सामाजिक व्यक्ति कितने जगह पर पहले से मौजूद है।

17. लोगों से अपनी भूमिका का काम से लेना योग्यता पर निर्भर है।

18. हम में अधिकांश लोगों ने अपनी भूमिका का विचार किया क्योंकि न तो हम रहते हैं और न नियामित कर रहते हैं।

19. व्यक्ति की अपनी गलतियाँ मान लेनी चाहिए।
20. यह जानना बहुत मुश्किल है कि लोग आपको पतन-रहते हैं या नहीं।
   अब आपके फिल्में मिल गईं यह इस बात पर निर्भर है कि आप फिल्में अच्छे की जाती हैं।

21. अंततः दामोदर साहब दोनों बाली बुरी घटनाओं, हारी साथ होने वाली अच्छी घटनाओं द्वारा वर्तमान हो जाती हैं।
   अतः अभिकार क्षणभरथम, दासतान्त्रय तत्व, अज्ञान, कार्यक्षेत्र या लीला का मिला जुला परिणाम होते हैं।

22. धोर प्रयत्न उत्तरा राजनीतिक मूल्यांकन का सफाया किया जाता है।
   राजनीतिक अपने पंद्रह पर रहकर जो कुछ करते हैं लोगों को उस पर नियंत्रण रखना कठिन है।

23. यह समझना मेरे लिए कभी-कभी मुश्किल हो जाता है कि अध्यापकों ने अंक फिल प्रकाश दिये हैं।
   जितना परिश्रम करता हूँ उसी के अनुसार प्राप्त करता हूँ।

24. अच्छा नेता यह आचरण रखता है कि लोग स्वयं केला करें कि उन्हें क्या करना है।
   अच्छा नेता लोगों से यह स्पष्ट बता देता है कि उन्हें क्या करना है।

25. कई बार मैंने यह मानता किया कि सुख पर जो घटा रहा है उस पर मेरा कोई बल नहीं है।
   मेरा मृत्युदण्ड संपन्न या फिल्म की कटूलतों नहीं है।

26. वही लोग अकेलापन महत्वपूर्ण करते हैं जो दोस्त बनाने का पतन नहीं करते।
   लोगों को प्रताप करने का अधिक प्रयत्न व्यर्थ है व्यापक यदि वह आपको पतन-रहते हैं तो पतन-रहते ही।

27. लूक की विकास में खेलों को अधिक महत्व दिया जाता है।
   टोली वाले खेल निरीक्षण के लिए अच्छे हैं।
28. हाँ, मेरे साथ जो घटता है वह मेरे की प्रवास का कारण है।
   कभी कभी मैं यह सहलूल करता हूँ कि मुझे अपने जीवन पथ पर कोई नियंत्रण नहीं है।

29. हाँ, अनेक बार मैं यह समझने में कठिनाई अनुभु करता हूँ कि राजनीतिक जैसा व्यवहार करते हैं वह क्यों करते हैं।
   स्थानीय अथवा राष्ट्रीय स्तर पर लुप्त सरकार का उल्लंघनित्य अंतः लोगों पर ही है।
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