Aims and Hypotheses

A thorough survey of the literature reviewed in the preceding chapter regarding the role of KR and its subsequent withdrawal on learning and performance of different tasks, has revealed that the performance is facilitated to a considerable extent, when KR is provided, but deteriorates following its withdrawal (Ammons, 1956; Locke, 1967; Mohan, 1977). It has been consistently reported that KR facilitates performance on a variety of tasks ranging from motor and psychomotor to intellectual tasks (Mohan and Deol, 1983).

A few studies have been reported on weight estimation with acquisition rates ranging from 22% to 54%. Only one study has been reported on Muller-Lyer illusion and KR on a very small sample of 10 Ss (Sen and Helode, 1971). One cannot generalize the results obtained on such a small sample. Thus, the evidence of inconsistent results regarding the extent of acquisition of efficiency on the task of weight estimation and practically negligible work on the task of Muller-Lyer illusion, necessitate a further probe into the effect of KR on performance. So, the aim of the present study includes:

(A)(i) Whether the information about the result of S's performance reinforces him:

(a) to estimate more accurately a weight of 40 grams?
(b) to help him reduce the extent of Muller-Lyer illusion?
(ii) To determine the extent and significance of this facilitative effect on the performance of both the tasks.

Another pertinent question is related to the withdrawal of KR and its subsequent effect on performance. The performance drops after the withdrawal of KR (Ammons, 1956). Whether this drop in performance is below, equal or above the initial level is yet to be determined. So, the objective of the present study is:

(B) (i) To ascertain the strength, extent and significance of extinction as a function of withdrawal of KR; and
(ii) To determine, whether this drop in performance is below, equal or above the initial level.

Secondly, it has been emphasised that the effect of KR on performance depends upon certain experimental and organismic factors. Frequency of KR is one amongst many factors which has been reported to be positively related to acquisition and negatively to extinction. However, the evidence of inconsistent results regarding the effect of different frequencies of KR on the acquisition of efficiency and extinction necessitates a further probe into the factor of frequency of KR so the aim is to determine:

2. How acquisition and extinction is related to the frequency of KR?

Thirdly, it has been recognized that every individual is unique and has his own life style and personality pattern.
The personality traits and sex differences do make a difference in the receptivity, responsiveness and reactivity as well as benefitting from experience (Rai and Gandhi, 1980). All people do not take performance or achievement with the same degree of enthusiasm and may not show uniform degree of zest and zeal to improve, so the investigator is interested to study:

3. Whether the extent of this facilitative effect of KR is uniformly distributed over Ss with different cognitive and affective traits?

With above three aims in view, the investigator was inspired to undertake the present study incorporating personality, anxiety, intelligence and sex coupled with KR on weight estimation and Muller Lyer illusion.

In the present study the variables would be manipulated in terms of two frequencies of KR - 100% and 50%, two levels of personality - extraversion and introversion, two levels of anxiety - high and low, two levels of intelligence - high and low and two sexes - males and females, replicating on both the tasks i.e., weight estimation and Muller Lyer illusion.

HYPOTHESES

Presently, an effort is being made to derive certain hypotheses regarding the effect of personality, anxiety, intelligence and sex on both, the acquisition of efficiency and its extinction, as a function of KR on the performances of weight-estimation and Muller Lyer illusion.
PERFORMANCE AND KNOWLEDGE OF RESULTS (KR)

A survey by Ammons (1956) and Mohan (1977), reveals that the incoming knowledge of how-he-is-doing creates an awareness in the learner, as to whether his responses are correct and he is on the right track. This incoming knowledge called feedback has been found to influence his learning in positive direction to a considerable extent. By getting the knowledge about one's performance, the subject is facilitated to remain on the track, avoid pitfalls and proceed in the right direction more efficiently. According to Mohan and Deol (1983), "it is the result of increase in the efficiency with which the subject grasps an impression of the ideal form of the actual response in conjunction with KR on any trial and utilizes the memory traces of this impression in reducing error in performance on the following trials."

It is a well established fact that KR facilitates performance. It is consistently reported that the introduction of KR facilitates and improves performance on line drawing (Thorndike, 1931; McGuigan, 1959; Mohan, 1969, 1973; Gupta, 1978; Mohan, Gupta and Sharma, 1985); time estimation (Madan and Dey, 1964; Mohan and Sekhon, 1972; Allen and Clark, 1979; Phillips et al., 1983; and Mohan and Deol, 1983); weight estimation (Mohan and Damral, 1971; Mohan and Gupta, 1972, 1984); reaction time (McCormack, 1959; Mohan, 1969a; Mohan and Mann, 1970; Strang, 1983); vigilance tasks (Mohan and Malhotra, 1974; Camus, 1981 and Huntermark and Witte, 1980); psychomotor tasks.
(Philips et al. 1980; Beck et al., 1980 and Baez, 1983), mental tasks (Angell, 1949; Pressey, 1950; Paige, 1966; Flook and Sagar, 1968; Mohan and Kumar, 1974; and Mohan and Dhingra, 1984) and Muller Lyer illusion (Sen and Helode, 1971) to a marked extent. In the light of the above mentioned studies with regard to acquisition of efficiency, it may be hypothesised that:

Performance on weight estimation and Muller Lyer illusion will show a marked improvement when KR is introduced.

**PERFORMANCE AFTER THE WITHDRAWAL OF KR (EXTINCTION)**

Phenomenon of extinction after the withdrawal of KR or reinforcement is well established in classical and instrumental conditioning. A considerable amount of experimental work has been focussed on the effect of the withdrawal of KR upon the performance level already attained by the administration of KR. According to Ammons (1956), "performance drops when KR is decreased. But the extent to which this efficiency would drop is difficult to ascertain." However, there are reported a few studies supporting this generalization.

Thorndike (1931) using line drawing, reported performance decrement following withdrawal of KR. Elwell and Grindley (1938) also reported extinction in target training after the withdrawal of KR, the skill fell even below the initial level. The results are supported by Macpherson et al. (1948), Bilodeau et al. (1959), McGuigan (1959), Sen (1976),
and Mohan and Vohra (1984). But there do exist some studies that report no significant decrease in performance after the withdrawal of KR (Bill et al., 1944; Bilodeau, 1953; Madan, 1961; and Madan and Dey, 1964).

Ammons (1956) and Madan and Dey (1964) have explained this lack of agreement between experimental findings regarding extinction on the basis of the difference in the control of some important factors, e.g., there is a possibility that certain processes serving as substitutes for knowledge giving events are eliminated in certain experiments and not in others after the withdrawal of KR. This might result in the performance decrement in the former and not in the latter.

In the light of the above mentioned studies with regard to extinction, it may be hypothesised that:

Performance on weight estimation and Muller Lyer illusion will significantly drop after the withdrawal of KR.

**FREQUENCY OF KR AND ACQUISITION OF EFFICIENCY**

The facilitative effect of KR is an established fact (Ammons, 1956; Mohan, 1977). This facilitative effect improves performance and acquisition of efficiency. However, if KR is introduced intermittently, it is generally observed that, greater the percentage of KR given, the quicker and greater the increase in the rate of acquisition. This generalization is supported by many empirical studies using a variety of tasks.
The superiority of the 100 % KR group has been reported on aiming and target-tracking (Houston, 1947; Bilodeau and Bilodeau, 1956); line drawing (McGuigan, 1959; Gupta, 1978; Mohan and Vohra, 1984; Mohan, Gupta and Sharma, 1985); time estimation (Madan and Dey, 1964 and Mohan and Deol, 1983); paired associate learning (Mohan and Dhingra, 1964); weight estimation (Mohan and Damral, 1971; Mohan and Gupta, 1972). In addition to these, certain other investigators e.g. Mohan and Damral (1971); Gerson and Richard (1979); Ho Linda et al. (1979); and Mohan, Gupta & Sharma (1985) reported only a trend in favour of the 100 % KR group. However, certain other investigators have reported no significant difference between the performance of two KR groups on aiming and tracking (Goldstein and Hittenhouse, 1954); instrumental learning (Rosen, 1961); simple reaction time (McCormack et al., 1963) and choice reaction time (Mohan and Mann, 1970).

The aforesaid studies have reported that the bulk of evidence favours better acquisition of efficiency with the increase in the frequency of KR. In view of this it can be predicted that:

The group receiving 100 % KR, will be superior in acquisition of efficiency in estimation of weight and decrement of Muller Lyer illusion than the group receiving 50 % KR.
EXTINCTION AND FREQUENCY OF KR

The bulk of literature regarding extinction as a function of different frequencies of KR has indicated a positive relation between the frequency of KR in the training period and subsequent extinction following its withdrawal, i.e., the higher the frequency of KR provided in the acquisition phase, the more the extinction after its withdrawal and vice versa.

Jenkins and Stanley (in Madan 1961) has generalized that "All other things being equal, resistance to extinction after partial reinforcement is greater than after continuous reinforcement, when behaviour's strength is measured in terms of single response."

Hartman and Grant (1960) reported that the groups receiving lower percentage of reinforcement, offered more resistance to extinction as compared with the groups receiving higher percentages of reinforcement. Myers (1960) also reported that the groups given 50% reinforcement showed greater resistance to extinction. Roger (1962); Loraine (1970) and Mohan and Vohra (1984) also found the resistance to extinction in favour of partial KR group in comparison with 100% KR group. In the light of the aforesaid studies with regard to the extinction of behaviour after the cessation of KR, it may be hypothesised that:

Extinction will be faster and greater in magnitude under 100% KR group than under 50% KR group on the tasks of estimation of weight and Muller Lyer illusion.
PERSONALITY AND PERFORMANCE WITH KR

Personality plays an important role in human learning and performance. Acquisition of efficiency when KR is introduced has been regarded as analogous to learning with reinforcement in conditioning type of studies (Mohan, 1973, 1977; Mohan and Deol, 1983). Therefore, the variables affecting the latter may also account for performance with KR.

Eysenck (1947, 1960) has linked his personality dimensions of E/I and N with learning. Since N dimension is positively related with anxiety (Bendig, 1957; Dutt, 1970), these two can be alternatively used. The dimension of E/I and anxiety are dealt with separately.

(i) EXTRAVERSION AND PERFORMANCE WITH KR

According to Eysenck's theory (1960, 1965), introverts excite quickly, accumulate Ir slowly and dissipate it faster whereas the extraverts excite slowly, accumulate Ir faster and dissipate it slowly. As such the extraverts are expected (a) to show less improvement in acquisition of efficiency when KR is given, and (b) less resistance to extinction after the withdrawal of KR. Many empirical studies have supported the above hypothesis. Frank (1956), Eysenck (1960, 1962, 1965, 1971, 1978); Mohan and Mann (1970) on choice reaction time, Mohan and Gupta (1972) on weight estimation; Mohan and Deol (1983) on time estimation; and
Mohan and Dhingra (1985) on paired associate learning - all reported introverts to learn faster with KR in comparison to the extraverts. The differences, however, did not reach significance in some cases. In the light of the above mentioned studies, it may be hypothesised that:

Introverts would show better performance than the extraverts on both the tasks of weight estimation and Muller Lyer illusion when KR is administered.

EXTRAVERSION AND EXTINCTION

In continuation of the second part of the Eysenck's (1947, 1960, 1965, 1967) hypothesis that introverts accumulate Ir slowly and dissipate it faster while extraverts accumulate Ir faster and dissipate it slowly, the latter are expected to show less resistance to extinction after the withdrawal of reinforcement or KR.

There is relative paucity of scientific investigations regarding the effect of E/I on extinction as a function of withdrawal of KR. Some indirectly related pieces of research are those by Pavlov (1927) on conditioning of dogs; Frank (1956) on eyelid conditioning. Pavlov (1927) observed that the dogs with excitatory kind i.e. introverted dogs developed stable positive conditioned responses with ease and retained these responses for a long time during extinction. The opposite was reported in respect of the dogs with inhibitory kind i.e. extraverted dogs. They developed positive conditioned responses
very poorly, which once formed, were easily disrupted and soon extinguished. Frank (1956) and Eysenck (1968, 1971) also reported in similar direction. On the basis of these studies it can be predicted that:

Extraverts will show more extinction in comparison with introverts after the withdrawal of KR.

(ii) **ANXIETY AND PERFORMANCE WITH KR**

Anxiety as a personality trait has been empirically found to occupy a central role in human performance. Taylor (1951) and Spence (1956) while working within Hullian framework assumed that the response in a conditioning situation is "some positive function of the total drive which, in turn, is partly internal anxiety or emotionality". Therefore, individuals, characterized with a higher degree of anxiety and greater drive would condition better in comparison with those low on anxiety.

But authenticity of this hypothesis has not been established empirically on all the tasks. This may be due to the difference in the complexity level of the tasks. The results on most of the tasks have been reported in favour of Yerkes-Dodson Law (1908), which states a curvilinear relation between drive and task difficulty, i.e., performance is disrupted at very low and very high drive levels. According to Eysenck (1964), "for each task there is an optimum drive, such that drive higher or lower than the optimum, results in impaired performance. Optimum drive is
lower for complex tasks and higher for simpler ones". This inverted-U relation has been experimentally obtained by Lynn and Gordon (1961) and Mohan (1967). This phenomena has been more or less established by Pandit (1969), Sridhar et al. (1973,1974), Mohan and Kumar (1979), Jain (1981), Mookerjee et al. (1982) and Chadha (1982).

With regard to Taylor-Spence (1951, 1953) hypothesis and Eysenckian dimensional theory (1947, 1964, 1971) the high anxiety Ss are faster in conditioning and slower in extinction. It implies that reinforcement in the form of KR facilitates the performance of high anxiety Ss by reducing their drive level to its optimum level. The provision of KR reduces the degree of uncertainty by informing the Ss whether they are on the right track. According to Arkin et al. (1983) KR interacts differently in accordance with the student’s knowledge of doing well or doing poorly, because KR is supposed to augment the anxiety response in case of failure and decrease the same in case of success. However, inconsistent results are reported in support of this contention. Prank (1956), Mohan and Mann (1970), Mohan and Gupta (1972), Mohan and Kumar (1973,1979), Mohan and Malhotra (1974), Mohan (1976) and Peter (1978) reported insignificant difference between the performance neurotics and stables. A trend was however, reported to be in favour of the stable or low anxiety Ss. But there do exist some studies that have reported the facilitative effect of KR on Neurotics.
Eysenck and Gillan (1964) have tried to arrive at a generalization keeping in view the nature of the task with regard to its requirement of accuracy. The authors, maintained that the high drive groups are slower but more accurate than the low drive groups. In the light of these results it can be predicted that:

The high anxiety Ss would be better in the acquisition of efficiency in weight estimation and decrement of Muller Lyer Illusion in comparison with their low counterparts.

ANXIETY AND EXTINCTION

There have been only a few experimental studies on the conditionability of neurotics and anxiety Ss. Frank (1956), while revising Pavlov's original observation regarding the behaviour of his experimental dogs, hypothesised that Neurotics of the dysthymic type form conditioned reflexes rapidly and these reflexes are difficult to extinguish; neurotics of the hysteric type form conditioned reflexes slowly, and these reflexes are easy to extinguish. The research workers have found that 'neurotics' as a group condition better than normals (Spence et al., 1953; and Frank, 1956). No study is reported regarding the effect of anxiety on the extinction of behaviour as a function of withdrawal of KR. On the basis of the empirical
evidence regarding faster conditionability of high anxiety Ss and their slower extinction (Spence et al. 1953) it can be hypothesised that:

The high anxiety subjects, being slower in dissipation of conditioned response, would be slow in extinction as compared with their low counterparts after the withdrawal of KR.

INTELLIGENCE AND PERFORMANCE WITH KR

Intelligence is considered to be one of the most important determiners in human performance and learning. A large number of studies have reported that bright Ss are superior to the dull ones (Vernon, 1961; Sharma and Mehtani, 1980; Mohan, J. et al. 1982; and Bhatia, 1983). However, when performance is coupled with KR, the dulls show better acquisition rates as compared with normals and brights. Cromwell (1963) explained the better performance of the retardates as compared with the normals on certain tasks, due to their lower initial performance in comparison to the latter's leaving more scope for improvement under experimental conditions. Mohan and Malhotra (1974) reported the superiority of the dull Ss on an auditory discrimination task when intelligence was coupled with KR. Mohan and Dharmani (1976) reported similar results on verbal conditioning. Gupta (1978) working on line drawing also reported a trend in favour of the dull group. Mohan and Gupta (1984) reported insignificant difference in the
In contrast with above stated results, Joshi and Gakhar (1980) found that high intelligent and active KR group demonstrated best results in comparison to other groups in Algebraic concept formation. Holden and Corrigan (1982) reported that KR improved the performance of the retarded group in a pursuit rotor task; but this improvement was more in case of the non-retarded than the mentally retarded. Peter (1982) also supported the above results.

Because of the initial poor performance of the low intelligent group, in comparison with the high intelligent group, the former will benefit more when the performance is coupled with KR.

INTELLIGENCE AND EXTINCTION

Regarding the effect of intelligence on extinction, the present investigator could lay her hand only on one study by Mohan and Vohra (1984) that probed the relationship between intelligence and extinction after the withdrawal of KR. The authors reported significant extinction in their dull subjects after the withdrawal of KR in a line drawing task. In case of mentally retarded, according to Ellis (1963), and Mohan and Vohra (1984), a memory deficit is assumed and as such, prolonged beneficial effect of KR would fail causing more extinction. So, it can be hypothesised that:
The low intelligent group would show more extinction in comparison with the high intelligent group after the withdrawal of KR.

**Sex and Performance with KR**

Sex differences have also been found to influence learning and performance. The superiority of females has been established in a number of studies where the learning and performance was coupled with KR. Mohan (1969) reported that the female Ss performed better on drawing a 4" long line and estimation of 7 sec. of time when the performance was coupled with KR. Mohan (1969a) and Mohan and Mann (1970) using choice reaction time; Mohan and Malhotra (1974) using tone discrimination; Gupta (1978) using line drawing, have also reported the superiority of females over males when the performance was coupled with KR.

But Mohan and Gupta (1984) reported the superiority of males over females on the acquisition rates on weight estimation when the performance was coupled with KR. This difference, however, was not reported to be significant. The authors have discussed the trend in favour of males due to their low initial ability than that of the females.

Kingsley and Garry (1962) maintained that the males were likely to do better on the tasks which required muscular strength while females are likely to excel in the skills requiring close coordination of small muscles and strict
attention to detail. Wilson and Kahn (1975) are of the view that superiority or inferiority of performance depends upon the sex characteristics of the task.

Estimation of weight and Muller Lyer Illusion are the tasks that require close co-ordination of small muscles, strict attention to detail and accuracy as the Ss are required to pull the hook for estimating the weight of 40 gms. and adjust the variable stimulus equal to the standard stimulus as accurately as possible. In the light of the existing literature and in accordance with Kingsley and Garry (1962), it can be hypothesised that:

Females will perform better than males on weight estimation and Muller Lyer illusion when KR is administered.

SEX AND EXTINCTION

Regarding differential role of withdrawal of KR on the performance of two sexes, no such study has been reported as yet. However, the better achievement and higher pass percentage of females in comparison with males in almost all the university examinations suggest that the females are more alert and conscious. Their drive level is also generally higher than that of the males (Pandit, 1969). Their higher drive level and cautious nature may help them to forget less rapidly whatever is learnt. Again, the females are considered to show superior performance on tasks requiring accuracy and strict attention to detail (Kingsley and Garry, 1962). The females, being minute
observers, conscious and sufficiently motivated, are expected to show better performance even after the withdrawal of KR. Thus, it can be hypothesised that:

Females will show less extinction than their male counterparts after the withdrawal of KR on both the tasks of weight estimation and Muller Lyer illusion.

**INTERACTIONS**

**EXTRAVERSION x ANXIETY AND PERFORMANCE WITH KR**

On the basis of many empirical studies conducted to find out the relation between E and N, Eysenck (1964) concluded that E/I and N are mutually orthogonal. According to Mohan and Kumar (1979), "The dimension of N at the most has been credited with interacting with E/I by either augmenting the detrimental effects or summating its potential of drive at the autonomic level with cortical arousal." The interaction of autonomic drive (N) with cortical arousal (E) would cause stable extraverts to have the lowest level of the total drive, neurotic introverts the highest and stable introverts and neurotic extraverts, intermediate levels (Eysenck, 1967). Mohan and Kumar (1974) showed that when the sub-parts of Raven's SPM are timed, the stable introverts performed best (by using zonal analysis for the four personality groups viz. stable introverts, stable extraverts neurotic extraverts). Mohan
and Gupta (1972) using weight estimation also reported a trend in favour of stable introverts.

In case of simple tasks like conditioning, Frank (1956) reported the superiority of neurotic introverts over all other personality groups on both, the acquisition and the extinction. Mohan and Mann (1970) and Mohan and Deol (1983) reported inconclusive interaction between E and N. But since reinforcement in conditioning experiments, facilitate the performance of high anxiety groups, it can be generalized that, KA will facilitate the performance of neurotics or high anxiety groups in the later stages of acquisition when the right response begins to dominate. Sarason (1966) and Ravinder (1979) also supported this generalization. Since the neurotic introverts are associated with excitation and neurotic extraverts with inhibition (Frank, 1956), it can be predicted that:

(a) High anxiety introverts will be significantly better than other personality groups in the acquisition of efficiency on weight estimation and Muller Lyer illusion, when KA is given.

(b) In accordance with Frank (1956), the low anxiety-extraverts, supposed to be associated with inhibition, will be faster and stronger in extinction in comparison to other personality groups.

EXTRAVERSION x INTELLIGENCE AND PERFORMANCE WITH KR

Regarding the relationship of intelligence x extraversion and performance, no substantial studies are available except that of Lewis and Ko (1973). In accordance with Anthony's (1973, 1977)
hypothesis, they reported a positive relation between Extraversion and performance on Maths among low intelligent Ss but negative interaction among high intelligent Ss. On the basis of Eysenckian hypothesis (1947, 1955, 1960, 1978) that introverts are superior in conditioning and more resistant to extinction due to their more excitation on the one hand and Mohan and Gupta's (1984) contention that low intelligents are better in acquisition rates when performance is coupled with KR and less resistant to extinction after the withdrawal of KR due to poor and low memory deficit (Mohan and Vohra, 1984), it can be hypothesised that:

(a) The low intelligent introverts would be better in the acquisition of efficiency in comparison to the groups with other combinations of intelligence and E/I.

(b) Low intelligent extraverts would be quicker and stronger in extinction in comparison to the groups with other combinations of intelligence and E/I.

**ANXIETY X INTELLIGENCE AND PERFORMANCE WITH KR**

Anxiety and intelligence are empirically found to be interdependent (Sarason, 1960, 1962, 1966; Spielberger, 1966a; and Ravinder, 1979). High anxiety and low intelligence taken together would deteriorate performance while low anxiety and high intelligence would facilitate performance to a considerable extent. It is consistently reported by many investigators.
that the high anxiety had a facilitative effect on performance at the higher level of intelligence but a debilitating effect at the lower level of intelligence (Sarason et al. 1960, 1966; Kathan, 1966a; Spielberger, 1966; Verma, 1973 and Lirujnan, 1977).

The above relationship between anxiety and intelligence holds good so far as the wrong response dominates in the initial stage. High anxiety starts facilitating performance as soon as the right response starts dominating (Sarason, 1966). Experimental evidence reveals that there is a qualitative change in the performance level of high anxious - low intelligent Ss after the provision of KR. It is empirically established that the performance of low intelligent Ss is facilitated more than that of the high intelligent Ss as a result of provision of KR (Cromwell, 1963; Gupta, 1978; Bayti, 1979). The better acquisition of low intelligent Ss is due to their low initial ability in comparison to the high intelligent Ss which leaves more scope of improvement for the former group. Similarly, it is also maintained that the high anxiety Ss are facilitated more than those with low anxiety (Mohan and Mann, 1970; Mohan and Dharmiani, 1976; Morocco, 1978; Bayti, 1979; and Mohan and Deol, 1983).

On the basis of the better acquisition rates of the high anxious and the low intelligent Ss as reported in the above mentioned studies, it may be hypothesised that:
(a) Acquisition of high anxious - low intelligent Ss would be significantly better than any other anxiety x intelligence group.

On the basis of Taylor and Spence hypothesis (1951), Spence et al. (1953) and Frank's (1956) contention that the high anxious Ss and neurotics are faster in conditioning and slower in extinction; and Mohan and Vohra's (1984) contention that the low intelligent Ss are faster and stronger in extinction, it can be hypothesised that:

(b) The low anxious - low intelligent Ss would be stronger and faster in extinction in comparison to other anxiety x intelligence groups.