The informational and motivational function of KR in human learning and performance has been well established. In its informational function it gives 'direction' to his subsequent behaviour by injecting into the subject(s) a desire to react to the new situation and thus acts like an incentive and an appropriate 'mover'. According to Mohan and Deol (1983), the improvement in performance as a function of KR is due to the interactive effect of its directive and motivational role and goal setting. What the individual does with this information, in turn, depends upon many other factors. Locke (1967), for instance, viewed that the motivational effect of KR is inter-linked with differential goal setting. He maintains that performance improvement is more a function of goal setting as compared to KR. The subject having a high goal might be motivated more in comparison to the subjects having a low goal.

Mohan (1977) viewed that the crucial issue is not merely the theoretical quibbles about KR, but what an individual does with KR. This brings us to certain factors which modify or accelerate the effect of KR and which definitely interact with the individual's reaction to KR.

Various investigators have employed different experimental designs with personality, intelligence, task specificity, situational drive and KR as determinants in studying human learning. Mohan (1977), in a recent review of research on the effect of KR on learning, has suggested
division of these factors into two broad groups, i.e., 'Organismic factors' that reside within the individual and those 'which are experimentally manipulable' hence external or 'experimental factors'. The effect of these variables upon learning with KR as glimpsed through various empirical studies, would be discussed under these two broad heads: i.e., 'Organismic factors' and experimental factors.

ORGANISMIC FACTORS

Organismic factors like personality, intelligence, drive level, aspiration level, self esteem, ego involvement and task specificity are those which reside within the organism and are not experimentally manipulable. They are controlled by matching the groups with regard to some personality traits, intelligence and anxiety level. Some of the studies relating performance with these factors are given below:

Personality and Performance with KR

Madan and Dey (1964) supporting Macpherson et al. (1948), conceived of two hypotheses to explain performance improvement by KR. Presently, we are concerned with their second hypothesis, "performing a simple skill with KR is comparable to instrumental reward learning in animals and hence performance improvement may be ascribed to the mere reinforcing effect of the approval or disapproval indicated by KR". In continuation of this hypothesis, Mohan and Deol (1983) observed, "If performance with KR is analogous to instrumental reward
learning, then, the variables affecting the latter, may also account for performance with KE. One such variable is personality differences to which much of the variation in learning has been attributed."

The concept of personality has been differently understood and defined by various psychologists. Here, we are concerned with only those approaches of personality which have invited lot of scientific research. There are quite a few personality theories which have led to experimental studies with conditionability, learning and performance right upto academic attainment (Mohan, 1977). One such theory is Eysenck's personality theory (1947, 1955, 1960) which posits four major dimensions virtually independent of each other. These are designated as Extraversion/Introversion (E/I), Neuroticism (N), Psychoticism and Intelligence. Psychoticism is used to differentiate normals from abnormals. The present study is not concerned with this dimension. So the dimensions which are to be studied with reference to performance are Extraversion-Introversion (E/I) and Neuroticism or Anxiety (N/S). Presently, we are concerned with high anxiety/low anxiety instead of N/S.

(i) Extraversion/Introversion and Performance with KE

Eysenck takes the concept of excitation and inhibition balance in the central nervous system from Pavlov (1927) and Hull's (1943) concept of reactive inhibition (IR) to explain the causation of extraversion-introversion. According to Pavlov (1927), dysthemics and hysterics appear to differ along the dimension of E/I, it seems that excitation is related
to introversion and inhibition to extraversion. Hull (1943) explained this inhibitory factor in terms of 'reactive inhibition' (IR) theory of learning. All responses leave in the physical structure—a state which acts directly to inhibit evocation of activity. This inhibitory substance manifests itself through reaction 'potentials'. This negative action is called IR. On the basis of Pavlov's (1927) and Hull's (1943) findings, Eysenck (1955) hypothesised that at human levels individuals would differ "in terms of excitation and inhibition balance." Eysenck contended that the E/I dimension is related to learning because the extraverts have a tendency to excite slowly, accumulate IR quickly and dissipate it slowly; whereas the introverts excite quickly, accumulate IR slowly and dissipate it faster (Eysenck 1960, 1965). The balance of the excitatory and inhibitory processes in the CNS predisposes the introverts to condition better than the extraverts (Eysenck, 1965).

The superiority of introverts over extraverts has been scientifically proved with conditioning (Frank, 1956; Das, 1961; Eysenck, 1962, 1965; Jawanda, 1965; and Mohan and Dharmani, 1976); vigilance tasks (Backer, 1960; Lynn, 1962; Eysenck, 1967; Mackworth, 1968; Mohan and Malhotra, 1974 and Mohan and Gill, 1983); with perceptual tasks (Rechtarchaffen and Bookbinder, 1960; and Mohan and Gill, 1979b); academic achievement (Lynn and Gordon, 1961; Child, 1964; Eysenck and Cookson, 1969; Goh and Moore, 1978; Singh, 1983 and Sudarshan, 1984); psychomotor
tasks (Backlow, 1973; Mohan and Gill, 1979a); Zeigarnik effect (Mohan and Rai, 1975; and Mohan and Jaspal, 1975) and on Muller Lyer Illusion (Mohan and Gill, 1981).

Some of the reviews on KR (Ammons, 1956; Locke, 1967; and Mohan, 1977) indicate a considerable paucity of work done with E/I affecting performance with KR. Some indirectly related pieces of researches are those by Forlano and Axelrod (1937) and Thompson and Humnicutt (1944) on the effect of praise and blame on extraverts and introverts in letter cancellation test. Their findings in agreement with those of Rim's (1965) and Gray (1970) suggest that the blamed extraverts improve their performance more than the blamed introverts. Praise seemed to work better with introverts. Blame instructions worked better with introverts on the 1st trial, while the same instructions caused a deterioration in the performance of introverts and improvement in the performance of extraverts in the subsequent trials. In case of praise instructions, the converse was true. Rai and Gandhi (1980) supporting the above results, reported that extraverted pupil teachers were better gainers in feedback acceptance as they respond to criticism positively. However, the praised extraverts and the blamed introverts did not differ significantly in mean scores on all the six tests. With the preceding background in view the investigator surveyed a few studies available where subjects were classified into personality groups based on E/I dimension.
and a learning situation provided in which KR could be extrinsically given.

Mohan and Mann (1970) studied the effect of E/I on choice reaction time (CRT) as a function of KR and reported quicker reaction of extraverts on initial as well as acquisition trials in comparison with introverts. However, the difference between the two groups did seem to lessen as introverts gained with learning. The interactive effect of KR and E/I on performance has also been studied by Mohan and Gupta (1972) using weight estimation, Mohan and Kumar (1973) using backward alphabet writing, Mohan and Malhotra (1974) using tone discrimination test, Batyi (1979) using academic achievement, Mohan and Deol (1983) using time estimation and Mohan and Dhingra (1985) using paired associate learning. Results in all the aforesaid studies failed to yield any significant difference between the performance of the two personality groups. However, in all the studies, the trend was reported to be in favour of introverts.

However, no such study is reported on Muller Lyer illusion and interactive effect of personality and KR. According to Mohan (1977) two dissimilar tasks may not evince parallel rates in the acquisition of efficiency. The present study as such, attempts to study the interactive effect of personality and KR on Weight Estimation and Muller Lyer Illusion.
(ii) **Anxiety and Performance with KR**

The mechanism and the impact of anxiety on learning and human performance, has been explained in the following two fold approaches, (a) psychoanalytic approach by Freud and neo Freudians (1924), and (b) Taylor Spence Model (1951, 1953). While the former has more relevance to explanatory, causative and clinical side, the latter approach, that considers anxiety as a drive level or arousability, is concerned with studying it scientifically and empirically. However, both the approaches share somewhat common definition of anxiety that anxiety is a reaction to a subjectively experienced danger situation, present or future. It develops in an environment which threatens the child's free use of his energies and undermines his self esteem and self reliance. Anxiety has been considered both as a transitory state variable and as a chronic personality trait. "From the stand point of a trait-state conception of anxiety, the most important stimuli are those which produce differential changes in A state in individuals who differ in A trait" (Spielberger, 1966). The Present study is concerned with anxiety as a personality trait which has been empirically found to have central role in learning and performance.

Most of the studies with respect to anxiety and human performance have been conducted in the framework of Taylor-Spence Model (1951, 1953, 1956) and Eysenckian dimensional theory (1947, 1957, 1969, 1971, 1978). Since Taylor's
concept of anxiety has been found to be highly co-related with Eysenckian concept of N, (Bendig, 1957; Dutt, 1970), both the concepts will be used alternatively for the present purpose.

As regards the causal explanation of N dimension, Eysenck (1953) believes that it is inherited and has neuro-physiological base. He also deduced from the Hull's theory (1943) that neuroticism may be considered a general factor in motivation or striving. He viewed that differences between people in emotionality or neuroticism are mediated by inherited differences in the liability and excitability of the autonomic nervous system (ANS). Some people are constitutionally pre-disposed to react strongly with their sympathetic system towards incoming stimuli of various kinds, whereas other people are pre-disposed to react much less strongly (Eysenck, 1955). Neuroticism affects acquisition of efficiency as it is considered a motivating agent (Eysenck, 1957). Osborne (1973) (in Mohan and Kumar, 1979) found that N, not E/I, emerged as the most significant dimension related to a high arousal word rating factor.

According to Taylor and Spence (1952), response strength (R) in a conditioning situation, is some positive function of total drive strength (D) which in part, is a function of the level of internal anxiety or emotionality of the subjects. Accordingly, Ss with greater anxiety would possess more drive strength and hence condition better than their low counterparts. Taylor (1951) and Spence et al. (1956) reported the superiority of high anxiety Ss on eyelid
conditioning. Robinson (1966), Barton et al. (1974), Singh (1981) and Singh and Vohra (1982-83) demonstrated that high anxiety facilitates academic achievement. However, the authenticity of the Taylor (1951) and Spence (1956) hypothesis could not be proved empirically for all the tasks. Rather, the results have been reported in favour of Yerkes-Dodson Law (1908), i.e., there exists a curvilinear relationship between drive and task difficulty and that performance is disrupted at very low and at very high drive level. This phenomena has been more or less established not only in Taylor Spence Model (1952) but also in Eysenckian Model (1967), Pandit (1969), Sridhar et al. (1973), Mohan and Kumar (1979) and Jain (1981).

It has been reported by many investigators that HA facilitates performance on simple tasks but deteriorates the same on complex tasks (Wenar, 1954; Spence, 1956; Sarason, 1961; Pandit, 1969; Mohan and Kumar, 1979; Jain, 1981 and Chadha, 1982). Mohan and Kumar (1979) reported that HA facilitated performance on simple sets of Raven's progressive matrices but deteriorated the same on the complex sets.

One of the techniques to reduce the level of anxiety and the tension provoking situation is to provide knowledge of results to the Ss. The KR reduces the degree of uncertainty by informing the Ss whether they are on the right track. However, there are two pertinent questions which need our attention. One, what role does KR play in the performance of high anxious and low anxious Ss, and two, how different levels of anxiety and KR interact with the initial right or
Keeping these questions in view, the effects of praise and blame have been related to test anxiety as well as general anxiety. In the case of praise, the effects appear to be independent of the anxiety level of the S. In the case of blame, and considering first of all, test anxiety, Eysenck (1964), reviewed four such studies that found a significant interaction between the effect of blame and the anxiety level of the subject. He also reviewed equal number of studies reporting absence of such interaction. He reported three more studies indicating that failure tends to improve the performance of low anxiety Ss; but the same had no effect on the performance of high anxious Ss. However, one of these studies reported opposite result, i.e., the HA Ss performed better under stress than the LA subjects. With regard to general anxiety, Eysenck (1964) reviewed six studies reporting a significant interaction between the effects of blame and the anxiety level of the S and eight studies reporting no such significant interaction between the two. The studies reporting interaction indicated that blame tends to improve the performance of low anxiety Ss and worsen the performance of high anxiety Ss. But in two studies the performance of high anxiety group improved after blame. Four studies indicated that after blame low anxiety Ss performed better than high anxiety Ss, while four studies reported no such interaction.

Morocco (1978) while studying the effects of feedback on situational anxiety and task performance reported that all
the subjects acquired the performance task, but that the Ss were more receptive to positive enhancement (praise) than negative feedback (blame) which threatens their self-image.

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. With the preceding background in view, the investigator surveyed a few studies available where subjects were classified into anxiety or N/S groups, and a learning situation provided in which KR could be extrinsically given. Mohan and Mann (1970) using reaction time, Mohan and Gupta (1972) using weight estimation, Mohan and Malhotra (1974) using tone discrimination and Mohan and Deol (1983) using time estimation, reported insignificant correlation between N and performance on above stated tasks when KR was used.

Peter (1978) studied the effect of KR and test anxiety in linear programme and reported that the anxiety level did not affect their performance in the low and moderate error rate programme under KR and no KR condition, and no interaction between KR and treatments (high and low anxiety) conditions. Morocco (1978) while studying the effects of feedback on situational anxiety and task performance reported that feedback facilitated the performance of all the Ss irrespective of the situation. Bitner (1978) reported that low anxiety Ss performed better than high anxiety Ss on achievement tests. Ahiya (1979)
in his study 'Effects of feedback on performance of high, average and low anxious Xth grade girls at knowledge, comprehension and application levels, reported no significant difference between the mean performance of the three anxiety groups. Bayti (1979) studied effect of KR on different anxiety groups and found that KR improved the academic performance of all the three groups i.e. high average and low anxiety. Bruin (1979) while studying the effects of immediate knowledge of results and test anxiety on academic achievement reported that the Ss did not show significantly different achievement irrespective of their anxiety level or provision of KR. However, the pattern of the group means suggested that the performance of facilitators and least affecteds might have been inhibited while that of debilitators and most affecteds might have been enhanced by KR. Baities et al. (1982) found that low anxiety Ss benefitted somewhat from both types of feedback relative to no feedback whereas high anxiety subjects were not affected by error oriented feedback and somewhat hinderance by success oriented feedback. Bethge et al. (1982) reported that feedback reduced test anxiety and negative orientation to the testing situation and thus improved the performance of the anxiety Ss. Mohan and Deol (1983) studied the effect of N and KR on time estimation and reported insignificant correlation between N and performance on time estimation. The trend, however, was reported to be in favour of neurotic group.

Thus the research evidence in the area of psychomotor,
perceptual and intellectual learning indicate no significant difference between the performance of extraverts and introverts, when the performance is coupled with KR. The trend, however, was always in favour of the introverts. This is because, the prolonged work periods ultimately become instrumental in bringing down the performance of extraverts.

With regard to anxiety and performance with KR, the investigators have not been able to reach the consensus, due to inconsistent results. However, Ar-kin and Walts (1983) empirically proved that knowledge of results works in both, the positive and negative direction in the initial stages of KR. They viewed that immediate feedback can either increase or decrease the test anxiety response. Students performing well clearly benefitted from information verifying the facts and students performing poorly, lost still further ground when they were aware of their poor performance.

PERSONALITY AND EXTINCTION

According to Eysenck-Frank (1956) hypothesis, introverts being associated with cortical arousal and excitation, slow accumulation of Ir and its faster dissipation, are expected to learn faster and extinguish it slowly. On the other hand, extraverts, being associated with inhibition, faster accumulation of Ir and its slow dissipation, are expected to condition slowly and extinguish faster. On the dimension of N or anxiety, Taylor and Spence hypothesis (1951, 1953) in continuation with Hull's theory (1943) suggests that high
anxiety Ss, due to high drive level, condition sooner and extinguish slowly in comparison with their low counterparts.

Frank (1956) studied conditioning and personality with regard to E/I and N dimension. Each S was given 30 reinforcements randomly interspersed with 18 test trials called acquisition phase, followed by 10 extinction trials for both PGR and eyeblink reflexes, in all the 3 groups of 20 dysthymics, 20 hysterics and 20 normals. The author reported that (a) Dysthemic (Neurotic introverts) gave significantly more conditioned responses than hysterics (Neurotic extraverts) both for acquisition and extinction trials (b) The anxiety states conditioned much better than the hysterics.

But, there is a relative paucity of scientific investigation on the effect of KR and subsequent extinction, if any, on withdrawal of KR. So a further probe into the factor of personality with regard to acquisition and extinction is considered worthwhile.

INTELLIGENCE AND PERFORMANCE WITH KR

According to Vernon (1961), intelligence is positively related with learning. It implies that the more intelligent an individual, the more readily and extensively he will be able to learn; and the bright and the dull individuals thus ought to have diametrically opposite rates of learning. But numerous empirical studies, conducted in the field of intelligence and learning of different tasks, have reported inconsistent results. According to Mohan and Gupta (1984), "there has been
Though a major bulk of studies report superior performance of bright subjects in comparison with the dull ones (Wilson, 1928a; Jenson et al. 1968; Mohan and Suri, 1972; Sharma and Mehtani, 1980; Sharma and Aggarwal, 1980; Mohan, J. et al., 1982) there do exist a few studies which report no significant difference between the performance of the two groups (Wilson, 1928b; Johnson, 1958; and Cromwell et al., 1961).

On the other hand, Wallin (1929 in Mohan and Dharmani, 1976) using tasks of backward counting, Osipova (1933) using knee jerk conditioning and finger withdrawal, Laycock and Stenley (1942) with reproductive tasks, Johnson (1958) using psychomotor tasks and Mohan and Dharmani (1976) with verbal conditioning found the retardates and dull subjects superior to normals and brights.

Regarding the effect of KR on learning and intelligence, Kennedy et al. (1962) while studying the effectiveness of praise and blame as a function of intelligence on card discrimination task pointed out that average and inferior intelligence groups benefitted more when praised and the above average group improved more when blamed. This differential effect of praise/blame must be explained in accordance with Mohan and Gupta (1984). The dull group may have been so used to failures and reprimands that praise was something novel for them and so motivated them more. On the other hand bright group may have taken praise for granted and blame came as a
shock to them, again motivating them to do better." However, Mysenck (1964) has reported a few studies where praise/blame had just the opposite effect on these groups i.e. where praise deteriorated the performance of low ability groups and improved the performance of high ability group and blame deteriorated the performance of high ability group instead of improving it.

Weisz John (1981) reported that retarded subjects showed striking deterioration after negative feedback while non-retarded Ss showed no such deterioration.

Some direct evidence is reported indicating the differential effect of KR on bright, average and dull subjects the results are again inconsistent. Mohan and Malhotra (1974) using an auditory discrimination learning, reported that their dull subjects were showing higher acquisition rates in comparison to the average and bright subjects. Gupta (1978) using line drawing and weight estimation, reported superiority of low intelligence group over high intelligence group in acquisition rates of both the tasks. The difference, however, could not reach significance level. Bayti (1979) studied the effect of KR on academic achievement on different intelligence groups and reported that below average and average subjects improved significantly when KR was introduced to experimental group. Mohan and Gupta (1984) while working on weight estimation reported no significant difference between dulls and brights. However, the trend was reported to be in favour of dull ones.
In contrast with the above studies, a few studies have been reported bearing just the opposite result, i.e., the superiority of the brights over dulls. Betz (1977) studied the effects of immediate KR on performance on a computer administered test of ability and reported that high ability group mean test scores under KR conditions were significantly higher than under no KR conditions on both the conventional and adaptive tests. While the low ability mean test scores were superior on conventional testing strategy alone. Joshi and Gakhar (1980) studied the effect of intelligence and KR and reported that intelligence and KR and the interaction of these two had significant effects on algebraic concept formation, KR condition showed better performance on all levels of I.Q., and high intelligence and active KR group demonstrated best results by gaining more scores as compared to other eight groups. Holden and Corrigan (1982) using pursuit target task demonstrated that the non-retarded group remained closer to the retarded group under all feedback conditions.

Prestwood (1979), however, studied the effect of KR and intelligence on learning with respect to task complexity and reported a significant interaction between KR, task difficulty and performance.

**INTELLIGENCE AND EXTINCTION**

The results, so far, indicate that the performance decrement takes place after the cessation of reinforcement or
KR. This decline in performance is empirically reported to be significant in case of retardate sample. As the role of KR is directional, motivational and goal-directed, it has long lasting effects in normals Ss who are supposed to have stronger memory traces for a longer duration of time. While the opposite is true with the low intelligents and dulls, in whose case, a memory deficit is assumed and as such prolonged beneficial effects of KR would fail. On this assumption Mohan and Vohra (1964) conducted a study on mentally retarded sample. They reported a significant deterioration in performance after the withdrawal of KR.

Due to dearth of work in the field of intelligence and performance (with KR) on weight estimation, and practically no work on Muller Iyer illusion, more work is required in this area with greater specification of conditions of intelligence, personality, anxiety and task with KR. The present study, thus, attempts to find the differences, if any, in the acquisition of efficiency and its subsequent extinction after the withdrawal of KR, on weight estimation and Muller Iyer Illusion when two levels of E, two levels of anxiety and two levels of intelligence and two frequencies of KR are used with high school students.

**TASK SPECIFICITY**

Different investigators have employed numerous tasks in order to demonstrate the facilitative effect of KR on performance. But KR does not affect their performance equally
well on all the tasks. Mohan (1969) maintained that some of the psychomotor tasks used repeatedly in the area of KR can be grouped together, e.g., line drawing, time estimation, weight estimation, reaction time, letter cancellation, backward figure writing etc. Mohan (1969) reported insignificant relation between the acquisition rates of two different tasks of line drawing and time estimation. This was accounted for due to the difference in the nature of the two tasks which resulted in poor relation (+.187) for the total sample for male (-.02) and for females (+.176) in the two acquisition rates. Mohan (1977) speculated two possible reasons for these low and insignificant correlation. One, the performance on various tasks is an independent activity. The author supported her argument on the basis of Duncanson's (1964) observation that each learning task requires its own specific ability. Secondly, she maintained that the factor which may account for such anomalies is the difference in the difficulty levels of the various tasks used, like, line drawing (Thorndike, 1931); reaction time (McCormack et al., 1963); time estimation (Waters, 1933; Mohan and Deol, 1983), weight estimation (Mohan and Damral, 1971; Mohan and Gupta, 1972, 1984). This differential difficulty level of different tasks might have a wide range from little improvement to 100% improvement. Mohan (1977) reported certain acquisition rates in support of this variation. For line drawing, the acquisition rates ranged between 17% to 23% (Mohan, 1969, 1973), for estimation of 40 ozs of weight, the rates were in the range from 24% to 56% in children, 27.3% in under graduates (Mohan and Gupta, 1972; and
Mohan and Gupta, 1984) and about 56 % in adult sample (Mohan and Damrel, 1971); for time estimation the range of acquisition rates was higher - 42 % to 52 % (Madan and Dey, 1964; Mohan, 1969; Mohan and Sekhon, 1972; and Mohan and Deol, 1983). This variation may explain to some extent the Locke's (1967) observation about the contradictory results obtained with performance when coupled with KR. Kim and Schuler (1979), in a study, 'The nature of the tasks as a moderator of the relationship between extrinsic feedback and employee responses', reported that the level of employee responses in non-stimulating tasks with high extrinsic feedback was higher than the low extrinsic feedback whereas in stimulating tasks, the level of employee responses with high extrinsic feedback and low extrinsic feedback was both equal. Kim and Schuler (1979) study mentioned above adds the element of stimulation by categorizing the tasks as stimulating and non-stimulating, still other facets e.g. pleasant-unpleasant and the tasks, according and not according to one's frame of reference, may be added as some other dimensions to the nature of the task.

Mohan (1969) suggested "Till such time when the used tasks are matched in levels of complexity and graded according to difficulty level, improvement with KR on one task may not be the same as that on another."

2. EXPERIMENTAL VARIABLES

The second kind of factors affecting learning and performance when coupled with KR, are experimental variables.
Some of these are: precision of KR, delay of KR, frequency of KR and distribution of trials. This cluster of factors would include those alterations in the administration of KR which are manipulated on the experimental set (Mohan, 1977). Ammons (1956) and Mohan (1977) made an exhaustive review of these factors. These factors are dealt with here in the following section, one by one.

(i) Precision of KR

The exactness and magnitude of reward is positively related to performance. According to Ammons (1956), "The more specific the information contained in KR, the better it is for performance". Alternatively, the more precise the information delivered to the subject, the more rapid the improvement and the higher the level of performance. This effect is, thus, primarily a directive one as the precision gives chance to check him from going astray, correct himself and keep himself in limits.

Waters (1933) on estimation of 12 sec. of time, Reynolds and Adams (1953) and Sagne (1954) on a perceptual skill; Kanfer and Marston (1962) on verbal conditioning, Zeigler and Paul (1962), Jones (1968) and Shapiro and Diane (1977) on a motor learning task, De Klark et al. (1978), and Erdos (1980) on rod and frame test. Jensen and Morenz (1961), have all
supported the contention that improvement in performance is roughly proportional to the degree of information given about the correctness of the response.

According to Ammons (1956), there seems an optimum precision of KR beyond which additional KR will lead to no more improvement. Newell and Kennedy (1978), however, related this optimum precision level of KR with developmental age in motor learning by empirically showing a curvilinear relationship between KR and age. According to these authors, very precise and very imprecise levels of KR produced a poorer performance, and the optimum level of KR became more precise with age.

(ii) Delay of KR

According to Ammons (1956), "The longer the delay in giving KR, the less effect the given information has". This generalization has been supported by many studies in this field. Keller (1943, 1945) on code reception, Angell (1949) on Chemistry quiz; Houston (in Ammons 1956) on pedestal sight manipulation test; Sax (1960) on paired associate learning of Chinese symbols with nonsense syllables; Larvey (1964) on tossing skill; Dyal (1964) on line drawing; Walters (1964) on children learning; Dyal et al. (1965) on discrimination problems with the mentally retarded; Paige (1916) on chemistry quiz. Wright and Gescheider (1970) on paired associate learning; Govardhan (1972) on simple learning, reported a corresponding increase in the errors with the increase in
delay of KR. Wright and Gescheider (1970) explained the superiority of immediate KR group on the basis that the effective KR seemed to minimize the interference generally assumed to develop during the normal course of paired associate learning.

In addition to these, there do exist a few studies that reported no significant difference between the performance of the immediate KR group and delayed KR group (Cooper et al., 1975 on stimulated carrier landing tasks, CHAR and Robuts 1978 and Wager Susan, 1984).

According to Mohan (1977), there is an optimum level of delay of KR which serves to increase the rate of performance. Bronckbill et al. (1964) conducted a series of twelve experiments using a wide variety of tasks. It was consistently found that the delay of feedbacks and rewards during learning was related to improved retention. According to Ward and Baumeister (1971), at least 4 temporal interval of delays may be distinguished. Usually delay upto 12 sec. are found to be beneficial (Jones and Bourne 1964; Baumeister and Hawkins, 1966). In practice, however, it is the nature of the experiment, the task used and conditions manipulated which determine the effect of delayed KR.

In view of the above quoted studies, it is concluded that the delay of KR decreases the efficiency of doing the work and rate of acquisition. Hence this factor needs no further probing.
(iii) Frequency of KR

"The efficiency in doing some performance increases with the increase in frequency of KR" (Ammons, 1956). Thus, the more often the KR is given, the better and faster is the learning. The amount of KR may be considered to have two dimensions. One is the precision of KR, the other dimension along which the amount of KR may vary, is the proportion of trials on which KR is delivered. This dimension is termed as 'frequency of KR'. It runs from 0 % to 100 % KR. It is 100 % when presented on all the trials and 0 % when not presented on any trial in the experimental situation. When KR is provided only on half or one fourth or three-fourth of the trials, the frequency of KR is 50 %, 25 % and 75 % respectively. The frequency of KR in a given situation can be scheduled in a periodic or aperiodic manner. The trial intervals after which KR is intermittently delivered are the same in periodic scheduling of the KR while in aperiodic scheduling of KR, they are interspread randomly in the total range of trials (Madan, 1961).

Houston (in Ammons 1956) using pedestal sight manipulation test for ranging and tracking on 3 different groups with 100 %, 50 % and 25 % frequencies of KR reported the superiority of the 100 % KR group over other two groups. Bilodeau and Bilodeau (1956) also supported the above findings. McGuigan (1959) using a line drawing (6") task, reported the superiority of 100 % KR group over 55 % and 10 % KR group. Abbey and Cowman (1960) using Toronto Complex Co-ordination apparatus
for tracking movement tasks, provided continuous and intermittent KR to two different groups. They reported the superiority of the former group that secured approximately 100% more matches per minute and were less variable in performance in comparison with the intermittent KR group. Hill et al. (1962) on T maze learning and Wiener (1963) on monitoring task, also reported the superiority of the 100% KR group over partial KR group.

Madan and Dey (1964), using estimation of 7 sec. time, revealed the highest acquisition rates for the 100% KR group (64.21%). Johnson and Payne (1966) studying visual vigilance task, reported significant difference between 0% and 25% groups and 25% and 50% group, but none between 50%, 75% and 100% KR groups. Lorain (1970) Using paired associate learning, Mohan and Damral (1971) and Mohan and Gupta (1972, 1984) using weight estimation, Gupta (1978) using the line drawing and weight estimation, Gerson (1979) using pursuit rotor task, also reported the superiority of 100% KR group over partial KR group. Linda and John (1979) studied retention of a motor skill on 87 Ss. They reported that it is the strength of the perceptual trace that determines retention. They argued that the perceptual trace of a criterion position gains an increment of strength each time the feedback stimuli associated with the criterion position are experienced. Mohan and Deol (1983) on time estimation; Mohan and Vohra (1984) on a line drawing task using a retarded sample; and Mohan and Dhingra (1985) on paired associate learning, also supported the above mentioned results. Mohan, Gupta and Sharma (1985), however,
reported only a trend in favour of 100% KR group in comparison to 50% KR group on a line drawing task.

However, there do exist a few studies reporting no significant difference between the performance of groups with different frequencies of KR. (Goldstein and Rittenhouse and Rosen, 1961 on instrumental reward learning; Mohan and Mann (1970) on choice reaction time, and Mohan, Gupta and Sharma, 1985 on line drawing). Probing on the causes of the difference in the results, Mohan (1977), contended that, this may be because of some inherent property in the task which provides the individual some automatic KR and therefore, the frequency of KR does not provide any differential results. Massel and Grassnickle (1965) hypothesized that greater the subject's uncertainty concerning the responses in paired associates, the greater is the information contained in KR and hence the greater the amount of learning.

**Frequency of KR and Extinction**

It is considered that different frequencies of KR affect the acquisition of efficiency and extinction differently. This fact is empirically supported by so many studies conducted in the field of conditioning. Jenkins and Stanley (in Madan, 1961) arrived at an empirical generalization 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 responses." This fact has been supported by many studies.
In one of these studies by Hartman and Grant (1960), the effect of 25%, 50%, 75% and 100% random reinforcement upon the acquisition and extinction of the conditioned eyelid response in human subjects was measured. It was found that during the 20 extinction trials, the groups receiving lower percentages of reinforcement offered resistance to extinction in comparison with other reinforcement groups. Myers (1960) using learning of an operant response in children, Roger (1962) on instrumental learning and Lorain (1970) on paired associate learning, have reported that 50% and 66% KR groups were more resistant to extinction in comparison to 100% KR group. However, Bilodeau (in Ammons, 1956) did not report any significant difference between the performance of different KR groups after the withdrawal of KR.

In the light of above mentioned inconsistent results regarding both the acquisition and extinction, a further probe into the frequency of KR would be desirable.

(iv) Distribution of Practice and KR

Distribution of practice is the amount of interval which is interposed among the trials given on a task. When the amount of interval, thus interposed, is considerable, practice is said to be distributed or spaced. Conversely, the term massed practice is applied when the amount of interval is relatively inappreciable (Madan and Dey, 1964).
Ammons reported in his review (1956) that massing of practice is facilitative in performance on motor tasks, since, the subjects could 'hold the feel' in the form of a 'memory trace'. He generalized that in the case of discontinuous tasks, when KR is given, small intervals between trials are generally more beneficial in learning than the longer ones. He based this generalization upon the study done by Macpherson et al. (1948). The Ss were required to push a lever up to a given pressure against a weight. The Ss preferred interval of only a few seconds because these short intervals allowed them to "hold the feel" of the correct movement. Ammons (1956) suggested that there might also be an additional effect of the short intervals, in that the Ss had less time to let their attention wander. On the other hand, Madan and Dey (1964) observed spacing of trials to yield somewhat better results in estimation of 7 seconds of time when KR was administered. This finding is more in conformity with Hull's (1943) concept of reactive inhibition, which would build up more in case of massed practice, and have more time to dissipate in spaced practice.

Archer (1954) (In Gupta 1978) used inverted alphabet printing as a task for which three different groups of Ss were given different degrees of spacing of trials i.e., greatest (30 secs.) intermediate (15 secs.) and no rest pause at all after each trial. Thus, the last group had to work for 10 minutes of continuous performance. The results indicated clearly that the performance was superior under 30 seconds.
interval followed by 15 sec. interval conditions. The mass practice-group's performance was the lowest. Mohan and Damral (1971) found no significant differences in distribution and mass practice on the task of weight estimation. It was found that performance under spacing of practice condition combined with 100% KR was significantly better than under mass practice condition with 33% KR.

Thus, the bulk of literature suggests that the variable of practice, if varied within a small extent, is unconsequential. It may be inferred, in the light of above mentioned studies, that spaced practice will produce significantly better performance than mass practice on various tasks and this factor does not require any further probing.

A brief review of the variables affecting performance with KR on a variety of tasks shows that some of these variables have repeatedly yielded unequivocal results, while others are yet in the process of scientific probing and conclusions. Some of these variables may be viewed as independent. Their different permutations and combinations may either increase or decrease the performance of the subject. So, there still exists the need to conduct further research in the area of learning with KR, wherein some variables are experimentally manipulated and controlled so that their interactive effect on performance can be brought forth.