Lecture 6

Book: Behavior Modification- What it is and How to do it

Chapter 6: Developing Behavioral Persistence Through the Use of Intermittent Reinforcement

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Summary

Schedule of reinforcement: Schedule of reinforcement is a rule specifying which occurrences of a given behavior, if any, will be reinforced. The simplest schedule of reinforcement is continuous reinforcement which is an arrangement in which each instance of a particular response is reinforced. Similarly, extinction is the opposite of continuous reinforcement, in an extinction schedule, no instance of a given behavior is reinforced.

Intermittent reinforcement: Intermittent reinforcement is an arrangement in which a behavior is reinforced only occasionally or intermittently rather than every time it occurs. It lies between the two extremes of continuous reinforcement and extinction. Many activities in the natural environment are not reinforced continuously. For e.g. working for a week before getting one's weekly paycheck.

While behavior is being conditioned or learned, it is said to be in the 'acquisition phase' and when it has become well learned, it is said to be in the 'maintenance phase.' It is best to provide continuous reinforcement during acquisition and then to switch to intermittent reinforcement during maintenance. The advantages of intermittent schedules are as follows:

1. The reinforcer remains effective longer because satiation takes place more slowly.
2. Behavior that has been reinforced intermittently tends to take longer to extinguish.
3. Individuals work more consistently on certain intermittent schedules.
4. Behavior that has been reinforced intermittently is more likely to persist after being transferred to reinforcers in the natural environment.

Another important concept is the distinction between 'free operant procedures' and 'discrete trials procedures'. A 'free operant procedure' is one in which the individual is free to respond repeatedly in the sense that there are no constraints on successive responses. For e.g. is a student

has been given a worksheet containing 12 math problems to solve, she could have worked at various rates such as 1 problem per minute, 3 problem per minute etc. In a 'discrete trials procedure' a distinct stimulus is presented prior to an opportunity for a response to occur and be followed by reinforcement, and the next response cannot occur until another stimulus is presented and so on. For e.g. is a teacher presented a math problem to a student and waited a brief time for her to solve it, following which the teacher presented another problem to the student and so on.

Ratio schedules: In a 'fixed ratio schedule' a reinforcer occurs each time a fixed no. of responses of a particular type are emitted. In general, the higher the ratio at which an individual is expected to perform, the more important it is to approach it gradually through exposure to lower ratios. The optimal ratio value that will maintain a high rate of response without producing ratio strain must be found by trial and error. When introduced gradually, fixed ratio schedules produce a high steady rate until reinforcement followed by a post reinforcement pause. The length of the post reinforcement pause depends upon the value of the fixed ratio. The higher the value, the longer the pause. Fixed ratio schedules also produce high resistance to extinction. Example of fixed ratio schedule is a coach asking players to do 20 pushups before taking a break. In this case the fixed ratio is 20. On the other hand, in 'a variable ratio (VR) schedule', a reinforcer occurs after a certain no. of a particular response, and the no. of responses required for each reinforcer changes unpredictably from one reinforcer to the next. The no. of responses required for each reinforcement in a VR schedule varies around some mean value, and this value is specified in the designation of that particular VR schedule. For e.g. that over a period of several months a door to door sales person averages one sale for every 10 houses called on. This does not mean that the sales person makes a sale at exactly every 10^{th} house. It might occur at two houses in a row or 5 houses in a row or may have to call on a large no. of houses before making a sale. Over several months however, a mean of 10 houses is required to produce reinforcement. The VR also produces a steady rate of responding but produces no or minimal post reinforcement pause. Ratio schedules (both variable and fixed) are used when one wants to generate a high rate of responding and can monitor each response. Fixed (FR) is more commonly used than VR in behavioral programs as it is easier to administer. A type of reinforcement schedule that is becoming increasingly popular in applied settings is progressive ratio (PR). It is similar to an FR schedule but the ratio requirement increases by a specified amount after each reinforcer. At the beginning of each session, the ratio requirement starts back at its original value. After a no. of sessions, the ratio requirement reaches a level called the 'break point' or 'breaking point' at which the individual stops responding completely. The typical effect of a PR schedule is an increasingly longer pause after each successive reinforcer and an indefinitely long pause at the break point. The main application of PR is to determine how potent or powerful a particular reinforcer is for an individual. The higher the reinforcers' break point is for the individual, the more effective the reinforcer is likely to be in a treatment program for that individual.

Simple interval schedules:

- Fixed interval schedule: In this schedule, a reinforcer is presented following the first instance of a specific response after a fixed period of time. The only requirement for a reinforcement to occur is that the individual engage in the behavior after reinforcement has become available because of the passage of time. The size of the FI schedule is the amount of time that must elapse before reinforcement becomes available. For e.g. two young children who play in the morning and a parent prepares a mid morning snack for them 2 hours after breakfast. Again after 2 hours lunch in prepared. Thus the children may make trips to the kitchen asking if food is ready in a period of every 2 hours. The childrens' behavior of going to the kitchen is characteristic of behavior reinforced on a FI schedule.
- Variable interval schedule: in this schedule, a reinforcer is presented following the first instance of a specific response after an interval of time, and the length of the interval changes unpredictably from one reinforcer to the next. In a VI schedule, a response is reinforced after unpredictable intervals of time. Checking one's mail box for mail or computer for email are examples of VI schedules in the natural environment.

Interval schedules with limited hold: A limited hold is a finite amount of time after a reinforcer becomes available that a response will produce it. A limited hold is essentially a deadline for meeting the response requirement of a schedule of reinforcement. That is, once a reinforcer is set up, its availability is "held" only for a limited period. In the natural environment, a good approximation of a fixed interval limited hold schedule is waiting for a bus. Buses usually run on a regular schedule. An individual may arrive at the bus stop early, just before the bus is due, or as it is arriving – it makes no difference for that person will still catch the bus. So far this is like an FI schedule. However, the bus will wait only a limited time e.g. 1 minute. If the individual is not at the bus stop within this limited period of time, the bus goes on and the person must wait for the next one.

Duration schedules: in a fixed duration schedule (FD) a reinforcer is presented only if a behavior occurs continuously for a fixed period of time. The value of the FD schedule is the amount of time that the behavior must be engaged in continuously before reinforcement occurs. In a variable duration schedule (VD) a reinforcer is presented only if a behavior occurs continuously for a fixed period of time, and the interval of time from reinforcer to reinforcer changes unpredictably. The mean interval is specified in the designation of the VD schedule. Both FD and VD produce long periods of continuous behavior. The FD schedule however produces a post reinforcement pause whereas the VD schedule does not. Behavior modification schedules use duration schedules only when the target behavior can be measured continuously and reinforced on the basis of its duration.

Concurrent schedules of reinforcement: When each of two or more behaviors is reinforced on different schedules at the same time, the schedules of reinforcement that are in effect are called concurrent schedules of reinforcement. In 1961, Richard Herrnstein proposed the matching law,

which states that the response rate or the time devoted to an activity in a concurrent schedule is proportional to the rate of reinforcement of that activity relative to the rates of reinforcement on other concurrent activities. Research has indicated other factors that are likely to influence one's choice when several schedules are available. They are: the types of schedules that are operating; the immediacy of reinforcement; the magnitude of reinforcement and the response effort involved in the different options.

Guidelines for the effective use of intermittent reinforcement:

1. Choose a schedule that is appropriate to the behavior you wish to strengthen and maintain.
2. Choose a schedule that is convenient to administer.
3. Use appropriate instruments and materials to determine accurately and conveniently when the behavior should be reinforced.
4. The frequency of reinforcement should initially be high enough to maintain the desired behavior and should then be decreased gradually until the final desired amount of behavior per reinforcement is being maintained. Always remain at each stage long enough to ensure that the behavior is strong.
5. In language that he or she can understand, inform the individual of the schedule you are using. A no. of studies indicate that people perform more efficiently when if they have specific rules to follow regarding the schedule in effect.