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Reinforcement and Its Educational Implications

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Abstract

This paper focused on the nature and concept of reinforcement and its educational implications. Reinforcement is the process of increasing or stamping in desirable behaviour of an individual through the mechanisms of positive, negative, primary or secondary reinforcers respectively. A reinforcer is the pleasurable stimulus that leads to an effect called reinforcement. Conditions or patterns of administering reinforcement are continuous schedule and partial (intermittent) schedule patterns. Partial schedule is sub-divided into ratio and interval with each having fixed and variables schedules respectively. There are also interactions between the conditions of reinforcement. A list of educational implications of reinforcement were outlined. Reinforcement as a behaviour modification technique can be applied to a wide range of behaviour problems and can be used in every human setting but its monotonous application makes reinforcement to lose its values before the client.

Keywords: Reinforcement, Conditions of Reinforcement, Educational Implications.

Introduction

Behavioural learning theories are theories propounded on how learning takes place by a group of psychologist who emphasize chiefly the observable and measurable aspects of human behaviour, stimuli and responses. They also emphasize the place of reinforcement and punishment in the learning process. Nwankwo (2001) noted that the major proponents of these theories include I. P. Pavlov, E. L. Thorndike and B. F. Skinner. The behaviorists believe that learning occurs through the process of conditioning with reinforcement as an important factor in the process. Two learning processes, according to Nwankwo (2001), the classical and operant conditioning are sub-summed under behavioural learning theories. A third behavioural process according to Vipene (2005) is the social learning approach by Albert Bandura. Thus, for clearer understanding of the topic of this paper (reinforcement), the nature and concepts of reinforcement is explained; followed by the mechanisms of reinforcement; conditions or schedules of reinforcement; interaction between conditions of reinforcement; educational implications; advantages and problems of reinforcement, and then summary.

The nature and concept of reinforcement

The principle of reinforcement is a psychological concept based on the idea that the consequences of an action will influence future behaviour. Rewarding behaviour is considered reinforcement, because it teaches the subject that the behaviour is desired, and encourages the subject to repeat it. Punishing a behaviour, on the other hand, teaches the subject that the behaviour is not desired, and should not be repeated. Punishment and reinforcement are important part of operant conditioning, used in many psychological experiments, (online, available, 5/5/2010, http://www.wisegeek.com/in-psychology-what-is-reinforcement.htm). Iheanacho (2002) observed that reinforcement can be said to be at the centre of the process of operant conditioning as it is virtually impossible to ignore it. Thus, reinforcement is the procedure or process of increasing or stamping in desirable behaviour of an individual. Example, a little girl that washes her plate after eating and receives a gift of biscuits is likely to put in more effort in other times. Reinforcement strengthens behaviour; it also intensifies some aspects of behaviour increasing the current value of response. It can change behaviour permanently or for a while. Meanwhile, withdrawal of reinforcement leads to the weakening of a new response (Isangedighi, 2007).

Baron (1998) noted that reinforcement is an important concept in education especially in promoting learning in the classroom situation. It is thus an accelerative behaviour modification technique. Behaviour of people is normally influenced by its immediate consequences. Consequences could be pleasurable to the organism and thus strengthen or encourage the repetition of such behaviour. On the other hand, consequences could be aversive or unpleasant to the organism and thus reduce the occurrence of the behaviour that preceded it. Pleasurable consequences are generally called reinforcers while unpleasant consequences are called punishers. Here we are concerned with reinforcers and their effects (reinforcement). Thus a reinforcer is a thing or a stimulus. Reinforcement is not a stimulus but rather its effect. Thus, whenever an event following an operant increases the probability that the operant will occur in similar situations, the process or effect and the consequences constitute reinforcement while the consequence is the reinforcer (Chauhan, 2002). Put in another way, reinforcement is the addition of pleasant stimulus to a situation or the withdrawal of a pleasant stimulus from a situation in order to increase or strengthen the response that preceded the stimulus (Nwankwo, 1995).

Mechanisms or types of reinforcement

Mechanisms or types of reinforcement are the processes by which reinforcers produce their reinforcing effect and strengthen behaviour that they follow. Conceivably, reinforcement may directly strengthen stimulus-response association; or reinforcement may affect the "willingness" or motivation of the learner/organism to engage in certain behaviours, or reinforcement affects both of these processes.

The following are the interpretations of the effects of reinforcement.

Positive reinforcement

Heward and Cavanaugh (1997:144) stated, "Whenever the presentation of an event following an operant increases the probability that the operant will occur in similar situations,

psychologists call the process and consequence positive reinforcement. The consequence is also known as a positive reinforcer". Thus a positive reinforcer is a stimulus that increases the probability of a response or behaviour occurring when it is added to a situation. Example, if you give biscuits to a child for running outside to welcome you from work or market and the welcoming behaviour continues; the process is positive reinforcement; the biscuits are positive reinforcers. Alexander and Jetton (1996:57) noted, "Whenever a teacher smiles at a student, says something pleasant to him, commends him for his work, assigns him a higher grade, select him for a special project or tells his mother how clever he is, the teacher is using positive reinforcement".

Negative reinforcement

Heward and Cavanaugh (1997:146) wrote, "Whenever the removal of a specific event following an operant increases the likelihood that the operant will occur in similar situations, we call both the process and consequence (removal or event) negative reinforcement". Kemjika (1996) noted that a negative reinforcement is a stimulus that increases the probability of a response or behaviour occurring when it is removed from the situation. Example, if a student is removed as a perfect because its duties affect adversely his academic performance. Then consequently his academic performance increases tremendously onward, the phenomenon is negative reinforcement. "If home work is seen as an unpleasant task, release from it will be reinforcing. Reinforcers that are escapes from unpleasant situation are called negative reinforcers" (Slavin, 2000:115).

In negative reinforcement, the stimulus or event removed is normally unpleasant to the organism while in positive reinforcement, the stimulus or event added or presented is normally pleasant to the receiver. Thus reinforcers, both negative and positive tend to strengthen repetition of particular behaviours.

Primary reinforcement

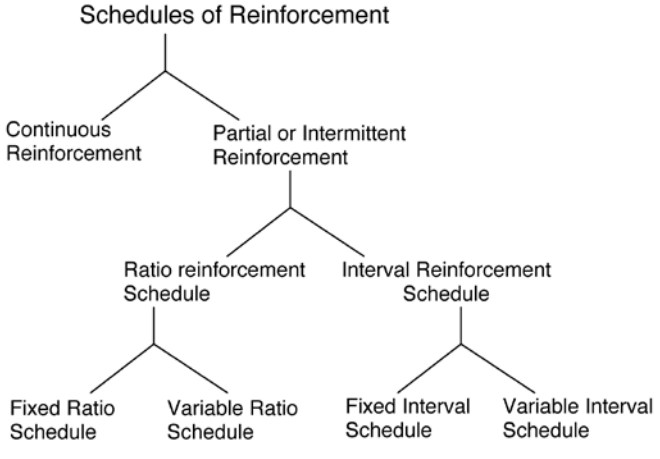
Berk (1997) explains primary reinforcer as a stimulus any deprived organism will approach, adding that primary reinforcers interact with the organism's physiological (or biological) state. That means they are important for the survival of the organism. They are events or behaviours that possess natural occurring reinforcing properties as a result of the intrinsic characteristics of the species that are being considered. Primary reinforcers identified are sleep, food, water, air, sex, moderate temperature, escape from pain, etc. However, "the reinforcing value of different primary reinforcers varies due to multiple factors (e.g. genetics, experience). Thus, one person may prefer one type of food while another abhors it. Or one person may eat lots of food while another eats very little. So even though food is a primary reinforcer for both individuals, the value of food as a reinforcer differs between them", (online, Wikipedia, the free encyclopedia). No wonder Reber (1995) explained that a lot of experimental works to isolate the absolute property of primary reinforcers (also known as biological or unconditioned or innate reinforcers) failed. Without going into the dilemma, primary reinforcer could be simply viewed as "a stimulus that naturally strengthens any response it follows" (Berk, 1997).

Secondary reinforcement

This is also known as conditioned or derived reinforcer. According to Wieklkiewjez (1995:98) "secondary reinforcer is that stimulus that reinforces because it was initially associated with a primary reinforcer". It lacks intrinsic reinforcing properties since such reinforcing values are acquired, a common example is money. Nwankwo (2001) observed that secondary reinforcers are events or stimuli that function to meet the psychological needs of organisms, sometimes on their association with primary reinforcers. Example, money is not primary reinforcer because it does not in itself satisfy biological needs of individuals; money rather as a secondary reinforcer can be seen to have the value to purchase things, for example like food, house, etc to meet the psychological needs of the organism like joy and satisfaction. The grade (secondary reinforcer), a student makes in his class may have little or no value to him unless his parents or others value him and praise him. The student now derives joy, happiness and love, warmth and acceptance which are psychological needs of the organism. Iheanacho (2002) concludes that secondary reinforcer is a previously neutral stimulus that has acquired the capacity to strengthen responses because that stimulus has been repeatedly paired with food or some other primary reinforcers.

Conditions or schedules of reinforcement

Several conditions of reinforcement can affect the rate of learning and final performance level attained. Because of the central position of reinforcement in educational process, it is necessary to lay more emphasis on its classroom or domestic application (Nwankwo, 2001). To Nwankwo conditions or schedule of reinforcement refers to the plan or pattern of administration of reinforcement to the beneficiaries. Hence this paper defines the schedule of reinforcement as a condition or rule guiding the delivery or administration of a reinforcer. It is the schedules of reinforcement that enables the experimenter to control the rate of the subject's responds. The delivery of a reinforcer is normally delayed until the occurrence of the response. There are two broad categories of schedules of reinforcement –continuous and partial (or intermittent); partial or intermittent schedule of reinforcement is further categorize into ratio and interval and each of these further have fixed and variable schedules respectively as shown in the illustration below.



(*Source:* As sketched by the researchers)

Continuous reinforcement Schedule

When reinforcement is given to an individual each time a desired or correct response is made, the schedule is called continuous (Nwankwo, 1995). It is normally a useful approach for establishing a relatively new desired behaviour or operant. Example, it is worthwhile to provide continuous reinforcement for children who are starting to attend kindergarten for the first time so that such behaviour of going to school will be established in them. Continuous reinforcement to Kemjika (1996) is also a good method to adopt by teachers for students who are not doing well in the class; be it at kindergarten, primary or secondary school levels. That is, such students are continuously reinforced each time they get the correct response. The nature of reinforcers should however differ for the categories of pupils or students; while material reinforcers like biscuits and sweets could do for those in kindergarten, exercise books or pencils may do for those in primary schools, while praises and words of encouragement could do for secondary school students. Continuous reinforcement should be replaced with other forms when the expected behaviour has been established.

Partial or intermittent reinforcement schedule

When some and not all the desired responses are reinforced, only during some instances, it is partial (intermittent) reinforcement schedule. Chauhan (2002) noted that Skinner and his colleagues identified four types of partial or intermittent reinforcement. These include fixed ratio and variable ratio; fixed interval and variable interval schedules. Some are based on time gap or amount of time that elapses between reinforcements and are called interval schedules. The others are based on number of responses correctly made, these are referred to as ratio schedules. As parents and teachers, we should understand these partial schedules and when to apply each in place of continuous reinforcement and as occasion demands (Vipene, 2005).

a. *Ratio-intermittent reinforcement schedule*
   i. ***Fixed ratio schedule: -*** In this schedule, reward is given to the student when once he is able to make a specified number of correct responses. Example, if a teacher decides to reinforce any student who gets three correct responses in a History class, such is fixed ration schedule of reinforcement. It means that the teacher has fixed three correct responses as a basis for reward for any particular student. This schedule encourages students to make more efforts because they know they have to get three correct responses before getting any reward. The teacher should normally inform the students before hand about the fixed number of correct responses (Nnachi, 2007).
   ii. ***Variable ratio schedule: -*** This involves rewarding the students on an irregular unpredictable and non-fixed basis. The student does not know the number of correct responses to make in order to get a reward but the teacher knows. In this schedule, the students may be rewarded after two correct answers at the first instance, then at the next instance after three correct responses and so on (Slavin, 2000). So the number of correct responses that attracts rewards varies from time to time as determined by the teacher. Here the students cannot predict when next they are likely to receive rewards; so the tendency

is that they will always put in their best to attain the unknown unpredictable target (Nwankwo, 1995).

b. *Interval-Intermittent Reinforcement Schedule*

i. ***Fixed interval schedule: -*** In this schedule, there are fixed times or intervals when rewards are given to those students who deserve them. That is, reinforcement is given at an appointed or fixed time, based on cumulative basis, for the correct responses. Schools' administrators and the teachers, may decide to reward deserving students at the end of every month or term or session. It is common to hear about some schools' prize-giving day during which students who excelled in various types of behaviour including social, moral and academic, are rewarded. Such according to Wielkiewjez (2005) is fixed internal schedule of reinforcement.

ii. ***Variable interval schedule: -*** In this schedule, students get rewards for correct responses at variable intervals of time. In this case, there is no fixed time interval, instead varying amounts of time should elapse between the last reinforced response and the next response to be reinforced. This is to say that the first and second batches of rewards could be given at time interval of two and three weeks respectively, then the third could come up at an interval of one month, yet the fourth at time interval of two months etc, (Nwankwo, 1995).

It has been found out that various schedules of reinforcement have different effects on rate of learning in human beings hence Baron (1998:40) wrote:

> *Skinner and his colleagues found for example, that when people are learning a new behaviour, they will learn faster if they are reinforced for every correct response (i.e. continuous reinforcement) and once the response has been mastered, it is generally better to reinforce on an intermittent basis. Fixed ratio schedule was found to be capable of resulting in stable responding, particularly when the ratio of reinforcement is low. The lower the ratio, the more stable the responding because the human or rat is conditioned to make many responses in order to get any reinforcement.*

Furthermore, it has been found out that variable ratio schedule induces the organism to make more responses than a fixed-ratio schedule and that extinction is likely to occur if a response is not reinforced. Teachers are thus advised to maximize the application of various schedules of reinforcement for enhanced learning on the part of students. However punishment which is an opposite phenomenon follows the same schedules as in reinforcement as discussed above.

Interactions between conditions of reinforcement

The similarity of behavioural outcomes noted with positive and negative reinforcement indicates that reinforcement may reflect an anticipated increase in appetitive or a decrease in aversive stimulation. The behavioural change that occurs as a consequence of the transition from one source of stimulation to another, which may produce an opposing state, is referred to as induction or behavioural contrast.

Positive and negative induction

After discrimination training between stimulus paired with reinforcement and one signaling non-reinforcement had occurred, responding to positive conditioned stimulus was enhanced if negative conditioned stimulus shortly preceded positive conditioned stimulus. The unusually high magnitude of the conditioned responses to the positive stimulus following the presentation of negative conditioned stimulus was called positive induction. However, negative induction is a discrimination formed between a compound stimulus signaling non-reinforcement and a stimulus consisting of one element of the compound paired with reinforcement. Thus negative induction is found if the conditioned response remains suppressed to the compound stimulus.

In contrast, removal of a stimulus signaling reinforcement or non-reinforcement activates the opposing process. For instance, inhibition replaces excitation following the termination of a positive stimulus. In a reciprocal fashion, terminating a negative stimulus transforms an inhibitory state into an excitatory one. Although anomalies exist, negative reward produces behavioural effects similar to those found with positive reward when intensity of the aversive stimuli is reduced, when the termination of aversive stimuli is delayed, and when single-alternating schedules of negative reward and non-reward are used (Anderson, 1990).

Behavioural contrast

These are changes in behaviour that arise as a consequence of interactions between reinforcement conditions. Interactions are observed when exposure to more than one condition of reinforcement produces a performance change that exceeds what would normally be found with a single condition of reinforcement.

The significance of the contrast is that reinforcement facilitates and non-reinforcement weakens behaviours that precede them and that similar changes in related behaviours result to the extent of the similarity of other stimuli to the stimuli signaling reinforcement or non-reinforcement. On the other hand, improving the reinforcement to one of the stimuli should enhance performance to that stimulus, and again, depending on the similarity of the stimuli, responding to the second stimulus should also increase. (*Sources*: online, 5/5/2010, htpp://ppathwz.cornell.edu/mbaproject/CIEPC/exmats).

Educational implications of reinforcement

A therapist who wants to use reinforcement to modify a particular behaviour problem should bear the following in mind, as noted by Nwankwo (1995) and Vipene (2005):

1. The therapist should prescribe the desired behaviour expected of the student or client, and communicate same to the client and go ahead to reinforce the behaviour when it occurs.
2. The therapist or teacher should recognize the effect of immediacy of consequences and delayed consequences following any particular behaviour. It is however generally accepted that consequences that follow behaviour closely in time affect behaviour far more than delayed consequences. The application of the

consequences is dependent upon the schedule of reinforcement to be used by the therapists.

3. The client himself is another factor to be considered while using reinforcement. What is reinforcing to John may not be to Tom. The reinforcement menu of any particular client must be identified and prioritized. Considering the client implies determining the nature of the reinforcers to use.
4. Time-gap should also be considered while planning treatment using reinforcement as the intervention strategy. Reinforcers are influenced by time. What is reinfo rcing to a child today may not continue to be forever. Value system is dynamic and changes with time. Thus attractive reinforcer should be used for the client at any point in time.
5. In choosing reinforcers, attention should be paid to their costs and availability. Therapists are usually advised to go for less costly, and easily available reinforcers while planning for problem intervention unless there is special need for the contrary.
6. The teacher or therapist should breakdown new behaviours into smaller parts and provide adequate reward along the way.
7. When students or clients exhibit the desired behaviours and you reinforce them, tell them why, that is feedback, it will encourage them to maintain such behaviour.
8. Immediacy in reinforcing is very vital so when grading an assignment or examination, it is better to present feedback to the students as soon as possible.

Behavioural problems amenable to reinforcement technique

Reinforcement can be used separately or in combination with other techniques to modify undesirable behaviour. Generally speaking, it can be applied to all behaviour problems; such as used to increase the rate of co-operative responses between pairs of children, used in classroom and school setting and home settings. Can be used in speech training and verbal conditioning, and rehabilitation of delinquent. It can be used to increase various forms of desired behaviour; and in various forms or ways to treat anxiety disorders, Somato-form and dissociative disorders etc. In fact, it has universality of application.

Advantages of reinforcement

i. Reinforcement is easy to apply; sometimes it is verbal and thus not costly
ii. It can be applied in all settings including home, schools, clinics and other social agencies.
iii. It can be used in treatment of various types of problems.
iv. It can be applied to both young and old.

Disadvantages

Disadvantages of reinforcement lie in its methodological application not in reinforcement per se, thus:

i. Sometimes, there is monotonous application of reinforcement to the extent that the client sees very little value in it.

ii. Excessive use of a particular reinforcer over a long period of time punctures its reinforcing capacity; reinforcers should therefore be varied with time of application.
iii. Sometimes, some reinforcers needed for treatment of some behaviour problems may not be readily available and some material reinforcers may be costly for some individuals to get.
iv. Some therapists or local users of reinforcement often fail to apply the principle of immediacy of consequence, even when it is the obvious option to delayed consequence.
v. Some people do not consider the nature of reinforcers or the client while planning for treatment using reinforcement; neither do some consider time gap during application (Nwankwo, 1995).

Summary

This paper has defined reinforcement as a process or procedure of increasing or stamping in desirable behaviour of an individual. Four mechanisms of reinforcement and reinforcers were identified which are positive, negative, primary and secondary in nature. Meanwhile, the conditions or schedule of reinforcement has been defined as the rule, plan or pattern of administration of reinforcement to the beneficiaries. Types of schedules identified are continuous and partial (intermittent); and partial schedule was sub-categorized into ratio and interval with each having fixed and variable schedules respectively. Interactions between reinforcement conditions are positive, negative induction; and behavioural contrast. Some points were also outlined as educational implications of reinforcement. Furthermore, behaviour problems amenable to reinforcement technique, advantages and disadvantages of reinforcement were all discussed. There is no doubt therefore that reinforcement still remains as a vital tool and technique in teaching and learning, and desirable behaviour modification processes in every social setting.

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