5

B.F. SKINNER

THE FATHER OF OPERANT CONDITIONING

LEARNING OUTCOMES

Having read this chapter you should be able to:

- understand the influence of Skinner on behaviourist theories
- recognise the difference between classical and operant conditioning
- apply principles of behaviourism to your practice
- understand the influence of his work on understanding the development of verbal communication skills.

KEY WORDS

operant conditioning; behaviour modification; positive reinforcement; negative reinforcement; punishment; schedules of reinforcement; classical conditioning; satiation

INTRODUCTION

B.F. Skinner is arguably one of the most influential theorists of the twentieth century, building on the work of renowned behaviourists, including John Locke and John Watson. Skinner defined his own branch of behaviourism as '**operant conditioning**', a theory that supposed behaviour is determined by consequences, such as positive and negative reinforcers, and the application of these will increase the possibility of a behaviour occurring again. Skinner's work advocated the idea that a behaviour could be shaped through operant conditioning and, as such, his theories became popular as a means of modifying behaviours for those suffering from phobias or addiction or in schools and clinics.

Despite taking a somewhat unconventional path to behavioural psychology, Skinner worked relentlessly in developing his theories and publishing works to expound his beliefs. He wrote prolifically on all aspects of animal and human behaviour, using his laboratory experiments as a basis for his publications and, according to Smith (1994: 519), 'no issue seemed too large or too small for his observant eye and analytical insights'. Skinner believed that psychology should be approached scientifically and only that which was observable should be measured. As a result, he invented a 'Skinner Box' in which to undertake his experiments – a secure soundproof box which ensured the animal could not be distracted by outside influences, thereby ensuring scientific objectivity.

Although his experimental work was undertaken with animals, Skinner saw no reason why this should not be applied to human behaviour too, and he had a keen interest in how human behaviour could be modified. This was reflected in his 1948 novel *Walden Two*, which saw him exploring a utopian approach to child rearing. He also applied his theories in a practical sense to the rearing of his own children through the invention of his 'baby-crib', a transparent, air-conditioned crib which required no blankets or sleep suits.

Skinner was a theorist who divided opinion and, despite having 'a large and loyal following' (Nye, 1979: 2), there were many who saw his theories as being too radical and he had 'many opponents who enthusiastically counter his views' (1979: 2). Many people believed that his work on animals could not and should not be applied to human behaviour, and there were those who felt that his belief in individual freedom as an illusion was contradictory to the American ideal. However, he remained firmly committed to his beliefs, referring to himself as a radical behaviourist, and it is this commitment that has made him one of the leading figures in the school of behaviourism even today.

BURRHUS FREDERIC SKINNER, THE PERSON

Burrhus Frederic Skinner, known as B.F. Skinner, was born on 20 March 1904 in the town of Susquehanna, Pennsylvania. His father, a lawyer, and his mother, a housewife,

were hardworking parents and Skinner had a traditional, old-fashioned upbringing. He was an active youngster who loved the outdoors and enjoyed building things. Perhaps the most significant event in his early life was the untimely death of his only brother from a cerebral aneurysm at just sixteen years of age. This 'had a dramatic effect on the family, [although] Skinner remained fairly objective about it' (Nye, 1979: 11). However, his brother had always been closer to his parents and his death resulted in their shifting their focus to Skinner, a position which he never really felt comfortable with (Nye, 1979).

Skinner enjoyed school and was heavily influenced by one teacher, Mary Greaves, who taught him drawing and English. It was following a debate, in the eighth grade with Miss Greaves, about whether or not Shakespeare had actually written *As You Like It* that he got his first taste of scholarship, and it was later, through Miss Greaves' influence, that he became an English literature major in college and afterwards sought a career as a writer (Nye, 1979).

Skinner attended Hamilton College, a small liberal college in New York, majoring in English and taking other courses in Romance languages, public speaking, biology, embryology, cat anatomy and mathematics. He expressed that this was an absurd range of courses, but they served him well in his later career (Nye, 1979). He did not fit into college life, enjoying neither fraternity parties nor football, a staple of college life in America. He did, however, write for the school newspaper, producing critical articles on the school and the faculty and, in one such article, attacking the esteemed national honorary society, Phi Beta Kappa. Despite being brought up a Presbyterian and attending Presbyterian Sunday School classes run by the aforementioned Miss Greaves, by the time he reached his teens he had become disenchanted with God and became an atheist – a further challenge to his college career, which required daily chapel attendance.

Towards the end of his time at college Skinner decided he was going to pursue a career as a writer, a decision which he later acknowledged was 'disastrous' (Nye, 1979: 13). Setting up a study in his parents' home he decided writing a novel was too challenging, instead turning to short stories. He found, however, that he lacked the motivation to write and easily became distracted. After undertaking a variety of writing jobs, including writing newspaper articles and a digest of decisions reached by the Board of Conciliations, he began to reconsider what he wanted to do as a career.

Deciding that he would prefer to write about science than fiction he began to consider psychology as a possible route. Despite knowing nothing about the field he was influenced by Bertrand Russell's book *Philosophy*, which discussed Watson's work on behaviourism, inspiring him to buy Watson's book *Behaviourism* (Nye, 1979). That decision to turn to psychology was later reinforced after he read about Pavlov's work in an article written by H.G. Wells. This resulted in him applying to, and being accepted by, Harvard University in 1928 to study psychology.

Skinner was awarded his psychology Master's from Harvard University in 1930, followed by his doctorate in 1931. He remained a researcher at Harvard University until

1936, where he began undertaking a variety of animal studies influenced by the work of Pavlov, in which, according to Nye, 'he followed the principle of control the environment and you will see order in behaviour' (1979: 16), thus beginning his journey into behaviourism. It was during his time as a researcher at Harvard that he developed his so-called 'Skinner Box' – a device designed to allow him to observe the behaviours of animals and their interactions with the environment. By observing the interactions of both pigeons and rats in the Skinner Box he began to develop his theory of operant conditioning, which formed the basis of his first published work, *The Behaviour of Organisms*, in 1936. In this book he drew comparisons with Pavlov's work, but also expressed how responses to the environment could be learned, as opposed to the involuntary responses about which Pavlov theorised.

As his fellowship at Harvard came to an end he secured a teaching position at the University of Minnesota where, alongside a successful teaching career, he continued his research on pigeons. By this time, he had also become a father and turned his research focus to education, initially designing a transparent baby-crib for his second daughter Deborah and, later, as his children got older, turning his attention to teaching, designing a 'Teaching Machine' and publishing *The Technology of Teaching* in 1968.

Following a brief period as Psychology Department Chair at the University of Indiana in 1945, Skinner returned to Harvard University in 1948 as a lecturer in the psychology department. He was later made a professor and remained at Harvard for the rest of his career. He became a prolific writer, publishing over 200 titles (Richelle, 1993), including his work of fiction, *Walden Two* (1948), in which he presented a utopian vision of the future whereby people became good citizens as a result of **behaviour modification**. He later turned his attention to applying his behaviour theories to society, receiving criticism from his contemporaries for his published work *Beyond Freedom and Dignity* (1971).

Skinner continued to be active in the field of behavioural psychology up until his death from leukaemia in 1990. Despite many of his theories falling out of favour, he remains one of the most influential psychologists of the twentieth century. His views on the use of **positive reinforcement** as a means of shaping behaviour have had a significant impact on practices, most especially in educational settings.

SKINNER'S THEORY

Skinner's theory is firmly entrenched in the field of psychology related to the science of behaviour, or behaviourism as it is more commonly known. Building on the theories of John Watson, his work followed Watson's basic principles of behaviourism more closely than any other psychologist, which led Skinner to refer to himself as a 'radical behaviourist' (Richelle, 1993) relating to his idea that behaviourism should be viewed as a natural science (Baum, 2011). His theories were less extreme than Watson's, however, and while he acknowledged that the mind was important in behaviour modification, he also believed that it was more productive

to study observable behaviour rather than attempt to discern internal, mental events, such as feelings, motives and intentions, which are not easily seen (Johnston and Nahmad-Williams, 2009).

Skinner introduced a new term into the field of behaviourism, that of 'operant conditioning' – a term which was coined following extensive research undertaken with rats and pigeons in his Skinner Box. Based on Thorndike's theory of law and effect, he observed that rats quickly learned that when sufficient pressure was applied to a lever in the box, a small amount of food was dispensed. Hence, the food led to the action being repeated. From this, he deduced that a behaviour which is reinforced tends to be repeated, hence the behaviour is strengthened. He also discovered that when there was no food reward, the action would eventually die out and the behaviour was thus weakened. Skinner used these observations to develop his theory of operant conditioning, in which he proposed that behaviour could be changed by the use of positive reinforcement, given directly after a desired response. In the case of the rats in the Skinner Box, they learned to go straight to the lever since the consequence of pressing the lever, in this case the food, was something they found pleasurable (see Figure 5.1).

In developing his theories further Skinner sought to determine whether behaviour could be equally modified through the use of **negative reinforcement**. In so doing, he introduced an electrical current to the box, which the rats naturally found uncomfortable. The current could be turned off by pressing a lever and, after several accidental knocks of the lever, the rats soon learned that they could switch off the electric current as soon as they entered the box, thus eliminating the undesirable experience. Developing this further, Skinner paired the switching on of the current with the turning on of a light. The rats then learned to associate the turning on of the light with the unpleasant experience of the electrical current, and therefore learned to press the lever as soon as the light came on, so as to avoid the unpleasant experience. This he referred to as negative reinforcement, in which the removal of an unpleasant experience can strengthen a behaviour (see Figure 5.1).

Care must be taken not to confuse the terms reward and **punishment** with positive and negative reinforcement, since Skinner argued that rewards and punishment do not necessarily reinforce a behaviour and, while utilising both may change a behaviour for a short period, the theory of operant conditioning relies on a behaviour being strengthened as a result of the positive or negative reinforcement. As Nye states:

> ... although giving so-called rewards may be reinforcing, the important point is that they do not necessarily strengthen the behaviours they follow. (1979: 30)

Furthermore, when considering the difference between negative reinforcement and punishment it should be noted that reinforcement focuses on the strengthening of a behaviour even in the case of negative reinforcement, whereas punishment is more likely to decrease or stop a behaviour. For example, a negative reinforcement designed to eliminate an undesirable behaviour might be to work harder to avoid the

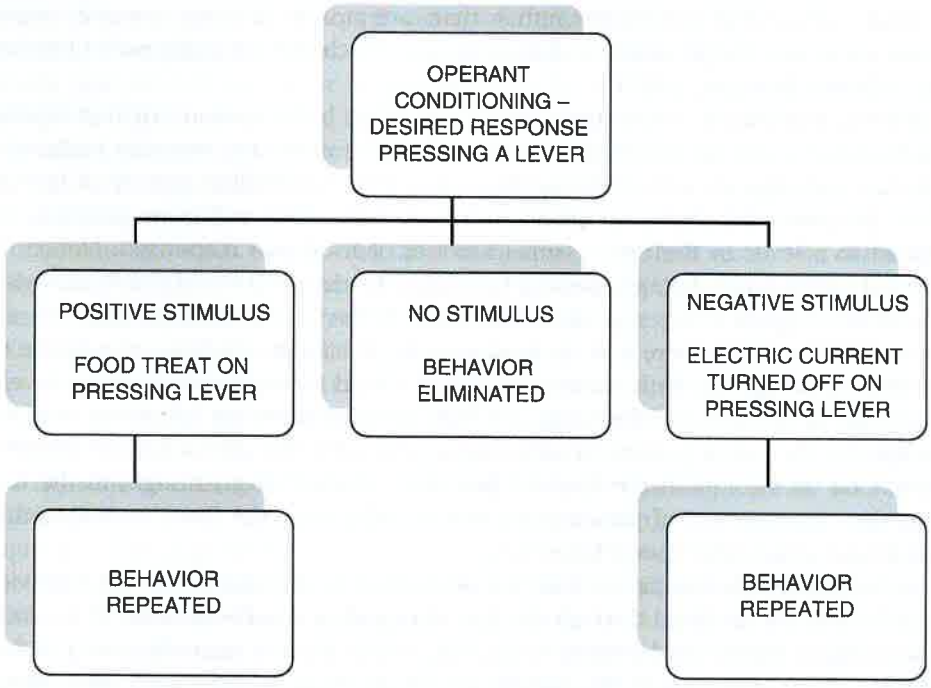

Figure 5.1 Skinner's theory of operant conditioning

consequences of getting poor grades at school or driving to the correct speed limit to avoid getting a costly speeding ticket. These would not be considered punishment since it is possible to avoid the adverse stimuli through changing or adapting a behaviour, which over time then becomes embedded. On the other hand, a punishment is not designed to reinforce a specific behaviour, but rather is intended just to make the behaviour stop. The tendency in this instance is not to learn to change the behaviour but rather to avoid the risk of punishment; thus when the risk of punishment is removed it is likely that the undesirable behaviour will return.

Skinner believed that psychology should be seen as a science and, as such, his work was conducted in strict laboratory conditions, which allowed him to change variables in order to ascertain the effectiveness of different reinforcers. Thus, he observed that a change in behaviour occurred if he varied the number of times in which the lever triggered a response, leading to him developing the idea of ***schedules of reinforcement***, which he documented in the 1957 text *Schedules of Reinforcement* (Ferster and Skinner, 1957). O'Donohue and Ferguson (2001) note that there are several kinds of schedules of reinforcement. As can be seen in Figure 5.2, a continuous schedule of reinforcement sees a reward being given each time a behaviour is observed; however, this could be seen as difficult to sustain, as well as creating a situation in which the subject becomes either reliant or satiated by the

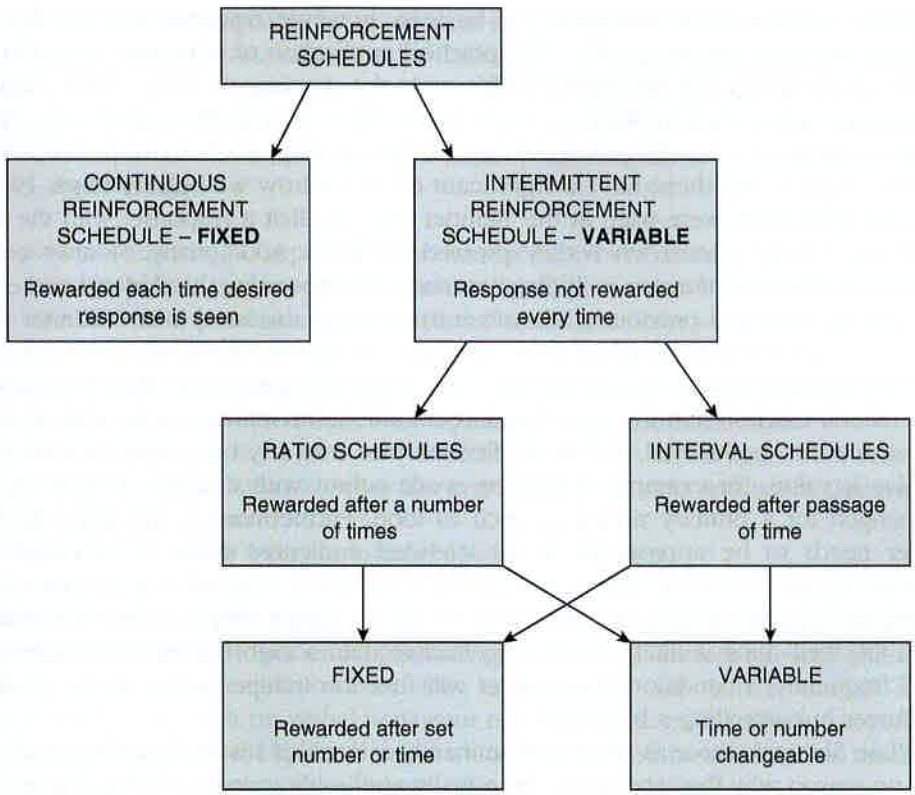

Figure 5.2 Skinner's schedules of reinforcement

reward. Therefore, Skinner advocated the use of an intermittent reinforcement schedule in which reinforcement was presented either through intervals, i.e., the amount of time between responses, or ratio, i.e., the number of operant responses needed before a reinforcement is presented. Additionally, as shown in Figure 5.2, both intervals and ratio can be fixed (always occurring after a set number of times or responses) or variable (in which number and time is unpredictable).

As a mechanism for modifying behaviour, different schedules of reinforcement can be applied flexibly in order to achieve a desired effect. For example, in a fixed ratio schedule a high rate of response can be seen while the reinforcer is in place; however, the behaviour is likely to stop once the reinforcer is removed. On the other hand, a variable ratio schedule may see a relatively high incidence of the behaviour occurring with less likelihood of the behaviour stopping at the end of the schedule since the recipient never knows when reinforcement will occur. Similarly, a fixed interval schedule might see a lower response rate than on a fixed ratio, although acceleration might occur at the end of the period to meet the reinforcer. Likewise, in a variable interval

schedule, consistency in behaviour can be seen; however, response rate can be low (O'Donohue and Ferguson, 2001). The practical application of schedules of reinforcement will be revisited in the 'Applying Skinner in the classroom' section of the chapter.

Skinner noted that reinforcers could be primary or conditioned. Positive primary reinforcers relate largely to biological functioning, such as food, water and sexual contact, and these have a significant effect on how we behave (Nye, 1979). Primary reinforcers were used in the 'Skinner Box' to elicit a response, with the rats receiving a food reward when they pressed the lever. Additionally, Skinner noted negative primary reinforcers, including extremes of temperature, hard blows and electric shocks. As noted previously, electric currents were also used in the Skinner Box to condition the rats to press the lever. According to Skinner no learning is necessary for the reinforcer to have an effect in the case of primary reinforcers since these result in a natural reaction. On the other hand, a conditioned reinforcer or secondary reinforcer needs to be learned, and in the first instance may rely on a primary reinforcer to give it value; for example, rewarding work output with a salary, which can be exchanged for a primary reinforcer such as food. Furthermore, a conditioned reinforcer needs to be appropriate to its intended audience, since, as observed by O'Donohue and Ferguson (2001), an infant is less likely to respond to a cash incentive which has no tangible value to them, whereas for an adult a simple acknowledgement for a job well done is likely to be less effective than a cash bonus. Nevertheless, if used frequently, a conditioned reinforcer will function independently of the primary reinforcer in controlling a behaviour.

While Skinner's theories were predominantly a result of his work with animals he saw no reason why they should not be equally applicable to human beings, believing that people could just as easily be controlled by the consequences of their actions. Although not likely to be controlled by food, Skinner argued that human behaviour is dramatically affected by reinforcers such as money, compliments and approval from others (Nye, 1979) and, likewise, actions are equally reinforced by the environmental changes they produce.

Although Skinner is best known for his theories on behaviour modification he also applied his radical behaviourism to the acquisition of language, putting forth a theory in his 1957 book *Verbal Behaviour*, arguing 'that language is like any other form of behaviour in that it is acquired through operant conditioning' (Keenan, 2002: 147). Skinner believed that babies learn language through behaviour reinforcement, a result of the child's imitation of others and the role of adult reinforcement (Johnston and Nahmad-Williams, 2009), and that a baby's babblings are the beginning of speech and, when received positively by the adults, result in further attempts at using verbal language. The closer the babbles become to real words the more positive the reinforcement, with adults generally rewarding only those behaviours that sound like real words or grammatically correct utterances. According to Skinner, children will gradually only use those words or utterances for which they have been rewarded, hence the adults are responsible for shaping a child's linguistic behaviour (Keenan, 2002).

In writing about language, he made clear that he was not dealing with language as studied by linguists, but, rather, verbal behaviour, 'that is an individual's activity in speaking and/or listening' (Richelle, 1993: 123). Dissatisfied with previous attempts to categorise verbal behaviour, he began to 'build his own functional classification of verbal behaviours' (1993: 124) through developing new labels to categorise speech types, these being:

- echoic – referring to repeated utterances of heard verbal behaviour
- mands – which is short for demands and refers to a verbal operant that is characterised by a previous response to the verbal utterance – this would normally require further reinforcement in order for it to be sated
- tact – which refers to verbal behaviour that provides information about the subject's immediate environment and requires no response from others
- intraverbal – which pertains to the interactive nature of dialogue, so a response will bear some relation to what has previously been said and is not designed to provide information
- autoclitics – which refers to internal speech or thought.

Skinner's work on verbal behaviour was, then, very much a means of describing how children chain words together to produce grammatically correct speech, utilising a variety of strategies reinforced by the responses of the adults around them. Unfortunately, his work on verbal behaviour received much criticism from his contemporaries, which will be explored later in this chapter, and as a result 'his theory of verbal behaviour has very few adherents' (Keenan, 2002: 149).

LINKS WITH OTHER THEORISTS

We have previously seen that Skinner was influenced by the works of John Watson and Ivan Pavlov, both of whom he credits with inspiring him to move from 'a philosophical approach to psychology toward an empirical, scientific approach' (Nye, 1979: 14). Both Watson and Pavlov experimented with observable behaviours and believed that humans have no free will; rather, they were moulded and shaped by the environment. However, a fundamental difference between Skinner and Pavlov and Watson lay in their beliefs as to how behaviour could be conditioned. Pavlov and Watson advocated **classical conditioning** – that is, learning which occurs as a result of an association between an environmental stimulus and a naturally occurring stimulus. In classical conditioning the subject has no control over the response, so in Pavlov's experiments, conducted with dogs, salivation occurred when a bell was rung at the same time as food was delivered. Eventually the food stimulus was no longer required for saliva to be produced, as the bell alone triggered the salivation, hence the dogs had been classically conditioned. Watson, too, carried out experiments which resulted

in a young boy called Little Albert being conditioned to be afraid of fuzzy white objects after loud noises were attached to the handling of a white rat. In both cases the responses had been conditioned by environmental factors.

Skinner, however, believed that responses could be moulded and shaped through operant conditioning. He explains it thus: 'the dog in the Pavlovian experiment salivates in anticipation of food, or because it expects food. In operant experiments a rat presses a lever because it anticipates that food will be delivered or expects food to be delivered when it does so' (Skinner, 2011 [1974]: 69). This suggests that the subject has more control over the response, so, rather than the reflex response that Pavlov and Watson theorised, in operant conditioning a level of choice is evident.

Skinner's work was perhaps influenced, then, to a greater degree by the work of Edward Thorndike. In his studies on animals, usually cats, Thorndike observed that when a behaviour was followed by a pleasurable consequence it would frequently be repeated. Thorndike's work was built around his puzzle box in which he would place the cat. He then timed how long it took for the cat to escape from the box to get to a piece of fish on the outside of the box. As with Skinner's experiments, the cats needed to press a lever in order to escape from the box. The similarities between Thorndike's and Skinner's work are clear and not surprising given that Skinner built on Thorndike's theory of law and effect. While both Thorndike's and Skinner's theories recognise that responses can be conditioned through consequences, Skinner developed Thorndike's work by utilising a reinforcer, rather than just a positive or negative consequence.

Links can also be seen between the work of Skinner and Albert Bandura since both believed that behaviour is learned from experience. However, while Skinner proposed that people were most influenced by the environment, Bandura disagreed that environment alone determined behaviour, and introduced the concept of reciprocal determination, in which cognitive processes, behaviour and context all interact with one another. Furthermore, Bandura suggested that learning was vicarious, proceeding by way of observing the behaviour of others and its subsequent consequences. As an example, while Skinner argued that behaviour was shaped by direct reinforcers, Bandura suggested that we come to learn what behaviours are acceptable through observation; as such, observing someone else receiving a reward is as powerful in shaping a behaviour as receiving the reward directly.

CRITIQUING SKINNER

One of the biggest criticisms levelled at Skinner was the generalisation he made between animals and humans. Most of his work was undertaken in a laboratory experimenting with rats and pigeons and, despite the fact that there have been clear applications of his work to explain human behaviour, this is still an area which has led to many people disputing his ideas. The main issue is in relation to the complexity of

human behaviour, which some say cannot be compared to the behaviour of animals as this works at a far more basic level. Nye (1979) acknowledges that common relationships between humans and animals can be observed, with the frequency of behaviours in both humans and rats increasing when certain consequences occur. However, he argues that humans have a far more rational approach, thinking things out before deciding what to do, whereas with rats the process can be seen as more mechanical. Carpenter (1974) supports this argument and cites examples whereby Skinner's analysis cannot be applied to human behaviour, observing instances where a child can repeat information told to them once by an adult. According to Skinner's theory this information would need to be repeated and reinforced in order for a child to retain it. However, Carpenter (1974) argues that even with a delay of some weeks or even months the child can still retrieve this information.

A further criticism of Skinner's assumptions that animal and human behaviour are comparable is that this 'degrades the human condition' (Nye, 1979: 74), with some simply resenting the fact that he likened animals to humans. Indeed, when he published his book *Beyond Freedom and Dignity* (1971), writers in both Europe and America criticised him for attacking the freedom of the individual. Richelle (1993: 4) quotes former US Vice President Spiro Agnew:

> America as a society was founded on respect of the individual and an unshakable belief in his worth and dignity. ... Skinner attacked the very precepts on which our society is based, saying that 'life, liberty and pursuit of happiness' were once valid goals, but have no place in 20th Century America or in the creation of a new culture as he proposes (Spiro Agnew).

Indeed, one such critic who disagreed with Skinner's theories on behaviour modification was Carl Rogers, the creator of non-directive counselling and client-centred therapy, who 'debated with Skinner on issues of freedom and control in human behaviour and action' (Smith, 1994: 525).

A further criticism of Skinner's work can be seen in his theories of verbal communication. Noam Chomsky, a linguist, wrote a critical review of Skinner's book *Verbal Behaviour* (1957). As a linguist Chomsky's theory lay in a belief that language acquisition is developed through a set of structures or rules which cannot be worked out by repetition. As such, a behaviourist position is inadequate to account for language acquisition (Richelle, 1993: 121). Chomsky also questioned the validity of extrapolating from animal behaviour something which was an inherently human activity and a highly complex one at that.

In his work Skinner favoured the use of negative reinforcement over the use of punishments as a means of correcting undesirable behaviour, warning society of the ill effects of using punishment, and arguing that the behaviour is likely to reappear after the punitive measures have been removed (Skinner, 1971). However, as observed by O'Donohue and Ferguson (2001), Skinner never presented any empirical evidence to support his suggestion that punishment should be abandoned altogether, nor did

he acknowledge the need to correct subversive behaviours which would not respond to negative reinforcements, e.g., violent criminals. O'Donohue and Ferguson (2001) go on to suggest that utilising positive reinforcement in such cases would take too long, and may not prove to be effective; furthermore this may prove to be harmful to those around the individual as the behaviour is not effectively dealt with.

While not directed specifically at Skinner's work, there has been criticism levelled at the increasing use of reward systems in schools, which, as we will see later in this chapter, can in part be attributed to Skinner's theory of operant conditioning. McLean (2009) observes that the rewarding of children with stickers, chocolate and in some cases games consoles reduces intrinsic motivators such as pride and satisfaction, a view supported by Professor Dennis Hayes, who, in an interview for the *Daily Telegraph*, observed that:

> People have lost the idea of doing anything because it is intrinsically worthwhile – you can only work when something has an external reward. It is anti-educational. (Paton, 2009)

A study undertaken by researchers from Manchester Metropolitan University (MacLure et al., 2012) also revealed weaknesses in the use of reward systems in schools. Their research, which was undertaken in the reception classes of four primary schools in Manchester, showed that in many cases the children did not understand why they had received rewards. Moreover, in a bid to ensure equity of praise and encouragement, the study showed that the overuse of rewards was in fact devaluing the sincerity of teachers' praise (MacLure et al., 2012). However, as we shall see in the next section of this chapter, rewards can be a powerful tool in helping teachers to manage classroom behaviour, and this should be considered alongside the criticisms as outlined here.

APPLYING SKINNER IN THE CLASSROOM

Skinner's theory contends that the 'likelihood of a child's behaviour reoccurring can be increased by following it with a wide variety of rewards or reinforcers' (Keenan, 2002: 24). It stands to reason, then, that the theory of operant conditioning can effectively be applied in a classroom situation in order to shape and modify behaviour.

Managing children's behaviour in school is an area which has been debated by governments past and present, and there are numerous reports which offer schools advice and suggestions on how behaviour should be managed, with schools utilising a variety of methods in order to shape behaviour. In a Department for Education report entitled *Pupil Behaviour in Schools in England* (2012), it was identified that the most common misbehaviour in schools is low-level disruption, which can result in up to a 30% loss of teaching time, thereby impacting on the education of other children within the classroom. It is desirable, therefore, that such behaviour is managed effectively in order to minimise the risk of children's education being compromised as a result of the misbehaviour of others.

In the past, schools had at their disposal a range of extreme measures to discipline children, the most common being forms of corporal punishment, including the cane, whippings and beatings. While corporal punishment was abolished in all schools in the UK by 1998, schools have continued to use different forms of punishment, such as detentions, exclusions and loss of privileges, as a means of managing undesirable behaviour. However, according to Skinner's theory, such measures are counterproductive, only managing the behaviour temporarily while the effects of the punishment are still fresh in the child's mind. Government policy and legislation following the abolition of corporal punishment recommended that 'schools should provide a range of opportunities in which pupils can excel and be rewarded' (Steer, 2005: 18), and advised that an appropriate balance of rewards and sanctions should be utilised to manage behaviour. As such, schools began to adopt a range of strategies more in keeping with Skinner's operant conditioning theory, including a variety of different, and sometimes complicated, reward systems designed to moderate the behaviour of the individual, such as stickers and praise, as well as systems which reward whole groups, such as house points.

Since then, teachers have become increasingly adept at applying such systems to eliminate undesirable behaviour through rewarding the desired behaviour instead, and reward systems in schools have become embedded in everyday practice, with children who are seeking approval from their teacher complying with what is being asked in order to receive the praise or reinforcement given. Cowley posits that rewards should be used as a 'strategy in a potential toolbox of techniques' (2014: 80) and observes that rewards help to encourage good behaviour and hard work and can motivate students who lack the intrinsic motivation to work hard. It is important, however, that the teacher has clearly communicated what behaviour they expect to see since it is far more effective to reinforce the acceptable behaviour than correct any misdemeanours once they have occurred. Returning to Skinner's work, he advocated that positive reinforcement was far more effective than negative reinforcement. As such, the success of any behaviour management programme is reliant on a consistent approach to managing positive behaviour, in order to minimise the likelihood of undesirable behaviour occurring.

Moreover, in order to be effective, reward systems in schools should be responsive to a specific situation and tailored to the needs of an individual or group of children. Furthermore, reward systems should be flexible in order that these can be adapted where children fail to respond as anticipated, or where **satiation** occurs. As seen earlier in the chapter, Skinner advocated the employment of schedules of reinforcement, in which rewards were delivered either continuously or on an intermittent basis. For example, a teacher delivering a new concept or mode of study may need in the first instance to use continuous reinforcement, such as praise, in order to encourage the pupils and maintain their interest, particularly if they are finding the work challenging. Such a strategy should prove motivating for the pupils and encourage them to remain focused; however, this should be viewed as a short-term strategy, with the aim to gradually remove the need for rewards through applying intermittent strategies, before removing the need for rewards altogether.

Lee and Belfiore (1997) observe that continuous reinforcement can be applied to teaching new responses, so might be particularly effective in addressing a challenging behaviour. However, satiation may occur if the reinforcement is applied over a period of time as the individual becomes tired of the reinforcer, leading to a loss of effectiveness and the undesirable behaviour resuming. It is important then to pre-empt this from happening by introducing schedules or reinforcement, either through a fixed ratio or fixed interval schedule. Lee and Belfiore (1997: 207) refer to this 'thinning' of schedules as a state of deprivation which helps to maintain the status of the stimuli as a reinforcer. Lee and Belfiore (1997) go on to argue that a schedule in which stimuli are only presented after a set period of time or occurrences more closely resembles real life, and which should reflect regular classroom practice, since arguably the continuous use of reinforcement in the classroom is both untenable and impractical.

Of course, it would be naïve to suppose that all undesirable behaviour can be eliminated solely by the consistent application of positive reinforcement. However, the theory of operant conditioning suggests that rather than punishing an undesirable behaviour, negative reinforcement is a far more effective means of preventing such a behaviour reoccurring. As previously stated, low-level disruption is the most common type of misbehaviour reported in classrooms, and this might include anything from children shouting out or getting out of their seats to interfering with other children who are trying to work. While this sort of behaviour may not be seen as particularly challenging, it does have a negative impact on teaching and learning and must therefore be addressed. Bennett uses the following analogy to describe low-level disruption:

> A stream cuts a score down a mountain until it becomes a ravine, and then a valley. It doesn't do this because it's powerful. It succeeds by persistence and patience, using the same weapon with which a weed splits a paving slab: time. A student can do the same to your lesson, and eventually your sanity, if they are allowed to drip, drip, drip away at you. (2010: 21)

However, it is highly likely that the children responsible for these low-level behaviours are seeking attention and by punishing such behaviours they are in fact being rewarded for their efforts. Therefore, in applying a negative reinforcement by, for example, ignoring the behaviour, children will soon learn that this type of behaviour is not gaining them the attention they crave, and they should eventually learn more desirable behaviours which will afford them the desired attention.

In many ways Skinner was ahead of his time when viewing the education system as a whole, arguing that extrinsic motivation to moderate behaviour should not be used at the expense of encouraging intrinsic motivation. He believed that 'one essential ingredient of successful teaching is leading students to find their own pleasure and satisfaction in learning activity proper' (Richelle, 1993: 173), and once this is achieved the acquisition of knowledge should become an intrinsic reinforcement; children who are motivated and enthusiastic to learn are less likely to require extrinsic reinforcement for learning to proceed. After observing a mathematics lesson at which his own daughter was present, he commented that:

> Possibly through no fault of her own the teacher was violating two fundamental principles, the students were not being told at once whether their work was right or wrong (a corrected paper seen twenty-four hours later cannot act as a reinforcer), and they were all moving at the same pace, regardless of preparation or ability. (Skinner, 1983: 64)

This observation is reflective of work undertaken by Black and Wiliam (2001) in their research into the use of formative assessment in the classroom, entitled *Inside the Black Box* (see Chapter 18). In this work they argue that 'teachers need to know about their pupils' progress and difficulties with learning so that they can adapt their work to meet their needs' (2001: 2). They also argue that any feedback undertaken by teachers or children should be used to inform the next steps of learning, and wherever possible feedback should be given instantaneously in order that children are aware of where they went wrong and can rectify this immediately. This work has seen a change in classroom practices, with an increased focus on the differentiation of work to meet the individual needs of the pupils and which involves pupils in assessment practices – something Skinner believed to be important in encouraging children to take responsibility for their own learning. Skinner urged teachers to be creative in their teaching, not adopting a 'one size fits all' strategy but finding ways to tap into the specific learning styles of their pupils. As Smith (1994: 524) points out, 'if a teacher already has a broad range of teaching strategies and tactics, then he/she will always be on the look-out for additional elements to add to the intellectual and practical repertory'.

OVERVIEW OF APPLICATION: SKINNER'S IDEAS FOR CLASSROOM PRACTICE

Operant conditioning can be used in the classroom to encourage a desired behaviour; the following are some suggestions as to the practical application of positive and negative reinforcement.

Positive reinforcement

- Praise immediately when pupils exhibit a desired behaviour, reinforcing why the pupil has received the praise, i.e., 'well done Sammy, you put your hand up to answer the question, just as I asked'.
- Positive feedback in books, using stamps or ticks, which reinforces why the work is deserving of commendation, e.g., 'well done, you made good use of verbs in your sentences'.
- Application of structured reward systems in the classroom, such as sticker charts or team points, can capitalise on the use of schedules of reinforcement, e.g., a pupil might be presented with a sticker on completing a set number of questions which can gradually be increased as they gain in confidence.

(Continued)

- For children with more challenging behaviour the structure of schedules of reinforcement can be intensified and personalised systems can be developed, for example a child who struggles to stay in their seat for any length of time might be rewarded after sitting for five minutes, which is gradually increased in time.
- Visual reward systems such as 'Ladders of Success', in which names are moved up the ladder as goals are received.
- Reward systems to encourage team working, such as placing beads in a jar or house points, leading to a team reward at the end of a set period, or when the jar is full. This encourages working together towards a common goal such as extra playtime or a sports afternoon.
- Celebrations of success such as a 'Gold Book Assembly' in which the whole school and families can share successes.

It is important to note that the use of positive reinforcement is designed to modify a behaviour over a set period, and as such is not intended to be used indefinitely. The overall aim is for a behaviour to become habitual. Furthermore, to avoid the risk of satiation, reward systems should be reviewed frequently to ensure that they are still appropriate and achieving the desired effect. Not all pupils will respond to positive reinforcement, and it may be necessary to apply a process of trial and error, particularly for children who exhibit the most challenging behaviour.

Negative reinforcement

While Skinner advocated the use of positive reinforcement over negative reinforcement, there may be instances where positive reinforcement does not achieve the desired results, in which case negative reinforcement may be a suitable alternative. However, it is important to ensure that a distinction is drawn between negative reinforcement and punishment since, as seen earlier in the chapter, punishment may eliminate a behaviour for a short period of time, but the aim of operant conditioning is to elicit a change in behaviour, which Skinner theorised is best achieved through negative reinforcement. The aim of negative reinforcement is to increase the chances of a desired behaviour happening again through removing the stimulus or acting to avoid the negative behaviours. Following are some examples of negative reinforcement.

- In a case where a child is seeking attention through poor behaviour an example of negative reinforcement would be to ignore the child; the removal of the attention which they seek may encourage them to find more positive ways of gaining the attention they crave. This should only be used providing the poor behaviour of the child is unlikely to cause harm to themselves or others.

- A teacher may remove the threat of homework if work is completed in class time, and the removal of the negative stimulus (homework) may encourage increased work output in class time. It should be noted that this may not be a strategy which can be consistently applied if the school has a homework policy which requires a set amount of homework over the course of a week.
- Pupils who do not respect playground rules when using resources such as footballs may have the resource removed. For example, if fights over the football are a regular occurrence, then the football – the negative stimulus – may be removed for a period. The subsequent threat of the removal of the football should result in improved future behaviour once the football is returned.
- Pupils may be encouraged to work hard to avoid getting a poor mark; if pupils know they are likely to get a weekly spelling or mental arithmetic test they are more likely to study for it to get a good mark. The negative stimulus would be the poor mark received for not studying.

SUMMARY

B.F. Skinner has been described as one of the most influential theorists of the twentieth century. He was a prolific writer, publishing his first scientific articles in the 1930s and continuing to publish articles and books for the next five decades. Not just a writer, Skinner should also be remembered for his scientific work, which formed the basis of his published work, in which he demonstrated how a psychological laboratory could be used as a tool for research. This is a tool still in common use today, not just in the experimental study of behaviour but also in those fields where behaviour is important at some stage of enquiry, such as in neurophysiology (Richelle, 1993).

Skinner's contribution to psychology was in the field of behaviourism, where he advanced many theories first put forward by renowned theorists Pavlov, Watson and Thorndike. However, he put his own perspective on this, developing his own strand of behaviourism: operant conditioning. Working initially with rats and pigeons, he boldly applied his theories of animal behaviour to humans in his quest to gain a comprehensive world view (Smith, 1994). This he accomplished, but it did earn him a number of high-profile critics.

While the field of behaviourism is no longer a dominant school of thought, Skinner's work remains an influential force in schools and institutions, with operant conditioning being a common strategy for managing behaviour. It is perhaps the practical application of his operant conditioning theory which has allowed his work to remain at the forefront of the field, with rewards and sanctions being common strategies used in schools today; and while this does not strictly adhere to his theory, its foundations can clearly be seen in his work.

Despite receiving some vehement criticism for his work and being frequently misunderstood and misrepresented, Skinner remained committed to undertaking work which would improve the human condition, and it is a testament to his hard work and commitment that he has left a legacy which makes him as well-known today as when he was at the height of his career.

GLOSSARY OF TERMS

Behaviour modification

Based on Skinner's operant conditioning theory, behaviour modification refers to changing a behaviour through the application of external stimuli such as consequences or reinforcement.

Classical conditioning

Reflected through the work of John Watson and Ivan Pavlov, classical conditioning refers to learning a behaviour through the process of association. Classical conditioning proceeds with the linking of two stimuli resulting in a newly learned response from the subject.

Negative reinforcement

A form of behaviour modification in which a negative stimulus is removed after a desired behaviour is exhibited. Skinner believed this to be longer lasting than punishment since the desired behaviour will be repeated to avoid the negative stimulus; for example a child who is constantly badgered by their parent to tidy their room will do it to stop the badgering, and eventually the tidying of the room becomes habitual to avoid a recurrence of the badgering.

Operant conditioning

A means of understanding behaviour through studying the cause of an action and its resulting consequences. Skinner believed that an action which was rewarded was more likely to be repeated and thereby through the process of operant conditioning behaviour could be shaped.

Positive reinforcement

The rewarding of a behaviour by providing something which the subject values with the aim of encouraging that behaviour to be repeated and reinforced.

Punishment

Using an aversive or painful stimulus to prevent an undesirable behaviour.

Satiation

Satiation refers to the satisfaction of a desire or need. When applied to operant conditioning this is when a stimulus which has previously been successful in modifying behaviour no longer proves to be effective, normally because the individual has become tired of that stimulus. It is for this reason that practitioners should review and revise reward systems on a regular basis.

Schedules of reinforcement

Schedules of reinforcement refer to a set of rules by which positive and negative reinforcement might be utilised to strengthen a behaviour. Reinforcement can be continuous or intermittent, and in the case of intermittent reinforcement can be fixed or variable and related to number or time.

FURTHER READING

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Chapter 8, 'Behaviourism', presents an overview of the history of the science and practice of behaviourist theory, including the work of Skinner.

Buxton-Cope, T. (2020) *Who the Hell was BF Skinner and What Are His Theories All About?* Somersham: Bowden & Brazil.

Documenting the life and works of B.F. Skinner in an easy to use format.

Chomsky, N. (1959) *Review of Verbal Behaviour* by B.F. Skinner. *Language, 35*, 26–58.

A scathing review of Skinner's work on verbal behaviour written by Noam Chomsky.

Epstein, R. (1982) *Skinner for the Classroom: Selected papers*. Champaign, IL: Research Press.

A collection of papers by Skinner focusing on his laboratory work, some of his major theories and the application of his work to animal training, education and child rearing.

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A narrative in which Kuhlman presents an in-depth examination of the two surviving Walden Two communities. Kuhlman explores the dynamics of some of the key players through drawing on interviews and explores some of the successes and tensions experienced.

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A series of original papers presenting a theoretical analysis of Skinner's theories, including a paper written by Skinner himself.

Skinner, B.F. (1971) *Beyond Freedom and Dignity*. Indianapolis, IN: Hackett Publishing.

Skinner's controversial work in which critics suggested he called into question a person's free will and autonomy, suggesting it was all an illusion.

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