

Describe and evaluate Hull's drive-reduction theory

The study of motivation is the study of the causes of behaviour. While there is general agreement that motivated behaviour is purposeful, goal-directed behaviour, different theoretical approaches see the underlying causes in different ways. Motives have been classified in various ways, but the most comprehensive classification is Maslow's hierarchy of needs, which distinguishes survival or deficiency (D-motives), and growth or being (B-motives). Hedonism can be seen as the central theme in both Freud's psychoanalytic theory and Skinner's operant conditioning. Influenced by Darwin's theory of evolution, many early psychologists tried to explain human behaviour in terms of large numbers of drives or instincts. This approach was replaced by Woodworth's concept of drive. Two major forms of drive theory are Cannon's homeostatic-drive theory and Hull's drive-reduction theory.

Hull's motivational theory must be considered in the context of his theory of learning. Drive-reduction theory was intended to explain the fundamental principle of reinforcement, both positive – the reduction of a drive by the presentation of a stimulus, and negative – the reduction of a drive by the removal or avoidance of a stimulus. Hull was interested in the primary (physiological) homeostatic needs and drives of hunger, thirst, air, avoiding injury, maintaining an optimum temperature, defecation and urination, rest, sleep activity and reproduction. He argued that all animal and human behaviour originates in the satisfaction of these drives.

The terms 'need' and 'drive' are fundamentally different. Needs are physiological and can be defined objectively, for example, in terms of hours without food or blood sugar levels. Drives are psychological and are hypothetical constructs, that is, abstract concepts that refer to processes or events believed to be taking place inside the body but which cannot be observed directly or measured. However, Hull operationalised drives as hours of deprivation. He proposed a number of equations, the most important of these was: $sEr = D \times V \times K \times sHr$, where sEr stands for the likelihood of any learned behaviour. It can be calculated if four other factors are known. 'D' is the drive or motivation, measured by some indicator of physical need, such as hours of deprivation. 'V' is the intensity of the signal for the behaviour and 'K' is the degree of incentive, measured by the size of the reward or some other measure of its desirability. 'sHr' is habit strength, measured as the amount of practice given, usually in terms of the number of reinforcements.

However, Hull's theory has a number of limitations. The relationship between primary drives and needs is very unclear, as the eating behaviour of obese people illustrates. Obese people tend to report that they feel hungry at prescribed eating times, even if they have eaten a short while before. Normal-weight people tend to eat only when they feel hungry, and this is relatively independent of clock time. Needs can arise without specific drives. So, we may learn that we need vitamin C but we experience a general hunger drive rather than a drive for vitamin C.

Another limitation of drive-reduction theory is that drives have been shown to occur in the absence of any physiological need. One example of such a non-homeostatic drive in rats is electrical self-stimulation of the brain (ES-SB). Brain stimulation is such a powerful reinforcer that a male rat with an electrode in its LH will self-stimulate in preference to eating if hungry, drinking when thirsty, or mating if it has access to a sexually receptive female. This effect has been found in rats, cats, monkeys, pigeons and occasionally humans. The main reward site for ES-SB is the median forebrain bundle. The effect seems to depend on the presence of dopamine and noradrenaline. Any behaviour defined as pleasurable involves the activation of these reward centres. ES-SB is seen as a 'short-cut' to pleasure, removing the need for natural drives and reinforcers.

Tolman's work has also challenged drive-reduction theory as he showed that learning could take place in the absence of drive reduction through the process of latent learning. In a maze-learning task, rats received no reinforcement for the first ten days of the experiment but did so from day 11. Having apparently made no progress during the first ten days, they showed a sudden decrease in the time it took to reach the goal box on day 11, when they received their first reinforcement (Tolman & Honzik, 1930). These rats had therefore been learning their way through the maze during the first ten days, but that learning was latent and not evident until they received the incentive of the reinforcement on day 11.

Hull's theory emphasised primary homeostatic drives to the exclusion of secondary non-homeostatic drives. Primary drives are based on innate, primary needs while much human, and some non-human behaviour, can only be understood in terms of acquired, secondary drives. Behaviourist psychologists, such as Miller (1948), Mowrer (1950) and Dollard & Miller (1950), modified Hull's theory to include acquired drives such as anxiety, which led to a great deal of research on avoidance learning in the 1950s. Other non-homeostatic drives and needs shared by humans and non-humans include curiosity, manipulation and play. These are linked to the search for stimulation and the need for competence, important for adaptation to our environment.

According to Maslow, human motivation is distinctly different from that of non-humans as it includes the need for self-actualisation. Drive-reduction theory fails to account for this and only incorporates survival needs.

Hull failed to address the complexity of human motivation, virtually all his work being conducted on rats. The theory places too much emphasis on homeostatic drives and too little on higher cognitive processes. However this is probably a reflection of how, at the time Hull was working, psychology was dominated by Skinner's behaviourism and the 'cognitive revolution' in psychology had not yet happened.