

Pavlov, By J. A. Gray. London. Fontana Modern Masters. 1979. Pp. 140. £1.25.

The Fontana Modern Masters series has been widely acclaimed, and the addition of a book on Pavlov—a physiologist whose work is usually part of core lectures to undergraduate psychologists—is very welcome. There can have been few cases where the selection of the student to describe the master can have been more apt than in the choice of Jeffrey Gray to give the account of Pavlov, since Gray is active in several experimental areas much influenced by Pavlov, and is also familiar with modern Russian writings in these fields. The outcome is well up to the standards of the series; a volume which is succinct, and accessible to the layman or undergraduate, which nevertheless incorporates a number of judgements and comments which will engage and intrigue professionals. Anyone remotely interested in Pavlov should read it.

Gray begins by deftly sketching in the biological and philosophical background to Pavlov's psychological associationism. It is easy to forget that within Pavlov's working life the concept of individual nerve cells (neurons) within the nervous system was hotly contested, and that Pavlov is not responsible for the idea that conditioning experiences change synapses. There are interesting philosophical precursors to Pavlovian attitudes in the writings of the Scotsmen Hume and Hartley. (Although Pavlov gave more direct acknowledgement to Descartes' concept of reflex action. Spencer's treatment of instincts, and studies of cortical function by, among others, Ferrier, Goltz and Munk.) Pavlov's general theories of brain function followed after more detailed work on neural control over 'the blood and the gut' had gained him the Nobel prize. His fame rested initially on his skill as an experimental surgeon—where others had failed, he was able to externalize a portion of the stomach (Pavlov's pouch), from which secretions of the pancreas could be collected. The influence of the taste and smell of food on stomach activities was measured by 'sham feeding'—pure gastric juice, uncontaminated by food itself, was obtained from a gastric fistula when an additional operation prevented food from reaching the stomach. Gray makes an exciting narrative out of the interplay of theories of neural and hormonal control of digestion secretions, which Pavlov had to integrate in his Nobel lecture of 1904. (My only quarrel is with the implication that gastric secretions were collected in man long after Pavlov's experiments with dogs: in fact Pavlov was explicitly trying to replicate in dogs observations published in the 1830s by Beaumont, made on a Canadian trapper with an unhealed gunshot wound in the stomach wall.)

The two introductory chapters are followed by a fairly standard 'Hilgard and Marquis' description of the methods and results of experiments on salivary conditioned reflexes, fleshed out with the Garcia 'bait-shyness' phenomenon. Then under 'The Theory of Conditioning' Gray firmly puts the post-Pavlovian case for separate processes of classical and instrumental conditioning. The Pavlovian sort is now airily defined as something which 'enables the animal to learn the relationships between stimulus events in its world' which amounts to the animal 'knowing that' (p. 64), while instrumental conditioning results in 'knowing how' to achieve ends. Pavlov himself was very complimentary about Thorndike's knowing-how-to-get-out-of-the-puzzle-box experiment, and noticed that his own dogs would learn to shake the food delivery apparatus to get food out for themselves, if given the chance—but said everything was a matter of forming associations in the hemispheres, and left it at that. Another post-Pavlov development is the assessment of the sensitivity of animals to probabilistic relations between stimuli, and Gray concludes that Pavlov may have over-emphasized temporal contiguity, although Pavlov rarely mentioned contiguity (it was Guthrie who did) but liked to talk about 'signalling functions' of stimuli.

Pavlov's theory of the brain mechanisms which underlie conditioning and signification involved two forms of brain activity, 'excitation' and 'inhibition', which ebb and flow about the cortex ('concentration' and 'irradiation') in a rather Gestalt-like manner. No one seems to believe in the ebbing and flowing any more, but 'inhibition', in an even vaguer substantiation, is still popular as an explanation for why an animal does not do something. Gray suggests that theories of brain function in conditioning have made little progress since Pavlov.

Like Piaget with children, and Skinner and Lorenz with other species, Pavlov established a considerable reputation as a recorder of empirical phenomena without ever resorting to a textbook of statistics. One consequence of an emphasis on individual animals was the Pavlovian theory of personality. Dogs selected as friendly and vivacious were very poor at conditioning, as they reacted to

the tedium and constraint of the experiment by either biting everything in sight or going to sleep. On the other hand, withdrawn and cowardly animals were excellent performers in the conditioning stand, provided that they did not get too nervous and go off their food. Pavlov adapted the Greek theory of temperaments to account for this, and, for better or worse, became responsible for the Eysenck Personality Inventory. Gray modestly omits to mention his own contributions to personality theory, but rightly suggests that Pavlov's influence is still visible, not only in the EPI. but in some forms of behaviour therapy as well.

The influence of Pavlov on theories of animal learning has of course been profound. But it can be argued that experimental advances in classical conditioning since Pavlov have been inconsequential, and that interpretations of Pavlov in the English-speaking world have been misguided. Pavlov (1930) himself wrote a vigorous attack on the way his work was then being treated by Guthrie and Lashley, but to no avail. As Gray points out, Pavlov would be just as 'surprised and distressed' today by the lack of interest in the brain shown by Western psychologists who study conditioning. Although Pavlov quite naturally pushed his own methodology of salivary conditioning, he constantly reiterated that what he was really after was an understanding of the 'analysing and synthesizing' activities of the cerebral cortex. Gray might have achieved a better balance between the real Pavlov and the image seen in what the cover blurb calls the 'distorting mirror of Behaviourism' had he mentioned Pavlov's own attempts to manipulate cortical activity directly, by the lesion method. These attempts would probably have been more extensive but for what Pavlov called his 'big mistake' (Pavlov. 1927. p. 321) of trying to make cortical lesions without any loss of blood, by a technique which led to post-operative scar tissue. Despite these difficulties, Pavlov produced results which would give him something to talk about in modern laboratories of physiological psychology. For instance, he investigated what Munk had called 'psychic' blindness, in dogs with ablations of the visual cortex: they had no normal object vision, but could be trained to give salivary reflexes to different levels of luminosity, and eventually to distinguish between a luminous cross and circle (Pavlov, 1927, p. 343ff). The conclusion drawn was that 'the dog understands but does not see sufficiently well'. Extensive work was done on the nature of auditory discrimination after temporal lobe ablations, and there were a number of very modern-sounding experiments on tactile discrimination in hemi-decorticate and split-brain dogs. The conclusion in the latter case was that there is no homolateral connection of the skin with the cortex, but with the commissures intact there are strong point-to-point connections between tactile sensations on different sides of the body, in dogs.

Not satisfied with the lesion method. Pavlov started work with multiple implanted electrodes. The point is that it might be fairer to Pavlov to emphasise his role as a brain scientist, coming between Ferrier and Munk, and for instance, Luria and Sokolov, rather than to limit his influence to the invidious position of being progenitor of the theories of Guthrie and Hull. Much of what Pavlov said about 'analysing and synthesizing' in the 'functional mosaic' of the cortex makes a certain amount of sense if each element of the mosaic is a modern cortical column, and even 'irradiation and concentration' of neural activity may not have been too far off the mark, in the light of what is now known about the topographic organization of sensory cortex.

A final area in which Gray's account provokes a number of questions is the network of relationships between Pavlov, his theories, and the Soviet state. Gray notes the decree signed by Lenin in 1921 which arranged for optimum conditions to be established for Pavlov's experimental work, and for Pavlov and his wife to receive double food rations. The same decree stipulated that government presses should print Pavlov's output in de luxe editions and that his apartment should be properly furnished. Gray states that Pavlov was hostile to Lenin's regime, and that Party officials rejected Pavlov's theories as 'vulgar materialism'. If this is so then the treatment of bourgeois liberals promulgating incorrect theories in the Russia of Lenin and Stalin must have been more benign than one has been led to believe. An alternative view is that there was a degree of mutual enthusiasm between Pavlov and the Russian government of the 1920s and 1930s which is now rather an embarrassment. Pavlov began in April 1917 (after the abdication of the Tzar, and just before the arrival of Lenin) by publicly welcoming the end of a 'sombre epoch of oppression' (Pavlov. 1955. p. 49). However, in the same speech (read in his absence to a conference of physiologists) he pointedly remarked that 'A grievous sin was committed by the Great French Revolution when it executed

Lavoisier', He obviously had some worries. But his treatment under Lenin could hardly have been more favourable, and even this was bettered under Stalin, when a special 'scientific city', Koltushi, was built outside Leningrad, which included facilities for research on apes. In return, Pavlov, at the very least, stayed in Russia, rather than emigrating elsewhere. (It has been said that Pavlov was offered a life-time grant in the 1920s, by the Medical Research Council, if he would move to England. As a full-time researcher under two Tzars, Lenin, Stalin, and with this offer as well. Pavlov was certainly outstanding in his ability to attract research funding.) More probably, Pavlov actively supported what he felt to be useful policies in his native country. His speech to a reception at the Moscow international conference in 1935 expressed passionate support for the 'historic social experiment' of Russian government at the time. He visited collective farms and the last publication recorded in the official selected works (Pavlov, 1955) is a laudatory letter from Academician Pavlov at Koltushi to 'leading miners' in the Ukraine. Was Pavlov one of those prominent scientists who served on subcommittees of the Politburo in the 1930s and gave opinions on the suitability of propaganda for collectivisation of the farms and worker emulation in the mines and factories? Perhaps not. But if Pavlov and his theories had nothing to do with social policies and propaganda techniques in Russia, then it is doubly ironic that the application of his ideas was more visible in America. In 1921, the year of Lenin's decree, J. B. Watson was signing on with J. Walter Thompson in New York, and before he left in 1935. Watson had developed, among other things, the concept of brand loyalty, and the crudely Pavlovian apposition of the brand name with stimuli indicating high social status, which effectively influences consumer behaviour to this day. (One Watsonian variant was testimonial advertising and one of the products he worked with was coffee.) But it was Pavlov, not Watson, who said that 'suggestion is man's most simplified and most typical conditioned reflex'.

Gray's account of Pavlov thus raises more questions than it answers, and emphasizes the purely behaviourist and Hullian aspects of his influence. However, these can hardly be called failings in a book of this length and purpose and Gray should be congratulated, and the book recommended to undergraduates. It could be recommended even more warmly, if only it had an index, but there seems to have been a decision not to have indexes in this series.

STEPHEN WALKER

PAVLOV, I.P. 1. (1927). *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex*. New York. Dover Publications.

PAVLOV, I.P. (1930) The reply of a physiologist to psychologists, *Psychological Review*, **39**, 91-127,

PAVLOV, I.P. (1955) *Selected Works*. Moscow: Foreign Language Publishing House.