John Broadus Watson, Behaviorist

John Broadus Watson, self-styled "the behaviorist," died on 25 September 1958 at the age of 80. His scientific life had come to a close a third of a century earlier, and he was unknown personally to a whole generation of younger men whose field of scientific activity he had defined and vigorously developed. His place in the history of science, and something of his stature, are indicated by three names—Darwin, Lloyd Morgan, and Watson—which represent three critical changes in our conception of behavior.

In establishing the continuity of species Darwin had attributed mental processes to lower organisms. He was supported by a host of anecdotal naturalists who recounted instances of reasoning, sympathy, and even artistic enjoyment on the parts of dogs, cats, elephants, and so on. The inevitable reaction was epitomized in the writings of Lloyd Morgan, who argued that such evidences of mental processes could be explained in other ways. A third step was inevitable, and it was Watson who took it: If there were other explanations of mental processes in lower organisms, why not also in man?

In dispensing with mentalistic explanations of behavior, Watson cleared the way for a scientific analysis. In doing so he acknowledged his debt both to Lloyd Morgan and to Thorndike, who, though he remained a mentalist, supplied a classical alternative explanation of "reasoning" in his experiments on trial-and-error learning. The epistemological issue was also in the air. Watson never took to philosophy (though, as he later said, his "milk teeth were cut on metaphysics"), but it was George Herbert Mead's great personal interest in Watson's animal experiments which supplied an immediate and crucial contact with relevant philosophical issues. A behavioristic interpretation of mental processes was later adopted by operationists and logical positivists, but the issue was to remain primarily empirical rather than logical.

Born in Greenville, South Carolina, Watson was to remember himself as a below-average and troublesome schoolboy with little to show for his early education except a love for manual skills. (He later built a ten-room house with his own hands.) His five years at Furman University, where he received an A.M. instead of an A.B., were aso remembered as a bitter disappointment. But his educational luck suddenly improved when an interest in philosophy took him to the University of Chicago. Few men have made as many fortunate contacts during their graduate careers: with John Dewey (though Watson later complained "I never knew what he was talking about and, unfortunately, still don't"); with Angell (who taught him to write); with Jacques Loeb (whom Angell thought "unsafe" as Watson's thesis advisor); and, particularly, with Mead. Under the Chicago influence his interests turned to biology, and he always regretted that, in addition to his Ph.D., he was not able to finish work for the M.D. degree at Chicago. At the age of 29 he went to Johns Hopkins University as professor of psychology, where he came into even closer contact with biologists and medical men, particularly Jennings and Adolph Meyer. Among psychologists he worked with Knight Dunlap and Robert Yerkes (who were later to formulate their own variety of "psychobiology") and with Curt Richter and Lashley, the latter fresh from Jennings' laboratory.

John Broadus Watson

From all this exceptional stimulation, Watson emerged with a burning recognition of the need for a science of behavior. In 1912, when he first outlined his "behaviorism," there was no scientific discipline devoting itself to this important aspect of nature. Sociologists and economists frequently considered the behavior of men, but seldom of man as an individual. Psychology, in spite of the early American movement of functionalism, was dominated by an introspective "science of mind" which Watson viewed with an impatience which was never to be satisfied. In his most important book, *Psychology from the Standpoint of a Behaviorist,* published in 1919, Watson defined the field he wanted to see studied and assembled available techniques and facts. A second edition in 1924 contained a clearer and bolder programmatic statement. The emphasis was necessarily on the program, for not more than one-third of even the 1924 edition contained facts strictly relevant to the science of behavior the author was proposing. Anatomical and physiological material were used to complete the book. Watson's own contributions were not great, and he was to have no opportunity to extend them. His studies on maze behavior and his concept of "habit" made an uneasy marriage with Pavlov's principle of conditioning, then just beginning to attract attention in this country. His frequency theory of learning was short-lived.

In spite of its shortcomings the book had a tremendous effect. The new movement immediately attracted attention and adherents. Dissenters fell into line on the other side. In the controversy which followed, Watson's taste for, and skill in, polemics led him into extreme positions from which he never escaped. He could not content himself with prosecuting an empirical study of behavior simply as such, for he believed that psychology was the science destined to deal with that subject matter, and he wanted to reform it accordingly. He had another reason for crusading against the strongly entrenched introspectionists, since they claimed to offer direct evidence of the mental processes he wanted to discard. Watson seized upon laryngeal and other covert verbal activities as the "thought processes" of the introspective psychologists and refused to acknowledge sensory aspects of behavior which could also be observed by the behaver himself. It has been suggested that he might not

himself have had visual or auditory imagery. In any case his sweeping denial of the existence of self-observed sensory events (the acknowledgment of which would not, as we now know, have implied the dualism he was so anxious to avoid) occupied him in what he later described as "a continual storm."

The same taste for polemics led him into an extreme environmentalistic position. In *Psychology from the Standpoint of a Behaviorist* he had devoted two chapters to hereditary behavior. Like all those who want to do something about behavior, he had emphasized the possibility of environmental modification, and this was widely misunderstood. Under the stress of battle he was led at last to the well-known cry: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years."

Watson also went beyond his facts, and in the same crusading spirit, in his views on child training. Experiments on the behavior of infants had shown him that emotional patterns could often be traced to conditioned emotional reflexes (a term he took from Pavlov via Lashley). He thought he saw the seeds of many behavior problems in early home experiences, and in his *Psychological Care of the Infant and Child*—a book he later publicly regretted—he cautioned parents against the unconsidered display of affection. (Current "mother love" theories are the other swing of that pendulum.)

And so it came about that Watson was to be remembered for a long time, by both laymen and psychologists alike, for a too narrow interpretation of self-observation, for an extreme environmentalism, and for a coldly detached theory of child care, no one of which was a necessary part of his original program. His brilliant glimpse of the need for, and the nature and implications of, a science of behavior was all but forgotten. Perhaps history is ready to return a more accurate appraisal. A year before his death he had the satisfaction of dedicating a paperback edition of his popular book *Behaviorism* to the American Psychological Association, which on 7 September 1957 cited him as follows: "To Dr. John B. Watson, whose work has been one of the vital determinants of the form and substance of modern psychology. He initiated a revolution in psychological thought, and his writings have been the point of departure for continuing lines of fruitful research."

B. F. SKINNER
Psychological Laboratories, Harvard University, Cambridge, Massachusetts

News of Science

Frontal Cloud System Pictures Obtained by Rocket

Clear pictures from the first rocket-camera unit designed specifically to photograph weather frontal systems and their associated cloud formations, from extreme high altitudes over ocean areas where there are no permanent weather stations, have been obtained from a successful firing and recovery of a Project Hugo rocket.

This is the first time that man has been able to look down from so high a vantage point on physical manifestations of the Norwegian weather front theory by which meteorologists have been forecasting the weather for the past 40 years. The frontal cloud pictures are the best obtained to date from a rocket.

The film, recovered at sea from the nose cone of the Nike-Cajun rocket, which reached an altitude of 86.25 miles on 5 December 1958, shows the frontal cloud formations over an Atlantic Ocean area, starting about 200 miles off the Virginia coast and stretching about 700 miles further eastward. The mosaic strip, covering approximately 1000 miles in length, compares roughly with the expanse between the southern tip of Maine and mid-Florida. The launching from the National Aeronautics and Space Agency's Pilotless Aircraft Research Station at Wallops Island, Va., was accomplished from a land-based installation of a shipboard-type Terrier missile launcher, and was effected without any delays or difficulty. Signals emitted by the nose cone's miniature transmitter were easily tracked by one surface ship and one aircraft, each carrying portable radio tracking equipment. Following the flight, the instrumentation package was successfully located and recovered from the sea by the destroyer USS LEARY, despite 8- to 10-foot swells and 25- to 40-knot winds.

Project Hugo

Project Hugo (highly unusual geophysical operations), conducted by the Office of Naval Research with funding assistance from the Bureau of Aeronautics and the U.S. Weather Bureau, is designed to further research into meteorological phenomena in an effort to improve the accuracy of weather predictions. It will also be of assistance to the U.S. Weather Bureau's Hurricane Weather Research Project in the field of hurricane photography.

Instrumentation

The Hugo-Nike-Cajun rocket consisted of a recoverable instrument head attached to a standard Nike-Cajun vehicle. Gross takeoff weight of the assembled rocket was 1552 pounds. Second stage gross weight was 270 pounds. The instrument head contained two 16-millimeter movie cameras, a radar tracking beacon, a Mytymouse homing transmitter, a primary programming device, a secondary programming device, a nose ogive jettison circuit, a drag parachute, a split-ring separation system, four blocks of slowly dissolving sea dye marker, and appropriate power supplies.

Design and construction of the Project Hugo rocket-camera assembly was done by the New Mexico State University at Las Cruces, under contract with the Office of Naval Research. The cameras themselves were specially designed and prepared by the Naval Research Laboratory.

Performance

In the 5 December shot the instrument head was not stabilized. The effect of this as it appeared in a showing of the film was a rather rapid turning of the