NATIONAL ACADEMY OF SCIENCES

RICHARD LESTER SOLOMON

1918—1995

A Biographical Memoir by

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Biographical Memoir

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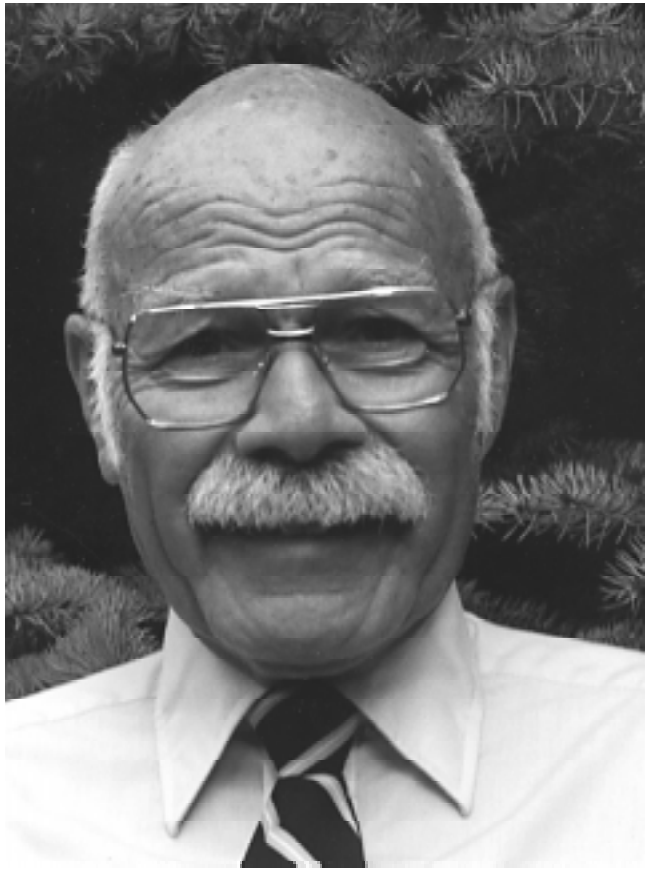
WASHINGTON D.C.



Richard L. Solomon

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October 2, 1918–October 12, 1995

BY ROBERT A. RESCORLA

RICHARD LESTER SOLOMON was the complete university professor. He cared deeply about the creation and evaluation of ideas. He loved the process of sharing these ideas with his colleagues and students. And he glowed with enthusiasm when he had the opportunity to foster the development of ideas in others. Dick Solomon was an experimental psychologist whose research interests ranged broadly around the theme of learning and motivation. He made major contributions to many areas, but he is especially known for his work on avoidance learning and opponent-process theories of motivation. For that work he received a wide assortment of awards and honors. Of equal importance, especially to him, he trained a whole generation of research psychologists, literally populating an important subfield with most of its leaders. Most importantly of all, he was a warm and supportive person, whose affection and wisdom strengthened every person and institution with which he had contact.

Dick was born in Boston in 1918, into a family whose mother had high moral values and whose father was a hard-driving CPA. He described his family life as orderly and intense, with an emphasis on manners, achievement, and

personal responsibility. The home environment emphasized the importance of reading and debate.

He attended public schools in Newton and Brookline, graduating with a spotty grade record marked by high grades from teachers he liked and low grades from those he disliked. One especially well-liked teacher, Tyler B. Kepner, demanded analytic thinking in the context of teaching United States history. It was Kepner's encouragement, and his high recommendation, that was critical to Dick's applying to college and matriculating at Brown.

Although his high school interests had tended more towards the humanities, Dick was drawn to economics and psychology at Brown, eventually completing a joint major. He carried out an undergraduate honors thesis directed by Joseph McV. Hunt, which earned him a summa cum laude degree in 1940. His eventual decision to focus on psychology was heavily influenced by the quality of the members of the Brown psychology department at that time, people such as Walter Hunter, Harold Schlosberg, Donald Lindsley, Carl Pfaffmann, and Lorrin Riggs.

Dick elected to remain at Brown for his graduate training, working in the laboratory of Harold Schlosberg. His graduate career was interrupted by the Second World War, during which he served as a research psychologist in the Office of Scientific Research and Development. There he worked on perceptual-motor systems for the defensive weapons systems of the B-29 bomber. At the end of the war Dick returned to Brown where he received his Ph.D. in 1947.

In 1947 Dick took up an assistant professorship in social relations at Harvard. He remained at Harvard, becoming an associate professor in 1950 and a full professor in 1957. In 1960 he was recruited by Bob Bush to the newly emerging psychology department at the University of Pennsylvania. At Penn he became the first James M. Skinner Univer-

sity Professor of Psychology. Dick retired from that department in 1984.

Reflecting the times in which he was trained, Dick Solomon had wide ranging basic research interests within experimental psychology. But two themes run through this remarkably diverse research career: a repeated concern with improving the sophistication of experimental designs and a consistent desire that the research be brought to bear on applied psychological problems.

Much of Dick's earliest work dealt with the so-called "new look" in perception. In the late 1940s and early 1950s it was popular to suppose that personal motivational variables might produce distortions leading both to nonveridical perception of such object dimensions as size and to reductions in the likelihood of seeing unpleasant events. In the midst of a field full of injudicious claims based on uncertain methodology, Dick conducted careful systematic experiments exposing clear parametric relations. As a result of these experiments, many of the less cautious claims were put to rest.

Beginning in the early 1950s, Dick began the work for which he is perhaps best known, the systematic study of avoidance learning in dog subjects. Avoidance learning was a hot topic at that time, in part because of the puzzle about what maintained the behavior once it was acquired. In a typical experiment a dog was placed in a two-compartment shuttlebox. Its task was to jump a barrier in order to cross to the other side. A warning signal, such as a tone or light or the raising of a door separating the chambers, alerted the animal that it had a short period, such as ten seconds, in which to cross to the other side. Failure to cross within that period resulted in the application of electric shock to the grid floor of the chamber; that shock could only be terminated by crossing. However, crossing during the warn-

ing period avoided the shock altogether. Dogs readily learned such a task and would reliably execute the jumping response trial after trial without shock, once it was learned. For many, the puzzle was that the animal appeared to be rewarded by the failure of some event to occur.

Characteristically, there were three aspects to Dick's approach to this work. The first was careful parametric investigation of the determinants of avoidance learning. In an era of demonstration experiments, Dick and his students collected some of the first really systematic data on avoidance learning. The second was the development of a theoretical framework which would account for the behavior in all its richness. For this he turned to the two-process theory which was being developed by Miller, Mowrer, and others. He saw, perhaps more clearly that anyone else, that avoidance learning was the product of two learning processes: a classical conditioning process in which the warning signal became aversive by virtue of developing a Pavlovian association with the shock and an instrumental learning process in which the animal's jumping response was rewarded by the removal of that aversive warning signal. That theory remains even today as the core part of current explanations of avoidance behavior. Thirdly, Dick realized the important clinical applications of avoidance behavior, and its extreme resistance to being eliminated, for the understanding of such human pathologies such as phobias.

Out of this work on traumatic avoidance learning grew three other threads of Dick's work. The first was the development, with Lucy Turner, of the so-called transfer paradigm. In the course of their analysis of the Pavlovian basis of avoidance behavior, they developed a paradigm which has proved to be of immense power in the analysis of associative learning. They found that after dogs had been trained to make an avoidance response to one warning signal, other

signals which had simple Pavlovian pairings with shock would also produce the avoidance behavior. Of special interest to Dick was the fact that this latter learning occurred even when the signal was paired with shock at a time when the animal was fully immobilized by curare. That transfer paradigm remains one of the major tools used today to identify Pavlovian and instrumental associations. In the course of developing that paradigm, Dick was extremely influential in helping the field work through one of its core distinctions, that between Pavlovian conditioning and instrumental learning. Second, while conducting transfer experiments, students in Dick's laboratory discovered the phenomenon of "learned helplessness" in which an animal that receives uncontrollable shocks subsequently has difficulty learning to avoid those shocks when given the chance. Again, the analysis involved careful parametric work, construction of theory, and attention to clinical application. Third, the study of avoidance naturally led to Dick's interest in a paradigm which is in some ways its complement, punishment. During the 1950s and 1960s a combination of political, scientific, and social attitudes conspired to popularize the view that punishment was an ineffective way to suppress behavior. Dick correctly saw that this was an absurd position and said so in his 1963 presidential address to the Eastern Psychological Association. The impact of that address was immense, leading many laboratories to take up the systematic investigation of punishment, greatly expanding our understanding.

Dick's final theoretical contribution was the development of a broad ranging theory of motivation, called the opponent-process theory. Building on ideas from perception, he developed a framework within which to examine strong emotional effects in terms of their initial consequences for the organism and the reactions that the organism gener-

ates to counter those consequences. This theory proved to have vast integrative power, bringing together ideas about such powerful human emotions as fear, love, and hope. In Dick's hands it also provided the means of understanding some important psychological aspects of drug addiction, participation in sports, and thrill-seeking of various sorts.

This array of important scientific work earned Dick just about every prize and honor that psychology has to offer. He was awarded the Distinguished Scientific Contribution award of the American Psychological Association and the Howard Crosby Medal of the Society of Experimental Psychologists. He was elected to the American Academy of Arts and Sciences and, in 1968, to the National Academy of Sciences. He held such honorific offices as president of the Experimental Division of the American Psychological Association, president of the Eastern Psychological Association, and chairman of the Governing Board of the Psychonomic Society. The University of Pennsylvania honored him as one of its University Professors, and Brown University bestowed on him an honorary doctorate. Because of wide respect others had for his thinking, he was asked to edit the field's most prestigious journal, the *Psychological Review.*

Influential as Dick was as a researcher, he was even more influential as a teacher and mentor. He had a huge educational impact on students at all levels. Undergraduates flocked to his classes, attracted by his enthusiastic and articulate lecture style. He was one of those teachers students remember decades later. His training of graduate students is legendary. Both at Harvard and Penn he attracted the brightest and best graduate students and gave them a training which made them the leaders in the field of elementary learning processes. In 1983 many of the thirty-two students he trained, together with colleagues he influenced at Penn and Harvard, gathered in a two-day celebration of Dick's

career. Uniformly, they recalled the combination of intellectual excitement and personal support which Dick conveyed. Every one of them spoke of Dick's commitment to fostering their intellectual growth and helping them to become independent thinkers and scientists. Dick had a way of creating a setting, providing resources, subtly affecting your thinking, and then standing back while you grew.

Each student had a story about how Dick had placed his students' careers first, often potentially sacrificing his own. My own experience is typical. While I was a graduate student, Dick and I were writing what we both knew would be an important theoretical paper on two-process theory. As we handed the drafts back and forth, something peculiar kept happening: the order of authorship kept changing. I would give him a draft with him as the (proper) first author and when it came back from him my own name was placed first. Thinking that it was a clerical error, I told Dick that he needed to speak to his secretary so that she got it right. I still recall his telling me, "She does have it right. I have plenty of publications and an established career, but you are just beginning. You need the authorship much more than I." It was this attitude that resulted in dozens of publications coming out of Dick's lab without his name ever being listed as an author. So unusual was his generosity that his grant applications had to have a separate section listing the publications of his students that resulted from earlier funding; his own bibliography reflected only a small portion of the work.

Anyone who passed through the University of Pennsylvania psychology department in the 1960s, 1970s, and 1980s heard of Dick's research seminar, the weekly meeting of his students. This exciting discussion was frequently attended by graduate students and faculty from other labs. It formed the core of the graduate education for dozens of psycholo-

gists. The interactions were broad-ranging and the arguments often heated. But no matter what the topic, Dick had a way of finding the essential and good ideas in what everyone said.

Just as the field honored Dick for his research contributions, it acknowledged his educational role. He was awarded Sigma Xi's Montie A. Ferst Award for ". . . notable contributions to motivation and encouragement of research through teaching" and the American Psychological Foundation's Award for Distinguished Teaching. He is one of the few people to have won the American Psychological Association's primary awards both for distinguished teaching and distinguished scientific contribution.

Dick served as a role model not only for his students but also for dozens of professional colleagues. Although he never accepted a major administrative position, he was the acknowledged intellectual and moral leader of the Penn psychology department. His commitment to high intellectual standards, combined with his fondness for others and his gentlemanly manner, made his opinion the most valued in any discussion of policy. The tone of civility that he established allowed even the most potentially explosive of issues to be debated openly and frankly. I never knew anyone to attribute to Dick any motives other than the good of the department and the science.

When Dick retired in 1984, he moved to North Conway, New Hampshire. There he continued to pursue vigorously his outdoor interests in hiking and canoeing. He also continued his role as a mentor, actively encouraging the members of the White Mountain Miler's, a local running club in which his wife Maggie was active. When I visited him, I would frequently be taken aside by members of the community to be told of his wonderful contributions to their lives. When he died in 1995, over two hundred people from

the community attended the memorial service. With the exceptions of Maggie, his daughters, Janet and Elizabeth, and his brother, David, those present knew little of his scientific contributions. But they had been touched by the same qualities of personal warmth, enthusiasm, and supportiveness that had so guided his professional research and teaching career. In 1996 the University of Pennsylvania renamed its psychology building as the Richard L. Solomon Laboratory of Experimental Psychology. This will memorialize his scientific contributions. But no building name can capture his human qualities.

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