

Experimental Psychologist Richard L. Solomon (1918-1995)

March 01, 1996

Experimental psychologist and APS Charter Fellow Richard L. Solomon died on October 12, 1995, in Boston, during cardiovascular surgery. Since his retirement from the University of Pennsylvania in 1984, Dick and his wife Maggie had been living in Conway Village, New Hampshire, an area he had come to love when he owned and worked a tree farm nearby.

A keen outdoorsman, who as a camp counselor had led city kids on hikes through the Maine woods during the summers throughout his academic career, in retirement Dick remained an enthusiastic hiker, cyclist, and canoeist, interests he and Maggie shared. He was the chief cheerleader and support system for the town 's running club, shouting encouragement at the start and finish lines of every race. He is survived by his daughters Janet and Elizabeth.

Dick Solomon was born in Boston in 1918. He received his AB from Brown University in 1940 and his MSc in Psychology from the same school two years later. During the second world war he was a research psychologist for the Office of Scientific Research and Development most notably working on new perceptual-motor systems to control the defensive gunfire of the B-29 bomber. When the war ended, Dick returned to Brown, where he received the PhD in 1947. He moved to Harvard's Department of Social Relations that year and was promoted to a Professorship 10 years later. In 1960 he joined the faculty of the Department of Psychology at the University of Pennsylvania, where he was named the first James M. Skinner University Professor of Science in 1975.

Solomon was elected to the National Academy of Sciences and was awarded the Warren Medal for research by the Society of Experimental Psychologists, as well as APA's Distinguished Scientific Contribution Award. He also received the American Psychological Foundation's Award for Distinguished Teaching in Experimental Psychology and Sigma Xi 's Monie A. Ferst Award for "... notable contributions to motivation and encouragement of research through education."

Solomon's laboratories at Harvard and Pennsylvania were magnets for graduate students; 32 men and women completed their PhDs under his direction. I hope they will forgive me for not citing them in the usual way in this necessarily brief history of research from Solomon's laboratories.

Dick Solomon was educated at a time when an extraordinary person could be well informed about several areas of psychology. From his earliest years at Harvard Solomon was sufficiently well informed to conduct and direct research on a broad array of topics, from word frequency and perceptual defense, to factors affecting children 's estimation of the size of tokens, to the effects of illumination on hoarding behavior of rats, to group characteristics as revealed in personality ratings and sociometric patterns, to generalization of imitation across drives and situations.

By the early 1950s, the problem of avoidance learning had become the primary focus of research in Solomon's laboratory. At that time, the fundamental challenge was to understand, in a mechanistic way,

how the absence of an event could be the reinforcer for avoidance behavior. One answer, proposed by O. H. Mowrer but developed more fully in Solomon's laboratory, was called two-process theory. It asserted that the warning signal in avoidance procedures came to evoke a fear response through Pavlovian conditioning because it was followed by the aversive event on early trials. When the avoidance response occurred, and the fear-evoking signal was turned off, fear reduction reinforced the avoidance response. Avoidance became escape from fear. Solomon's focus on two-process theory, along with his commitment to a multi-disciplinary approach, set the stage for a number of important lines of research. First came a careful experimental analysis of signaled avoidance, along lines suggested by two-process theory. Several of Solomon's students and former students looked for independent evidence for changes in fear, indexed either physiologically or behaviorally, evoked by the warning signal over the course of acquisition and extinction of avoidance.

Avoidance, fear, and related topics remained the focus of Solomon's research after he moved to Pennsylvania. In a 1963 presidential address to the Eastern Psychological Association, Dick argued that punishment, when properly used, was an effective procedure for suppressing behavior, and that its effectiveness, like that of its close relative, avoidance training, could be understood in terms of two-process theory. This essay came at a time when the prevailing view was that punishment was not very effective, and it had a catalytic effect on research on punishment, which is now fairly well understood.

Transfer of control experiments conducted in Solomon's laboratory showed that performance of an avoidance response that had been trained to one stimulus in one context transferred to another stimulus that had been functioning as a Pavlovian signal for the aversive event in a different context. The transfer paradigm allowed changes in instrumental responding to be used as indices of Pavlovian conditioned fear. Using such a paradigm it was demonstrated that CSs from a variety of Pavlovian procedures evoked conditioned inhibition of fear. The importance of Pavlovian conditioned fear in avoidance learning and punishment, along with the availability of the Conditioned Emotional Response and transfer of control procedures, powerful tools for studying fear and its inhibition, made fear an attractive vehicle for studying Pavlovian conditioning. Research by Solomon, his Harvard and Penn students, and others, using fear as a representative conditioned response, made a major contribution to the exploration of Pavlovian conditioning, as novel experimental designs generated provocative new phenomena, which in turn inspired comprehensive and fruitful theories.

Interest in the role of Pavlovian conditioned fear in avoidance responding stimulated interest in the role of Pavlovian processes within instrumental behavior generally, and by the late 1960s, transfer of control experiments designed to elucidate Pavlovian-instrumental interactions abounded. Stimulus as well as motivational properties of Pavlovian conditioned states were seen to be important determinants of instrumental responding. The direction of this research was in large part set by a framework for categorizing interactions between Pavlovian and instrumental processes that emerged from Solomon's laboratory.

The learned helplessness hypothesis, which has had a substantial impact on nearly all of psychology, was prompted by the finding, in Solomon's laboratory in the mid-1960s, that prior exposure to inescapable, unavoidable shocks resulted in profound impairment with subsequent escape learning. Search for this interference effect itself arose from observations in transfer of control experiments that latencies of the first escape response in avoidance/escape training were longer for animals that had received classical conditioning first than for animals that had received avoidance training first.

Interestingly, the importance of the level of conditioned fear, and of signals that mitigate that fear, has been a focus of recent experimental analysis of learned helplessness.

From the early 1970s Solomon's primary theoretical focus was on the opponent-process theory of acquired motivation, which, taking the phenomena of opiate addiction as a model, asserts that with repeated presentations of a hedonic event, the initial affective response to that event diminishes, and an affectively opposite response develops to termination of the event. Dick always was concerned about how results from the laboratory might apply to the "real world," but it was in the case of opponent processes that he extrapolated most freely, from changes in emotional responses to aversive events or drug experiences in dogs and rats to changes in affect as people become veteran sport parachutists, sauna bathers, or distance runners, and even to changes in lovers' affective reactions to separations.

Dick Solomon's profound impact on his graduate students was largely through example. He exemplified those characteristics that a scholar, researcher, and teacher of graduate students should possess. His enthusiasm for a broad range of psychological questions was perhaps his most striking characteristic, and he communicated that enthusiasm to students and colleagues alike. On listening to him discuss research questions in first-year proseminar, and later in his weekly research seminar, it became obvious that the formulation of fundamental, testable questions about learning and motivation and consideration of the implications of the research that followed from those questions were vitally important and exhilarating activities. After a relatively short time in Dick's laboratory such issues and activities became terribly exciting for his graduate students too.

Dick Solomon created a research environment that was supportive as well as exciting. He characteristically treated with respect ideas proposed by his students in seminars and casual conversation. In research seminar, where students and postdocs proposed new approaches to research problems, often there was considerable "cut and thrust" as participants focused on a proposal's shortcomings. Dick took a different tack, guiding the discussion so that what was valuable in a proposal, however incomplete or flawed, could emerge. When a question of research design or strategy was being considered, he encouraged students to work out answers for themselves. Even less confident students discovered that they could make worthwhile contributions to the research effort. Dick Solomon used his personal force and eloquence to create an intellectual climate that fostered creativity and independence, and the students thrived. Throughout his retirement Dick maintained an affectionate interest in the intellectual development of his former students.

Dick also taught his graduate students, again largely by example, that acceptance of the role of university professor entails a commitment to maintain a balance between the time and energy spent on one's particular research interests and those devoted to teaching and the operation of the university. Despite his dedication to research, Dick never acted as though it was appropriate to pursue a research question to the exclusion of the other roles that the best scholars and researchers must play if the universities are to fulfill their promise. Although he was actively engaged in several research projects and was doing an extraordinary amount of editing and reviewing- he was editor of the *Psychological Review* from 1959 to 1964-Dick nonetheless contributed much more than his share to the life of the university.

In May 1983, Dick's students and colleagues from all over North America met to honor him in his 35th academic year. His former graduate students and postdocs presented 22 scientific papers which were

collected in the volume *Affect, Conditioning, and Cognition: Essays on the Determinants of Behavior* (Brush and Overmier, 1985), a volume the group offered to Dick in appreciation for all he had done, and with respect and love for the teacher and the man he was. We were grateful for the opportunity to honor him in that way. At this year's meeting of the Eastern Psychological Association in Philadelphia, on the afternoon of March 30, there will be a symposium "Conditioning, Learning and Affect: The Legacy of Richard L. Solomon," in which a few of Dick's students will review his major ideas and research, and outline subsequent developments in learning, motivation and related areas of psychology which his research and thinking continue to influence.