Carl L. Howland

CARL IVER HOVLAND

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BY ROGER N. SHEPARD

YALE PSYCHOLOGIST Carl Hovland made singularly important contributions to experimental, social, and cognitive psychology (focusing respectively on human learning, attitude change, and concept acquisition). In the process he worked unremittingly "to improve the standards and quality of research in psychology and related fields," earning (in the words of one of his longtime coworkers) universal recognition as a "statesman of the social sciences" (Janis, 1968, p. 530).

Hovland also served as an insightful and trusted consultant to numerous governmental and educational agencies, industrial organizations, and philanthropic foundations. All this he did within a life lasting not quite forty-nine years. He could hardly have foreseen how limited would be the time available to him (both his parents lived into their nineties). Yet he compensated, in effect, through his remarkable precocity, quickness of mind, and productive use of every waking moment—along with his extraordinary ability to bring together bright young researchers with widely differing theoretical perspectives, to provide them with support and subtle guidance, and to formulate coherent syntheses of the emerging results. A man of unsurpassed gentleness and moral integrity, he left a deep and permanent mark on everyone who knew him.

MY OWN RECOLLECTIONS OF HOVLAND

I first met Carl Hovland when I arrived for graduate study in Yale's illustrious Department of Psychology in the fall of 1951. Hovland's title, Sterling professor, seemed wonderfully euonymous for this tall, distinguished man, endowed as he was with rare personal qualities and wavy hair turning to silver. Now, over forty-five years later, I am astonished to realize that this revered member of the department, who had been serving as chairman of the department and director of the Laboratory of Psychology, was at that time only thirty-nine years old!

Particularly striking were the apparent ease and efficiency with which Hovland managed all the many things in which he was always engaged and his constructive use of every moment of time. While showing genuine interest in everyone with whom he had contact, he had a way of keeping administrative interactions brief and to the point. His extraordinary memory enabled him to carry out much of the department's business through chance meetings in the hall or stairway—venues that minimized the risk of someone plunking down in a chair in his office for more than the time needed to resolve whatever issue was at hand. If Hovland did not encounter a graduate student sufficiently soon concerning some matter, the student would find a slip of paper in his or her departmental mailbox with the succinct notation: "See me. CIH." More than once, discussions of my own research were carried out as I tried to keep up with Hovland's rapid stride to the New Haven railway station where he would be catching a train to New York—perhaps to consult with AT&T, Bell Laboratories, or the Rockefeller or Russell Sage Foundations.

On those occasions when I did actually sit down in Hovland's office, he would also be reading his mail and talking with someone else on the telephone. When I called

him on the phone, I could hear someone else in his office and the occasional rattle of a letter being opened. And, when I sent him a note, I imagined that while he was perusing it, he would also be talking with someone in his office and someone on the phone. I fantasized having the delivery of my written letter, the playing over the phone of my recorded voice, and my physical entrance into his office converge upon him simultaneously—thus gaining, for once, his undivided attention! In truth, however, I welcomed the brief hiatuses that Hovland's time sharing entailed as I was striving to marshal my ideas for his assessment.

Another Hovland student, Herbert C. Kelman (now Cabot professor of social ethics at Harvard), described to me how the drafting of his 1953 paper with Hovland began: "In consultation with Carl, I designed and carried out an experiment on the sleeper effect [in which the tendency to endorse a proposition from a low credibility source increases as the source is forgotten]. When the data were collected and analyzed, I . . . told him that I would like him to coauthor the article reporting the research. In his customary generosity, he told me that this was my experiment and he was not expecting coauthorship. But I insisted—whereupon he pulled out a yellow pad and started writing! Right then and there!" (Kelman, letter of March 25, 1997).

Hovland was the most efficient and organized individual I have ever known. But the efficiency and organization was all in his head; it did not depend on external aids. He conducted classes and chaired meetings in his quiet, informal manner without notes, while the desk and side table in his office remained piled with papers in no visible order. When another of my fellow graduate students inquired whether he might retrieve a term paper to correct an er-

ror, Hovland briefly rummaged through papers piled on the side table. Then turning to my waiting friend, he remarked, "You may think there is no order here. Actually, there is an order; it's just not an order designed to meet that particular type of request." And order there evidently was; Hovland's secretary, Jane Olejarczyk, told me, "Quite often he would call and ask me to retrieve some document with instructions like: it's in the third pile from the left on the table by my desk, about a third of the way down, and there's a Russell Sage report, printed on blue paper, just before you get to it . . . Amazing! He was always on target" (personal communication of May 29, 1997).

Hovland was a master of the Socratic method. Seemingly without any prepared agenda, he would ask the graduate students around the seminar table for their comments on the (always seminal) readings he had assigned, or for their proposals concerning an illustrative problem of experimental design or data analysis he was working through on the chalk board. At first, this evoked frustration or anxiety in students accustomed to more structured styles of instruction. (A student who had volunteered to calculate—in those days, by means of a slide rule—a number called for by the illustrative problem might find that, before he or she was able to come up with the answer, Hovland was already writing it on the board, apparently having arrived at it by his own swifter, purely mental calculation.) Former Yale student Philip Zimbardo (now a professor of social psychology at Stanford) remarked that the combination of Hovland's shyness and intellectual mastery may have prevented him from even suspecting that some students found him intimidating (personal communication of April 3, 1997). Nevertheless, out of our bumbling efforts a coherent picture would gradually crystalize, to be succinctly articulated by Hovland at the end of each class session. It was the goal

toward which Hovland evidently had been subtly guiding us all along.

I asked Hovland to serve as my dissertation advisor not only because I valued his quick intellectual grasp but also because he seemed uniquely free of commitment to any particular theoretical position and, hence, supportive of the exploration of promising ideas, wherever they might lead. Because of the great respect everyone had for him, Hovland was also able to give my career a couple of unexpected boosts at its very start. He endorsed the suggestion of a younger member of my dissertation committee, Burton Rosner, to take the unusual step of recruiting a mathematical psychologist from outside Yale to serve on the orals committee of my more-than-usually mathematical dissertation. One consequence was that the up-and-coming outside examiner selected, George A. Miller, invited me to join him a year later as a postdoctoral associate at Harvard. Then, following those two postdoctoral years, both Hovland and Miller recommended my appointment as a member of technical staff in a small basic research group that Hovland had been instrumental in establishing in the Bell Telephone Laboratories, Murray Hill, New Jersey. The research I was able to carry out during my two postdoctoral years at Harvard (where I first learned to program on the Univac 1, just given to Harvard) and during the next eight years at the Bell Labs (where I had access to a major computer facility) undoubtedly contributed to my own ensuing appointment to a professorship at Harvard.

In 1957 I participated—along with both Miller and Hovland—in a Summer Institute on the new computer simulation approach to modeling human cognitive processes organized by Alan Newell and Herbert Simon at the RAND Corporation in Santa Monica. Simon, who remembers Hovland "with great fondness," mentioned that Hovland

and Miller had "co-opted" him to join their small ad hoc committee of the Social Science Research Council, which had some Ford Foundation money for work in cognition. It was this money, Simon said, that made possible their Summer Institute (personal communication of May 27, 1997). Over a lunch with Hovland in Santa Monica that summer, I recalled how my doctoral research at Yale only two years before had necessitated my approximation of the eigen roots and vectors of matrices by hours of tedious computation on mechanical desktop calculators. "When," I wondered, "would Yale obtain a programmable electronic computer?" With a wry smile, Hovland replied that he was on a committee that had just been established at Yale to receive the gift of such a computer—in case one should be offered! Only three years later, the 1960 papers on computer simulation of thinking and concept attainment authored by Hovland, alone and with his student Earl Hunt, were already appearing.

It was shortly after joining the Bell Labs that I began my one direct research collaboration with Hovland. Herbert Jenkins and I had undertaken a study of classification learning in which human subjects learned by trial and error which of two responses was correct for each of the eight possible stimuli having either of two values on each of three binary dimensions (for example, square or triangular, large or small, and black or white). Jenkins and I sought to determine the number of trials required to learn different classifications in which correct responding required taking account of values on just one, on two, or on all three of the stimulus dimensions.

When we mentioned this study to Hovland, we learned that quite independently, he and two research assistants had just begun presenting subjects with explicit classifications of just such binary-valued stimuli into two groups of

four (one displayed on the left, the other on the right). They, however, were measuring subjects' speeds and accuracies of reconstruction of the two groups from memory, and recording how the subjects described the rules they found to govern each classification. We quickly agreed to join forces and, during our ensuing collaboration, Jenkins and I (often together with the Bell Labs learning researcher Ernst Rothkopf) would meet with Hovland—usually at his home in Hamden, outside New Haven.

On these visits, the Hovlands' longtime housekeeper Elizabeth would serve us lunch, elegantly presented with fine china, silver, and linens in the Hovland's formal dining room. I must have been seated in Mrs. Hovland's customary place. For, under a slight bump in the rug there was a button that I sometimes inadvertently hit with my foot, summoning the housekeeper, to my mounting chagrin.

At about this time, a growth in Hovland's neck (in the parotid gland just below his right ear), which had been diagnosed as benign some years earlier, had recurred and was now determined to be malignant. Both the advance of the cancer and the measures undertaken for its treatment (surgery, radiation, and a then highly experimental chemotherapy) were soon exacting a toll on Carl's previously inexhaustible energy, entailing a temporary loss of his full head of hair, which had rapidly turned entirely white, and a total deafness in his right ear.

Long before, Carl's wife Gertrude, like himself, still relatively young and universally regarded with admiration and affection, had been increasingly afflicted with rheumatoid arthritis. Anticipating his own impending death, Hovland became deeply concerned about his wife's growing helplessness. Her neck was now so fragile that she had to wear a neck brace whenever she was up and about.

On August 26, 1960, my two colleagues and I made our

last scheduled trip from the Bell Labs to the Hovlands' home to discuss the final stage of our collaborative project. We were met at the door by housekeeper Elizabeth, who, tearfully and barely able to speak, informed us that Mrs. Hovland had an accident earlier that morning and that Mr. Hovland would not be able to meet with us. We got in the car and headed back to New Jersey.

I later learned that Gertrude, having gotten out of bed without her protective collar, stumbled and fell. Her weakened neck snapped and she died instantly. A few days later, Carl called me to apologize for not being able to meet with us after our long drive. When I assured him that no apology was necessary and expressed my heartfelt sympathy, he became, for the only time in my experience, choked with emotion and was briefly unable to speak. The loss of his beloved wife was a terrible blow to this most caring and responsible of men—left, as he now was, with two children in their late teens and with less than a year remaining of his own life.

Right up to the end, Hovland continued doing (to the extent that he was physically able) just what he had been doing even before he learned that he was mortally ill. Apparently, Hovland had always proceeded each day with what he regarded as most important—as if that day might be his last. To avoid the stairs, his final weeks were spent in a bed that had been set up in the same dining room where my colleagues and I used to talk with him over lunch. He was cared for by his son David, then an undergraduate at Yale, and by his daughter Kathie, who, having just entered Wellesley College, traveled down from Massachusetts to be with her father during the weekends. Carl died on Sunday night, April 16, 1961, just after Kathie left for her trip back to Wellesley. Coincidentally, problems arising in their necks had cut short the lives of Carl and Gertrude alike, near the ends of their forty-eighth years.

The 1961 Shepard, Hovland, and Jenkins study "Learning and Memorization of Classifications" appeared in the *Psychological Monographs* in that same year—but not in time for Hovland to see it in print. Along with Hovland's own last book *Social Judgment*, written in collaboration with Muzafer Sherif (who completed it after Hovland's death), our monograph was thus one of the last publications on which Hovland appeared as an author. Some thirty years later, this monograph attracted renewed interest among cognitive scientists, who have used our results to test alternative connectionist or "neural net" models for classification learning; or to elucidate the roles of stimulus dimensions called perceptually "separable" (like size and shape—as in Shepard, Hovland, and Jenkins, 1961, p. 3) versus those called perceptually "integral" (like lightness and saturation of colors—as in Shepard and Chang, 1963, p. 96). And the three students who served as research assistants in this work—Albert Bregman and Earl Hunt (with Hovland) and John Gibbon (with Jenkins and me)—have all gone on to make their own influential contributions at three major universities (Bregman in auditory perception at McGill, Hunt in human cognition at the University of Washington, and Gibbon in timing behavior at Columbia).

FAMILY HISTORY

Carl Iver Hovland was born in Chicago on June 12, 1912, to two Lutherans of Scandinavian descent who, unlike Carl, both survived into their nineties—Ole C. Hovland (1871-1967) and wife Augusta Anderson Hovland (1876-1970). Carl's younger brother Warren described both parents as "deeply religious." Augusta had immigrated alone from Sweden at the age of twelve, and had never had any further formal education. Ole had grown up on the Minnesota farm of his immigrant parents—Iver Christenson

Hovland, who had been a shoemaker in Norway, and Marit Olsen Schjeie, whom Carl's older brother Roger described as "a sharp, quick-witted Norwegian lady, proud of her ten children." Carl's father Ole left the family's Minnesota farm to become an electrical engineer and inventor in Chicago. The traits for which Ole is commended in an article in the *Bulletin of Automatic Telephone Engineers* are similar to those that everyone came to admire in his son Carl. One of Carl's two brothers (long-lived like their parents), Roger (1907-94, six years older than Carl) followed his father into an engineering career, and C. Warren (born 1918, six years younger than Carl) became a professor of philosophy and religion and chair of the Department of Religious Studies at Oregon State University, where a building is named "Hovland Hall" in his honor.

Carl's son David Alan Hovland (born July 18, 1941) and his daughter, now Katharine Hovland Walvick (born December 12, 1942), both manifest intellectual aptitudes reminiscent of their father's. David obtained his Ph.D. in psychology from Harvard where I, who had been his father's advisee at Yale, served in turn as David's advisor until I moved to Stanford in 1968. David and his wife Carol now live in Austin, Texas, where David is a professor at Park College. Kathie received a Wellesley B.A. in mathematics and became at one time the youngest woman life master at bridge. She represented the United States in several bridge olympics around the world, winning Bronze Medals in the Canary Islands and Geneva. She and her attorney husband Walter now live in McLean, Virginia, outside Washington, D.C., where she is senior legal editor for Dickstein Shapiro Morin & Oshinsky LLP. David and Kathie each have one son and one daughter, all now grown.

A cousin, Mary Hovland Jenni, though never having met Carl, developed a keen interest in him and his work while

pursuing her own doctoral studies in psychology at the University of Montana in the 1970s. She contacted several of Carl's family members and former colleagues, asking for their recollections of him. Much of my information about his family and childhood comes from her unpublished report (Jenni, December 1974). Carl was described, she said, as "a brilliant child, shy, quiet, introverted, unathletic, troubled by illnesses." Carl's first-grade teacher reportedly said that Carl "lived in his own dream world and did not relate to the group" (Warren Hovland's letter to Jenni of November 4, 1974). Everyone agreed that Carl found satisfaction in learning and scholastic achievement, and many spoke of the early emergence of Carl's love of music and his impressive proficiency on the piano. During college, Carl partly supported himself as an organist for the Lutheran church, though his formal association with the church otherwise ended during this period.

It was a shared love of music that brought together Carl and Gertrude Raddatz, his wife-to-be. Gertrude was born in Chicago on September 13, 1911, the first of five children. Carl and Gertrude both attended Chicago's Luther High North, studied piano with the same teacher (Esther Kittlesby), and enjoyed playing piano and organ duets. Gertrude went on to study piano at the American Conservatory in Chicago and then to teach piano—until her hands became too crippled by her rheumatoid arthritis. Carl and Gertrude were married on June 4, 1938, when Carl (whose mother reportedly had told her sons that a "boy" should not marry until he was thirty) was about to turn twenty-six.

Manifesting the engineering aptitude of his father and older brother, Carl experimented with 3-D photography and designed and built his own high-fidelity systems. He developed such expertise in sound reproduction that his

advice was reportedly sought by professional audio engineers. (Once, while I was still a graduate student, Carl took obvious pleasure in inviting me to challenge his new system's capabilities with selections from his extensive collection of classical records. It was my first exposure to the just perfected stereo reproduction of sound and to the astonishing realism it could achieve.)

Until the untimely deaths of both parents, the Hovland home—in addition to being filled with music—seems to have been a consistently warm and supportive one. Kathie wrote to me of her "strongest feelings" about her father— "awe and pride in his brilliance and his accomplishments, joy in the tender memories of our togetherness (including playing piano duets, my 'helping' with his experiments . . . discussing everything from my academic goals and achievements to my boyfriends, listening to operas from the Met on the radio on Saturday afternoons, and my driving him to New York to Sloan Kettering Institute for cancer treatments), and admiration for his proud, quiet strength and courage (especially after my mother died and toward the end of his life)." She concluded, "I have nothing but superlatives to say about my father. He was the very best!" (letter of August 23, 1988).

PROFESSIONAL HISTORY

As an undergraduate at Northwestern University, Hovland acquired a strong background in mathematics, physics, and biology, as well as in experimental psychology, receiving his A.B. with highest distinction in 1932 (just before turning twenty). On a Catharine White fellowship he also obtained his A.M. there in 1933 and completed research that appeared in his earliest published papers (the first, coauthored with a stimulating new Northwestern faculty member G. L. Freeman on "diurnal variations in performance and related physiological processes").

Concerning a letter recommending Hovland for graduate study, Yale's Walter R. Miles recalled that, "The letter's language of so high approval and praise was such as to make [the] Yale professors smile and shake their heads. As events evolved they were using similar language in . . . recommending the same Carl Hovland . . . a very few years later" (Miles, 1961, p. 122). Hovland prepared six papers for publication during his first year and in just two more years he received his 1936 Ph.D. with honors under the prominent Yale learning theorist Clark L. Hull.

Hovland's dissertation provided the first evidence for a law of generalization, in which the tendency to make a response learned to one stimulus falls off exponentially with the distance separating a test stimulus from the original training stimulus along a sensory continuum, such as the continuum of auditory pitch (Hovland, 1937). Beginning with my own dissertation twenty years later, I developed a new approach that provided more definitive evidence for such a law (Shepard, 1958, Figure 2) and, thirty years still later, a theoretical justification for the law's possible "universal" character (Shepard, 1987, Figures 1 and 3). Such a law of generalization was also central to the interpretation of the results of our joint study of classification learning (Shepard, Hovland, and Jenkins, 1961, pp. 25-30). I still regard generalization as the most fundamental problem of human, animal, and machine learning—if not, indeed, of education and cognitive science generally.

On completing his dissertation, Hovland was immediately invited to join the Yale faculty, of which he remained a member for the rest of his life. Two 1940 publications illustrate the extraordinary range of his early work at Yale. As part of an interdisciplinary group investigating the connection between frustration and aggression, Hovland and Robert Sears (1940) discovered a substantial (negative) cor-

relation, over a century of U.S. history, between economic indicators (such as the price of cotton) and number of lynchings. At the same time, according to one of his later coworkers, M. Brewster Smith, Hovland served as the "heavy hitter" on the team of Hull, Hovland, et al. that produced the 1940 monograph "Mathematico-Deductive Theory of Rote Learning" (Smith, personal communication of 1997). This book, though too technically demanding to have been read by many psychologists, has been deemed "as elegant a volume as ever published in psychology" by a later Hovland student who decided to pursue a career in psychology after "stumbling upon that volume in [his] undergraduate browsing days" (McGuire, 1996, p. 46).

From 1942 to 1945, during America's involvement in World War II, Hovland was on leave from Yale. Recruited by the noted sociologist Samuel Stouffer (himself on leave from the University of Chicago), Hovland headed the Experimental Section of Stouffer's Research Branch under Major General Frederick Osborn's Information and Education Division of the War Department. The primary mission of Hovland's section was to evaluate the training programs and films being prepared by the Information and Education Division for American troops in the United States and Europe. Hovland was responsible for guiding and synthesizing the work of some fifteen researchers.[1]

Despite his wartime leave, Hovland rose meteorically at Yale through the ranks of instructor (1936), assistant professor (1937), director of graduate studies (1941, at age twenty-nine), associate professor (1943, in absentia), full professor, chairman of the psychology department and director of the Laboratory of Psychology (1945, at age thirty-three), to Sterling professor (1947, at age thirty-six). Indeed, Hovland and his twenty-eight-year-senior mentor Clark Hull were both named to Sterling professorships in 1947. I

was told that this made psychology the only department at that time with two Sterling professors and that this came about because Hovland, in his characteristic generosity and sense of fairness, would not accept the honor in advance of his mentor.

Beginning with his research during the war, Hovland brought the methodological talents he had honed in his experimental work on learning and generalization to bear on problems of communication and social psychology. He and a number of those who had worked with him in the Research Branch prepared a series of volumes titled "Studies in Social Psychology in World War II." Hovland was the senior author of volume 3, the highly influential 1949 *Experiments on Mass Communication*.

After returning to Yale, Hovland established the "Yale Communication and Attitude Change Program." With the help of the Rockefeller Foundation, this program supported for over fifteen years (until Hovland's death) research by Hovland and over thirty coworkers and students.[2] This work established how verbally presented information changes (or renders resistant to change) a recipient's opinions and beliefs as a function of experimentally manipulated variables, such as the recipient's prior position on an issue, the recipient's self-esteem, the credibility of the source, the extremity of the position advocated, the order of presentation of arguments, whether one or both sides of the issue are presented, whether the conclusions of an argument are explicitly stated or are left to the recipient's inference, whether the recipient actively attempts to reproduce the arguments for someone else, whether the recipient is induced to think of counter arguments, whether the presented information is designed to elicit the recipient's emotions (especially fear), the time that has elapsed since the information was presented, and the conditions imposed at

the delayed time of assessment of attitude change (for example, whether knowledge of the forgotten high or low credibility source is reinstated).

Following Hovland's death, his attitude change program was characterized as "the largest single contribution [to the field of social communication] any man has made (Schramm, 1963, p. 5). Over thirty years later, it was still deemed "the biggest single force within psychology's communication-relevant attitude-change movement" (McGuire, 1996, p. 43), and as "the gold standard for research in social psychology" (Timothy Brock, personal communication of May 20, 1997). Zimbardo has suggested that the secret of the success of this program lay in Hovland's unique conceptual ability to decompose the complex relations between persuasive communications and attitude change in a way that rendered them susceptible to controlled laboratory experiments. Moreover, by "establishing a structural-sequential mode of the input-mediating-output variables and processes involved, Hovland anticipated the later information processing approach that proved so valuable in cognitive psychology (Zimbardo, personal communication of June 9, 1997).

Hovland also played a crucial role in the formation of what became the Bell Telephone Laboratories' Behavioral Research Center, of which I was a member from 1958 to 1966. It was, I believe, the longest lived of any group whose members were given the freedom to pursue basic psychological research within an industrial setting. According to William A. Baker, former president of Bell Labs, the establishment of this group came about when Robert Greenleaf of the personnel department at AT&T and Baker (then vice-president for research at the labs) decided that in view of the vast number of employees that the Bell System trains every year and the even vaster number of customers that daily interact with the telephone system, a small self-sus-

taining group of behavioral scientists might be justified within a large laboratory traditionally oriented toward the physical sciences. They turned to Hovland, whose earlier work in industrial psychology had impressed them with its "ingenuity" and "versatility." Baker said, "Carl achieved an extraordinary rapport with our industrial endeavor" (personal communication of May 11, 1995).

Hovland recruited two former students of the brilliant MIT social psychologist Kurt Lewin to establish strengths in both basic and applied social psychology—Morton Deutsch and Alex Bavelas. But Bavelas (who had been selected to lead the applied effort) did not stay long, whereupon a struggle ensued between Bell Labs and the personnel department of AT&T about whether the new group should be oriented toward basic or applied research. Hovland "played the pivotal role . . . in the decision to support its basic research orientation," said Deutsch, who warmly recalled "Carl's intellectual openness, personal support, and his skills as a mediator of conflict" (personal communication of March 24, 1997).

During the ensuing years, the Bell Labs' Behavioral Research Center attracted a number of creative young psychological researchers. Some time after Hovland's death, when changing circumstances led Bell Labs (and many other companies) to curtail support for basic research, virtually all of these scientists were able to move to professorships at major universities. Indeed, despite its relatively small size, this center has had as many as five of its members elected to the National Academy of Sciences.[3]

The area to which Hovland turned his attention toward the end of his life concerned the cognitive processes of concept acquisition, problem solving, and thinking. During the few years left to him, he advised or collaborated with at least ten researchers in this increasingly active area.[4]

The letters Mary Jenni received in response to her 1974

inquiries to Hovland's former colleagues are remarkably consistent in their expressed admiration of Hovland's intellectual powers, his administrative efficiency, the moral quality of his judgments and actions, and the affection everyone felt for him.

Leonard W. Doob, who was a young member of Yale's faculty when Hovland arrived there in 1934, wrote, "Clearly he was the outstanding student of the year, coming here with a tremendous recommendation from Northwestern." Even when he had joined the faculty, Doob said, Hovland was "shy and self-contained; you never quite knew what he was thinking. His IQ was incredibly high. He was a very efficient administrator; the details, externally at least, never seemed to bother him because he dealt with them so quickly and apparently painlessly" (letter of November 4, 1974).

Robert R. Sears, who had been on the Yale faculty with Hovland between 1936 and 1941 (though David Star Jordan professor of social science at Stanford when he responded to Jenni's 1974 request), wrote, "Carl was a big man in every respect. He was very gentle and . . . very musical. He was a cheerful, smiling person who came into the office every morning and put his head in my door and said 'what's new?' We both had classes over on the main quadrangle . . . at 11:00 . . . He walked so fast that . . . I got to class . . . puffing and panting while Carl went up to a second floor lecture room, bounding two or three steps at a time . . . He was a wonderful guy . . . At our house he would sit and play with my son David, who was then about a year old." Sears's letter concluded, "He was a remarkable man, brilliant in every sense of the word, and a delightful friend and warm companion" (letter of October 28, 1974).

Incidentally, Sears's son David later went on for graduate study with Hovland and became a professor at UCLA. About Hovland (who died during David's last year at Yale), David

told me, "He took me into his home for several days after I was released from the hospital following an appendectomy . . . I treasure the memories of the times I [spent] with him, in class and out." An incident that David recalled well illustrates Hovland's mixture of warmth, shyness, and propriety: "One year a group of students went to the Hovland house to sing Christmas carols, as a gesture of appreciation; we saw Carl hasten to run upstairs to put on a coat and tie before coming to the door to greet us" (personal communication of May 19, 1997).

Leland DeVinney, one of Hovland's associates in Washington during the war, later became director of social science at the Rockefeller Foundation, which provided much of the support for Hovland's attitude change program at Yale. He wrote, "In the field of communication and attitude formation . . . [Hovland] is recognized as the leading pioneer." Concerning Carl and Gertrude, he said, "My wife and I . . . have never known lovelier or finer people," and added, "I also have known many of Carl's associates and students and know that Carl was an extraordinary teacher and research guide. He was highly respected and also loved by all of them" (letter of November 9, 1974).

Donald R. Young, another of Hovland's associates during the war, who later became director of the Russell Sage Foundation on whose Board of Directors Hovland served until his death, wrote that he had found it "a joy to work with a man of Carl's qualities. He was among the very best research psychologists, highly skilled, imaginative, and reliable. He always delivered a top product." Recalling his last visit with Hovland, Young said, "He was then so ill that he had to go to bed immediately when the meal was ended, yet he still was the perfect host giving little evidence of either the physical or mental suffering he must have been enduring." Young concluded, "In my seventy-six years I have

known few men his equal and none his superior" (letter of November 19, 1974).

Claude Buxton, who succeeded Hovland as chairman of the psychology department at Yale, wrote, "Carl . . . became my dearest friend, . . . a very gentle [and] very moral person, and his code included never taking advantage of anyone or anything . . . He is one of the two or three people I have ever known who made a moral assessment of his own proposals or ideas . . . He was enormously efficient and organized—one of our colleagues used to say that everything Carl did he did on ball bearings, because it went so smoothly; he was tremendously stimulating to graduate students, . . . [who told] me they did more work for [Carl's evening special-interest] no-credit meetings than they ever did in their regular courses" (letter of November 8, 1974).

Irving L. Janis, who worked with Hovland both in his Experimental Section in Washington and then (as a younger faculty colleague) in his attitude change program at Yale, similarly concluded his letter to Mary Jenni by saying, "You can feel justifiably proud of your cousin. He was a truly great psychologist and a great person" (letter of October 30, 1974).

Much the same picture emerged from my own more recent inquiries. Jane Olejarczyk, who is now assistant business manager for academic affairs/registrar for Yale's psychology department, but who began working as Hovland's secretary when she was only nineteen, said, "Knowing how inexperienced I was with academia he constantly assigned me to projects about which I had no clue and gently insisted that I could do [them]. He didn't lavish praise but I knew I did well when the next task was more difficult than the one before." Olejarczyk spoke of Hovland's "warmth" and said, "There was the feeling when he was about that

you were part of a family and that you mattered." She added that "Gertrude Hovland was the epitome of grace" (personal communication of May 29, 1997).

Eleanor E. Maccoby (Browning professor emerita of developmental psychology at Stanford), who remembers Hovland well and whose late husband Nathan Maccoby worked in Hovland's group during the war, observed that Hovland was exceptional both in his quick and wide-ranging intelligence and, also, in his "complete absence of guile" (personal communication of 1996).

Harold H. Kelley (professor emeritus of social psychology at UCLA), who worked with Hovland in his Yale attitude change program in the 1950s, wrote, "Of course, the most important thing about Carl was his enormous intellect, his quick understanding of [nearly] everything that was going on, and the ways he let his thought and work roam far and wide . . . In organizing the personnel of his program, he was deliberately and sympathetically eclectic, grabbing here and there so as to include all possible lines of thought that might bear on the communication/persuasion process" (letter of June 24, 1995).

William J. McGuire noted that "it never bothered Hovland that members of the group . . . were driven by antagonistic theories that made opposite predictions" and remarked that what prevented these decentralized, individualistic projects from "becoming undesirably anarchical was Hovland's particular intellectual excellence as a synthesizer. He could attend a symposium of papers that seemed to have little in common and, if called on to summarize them, seemed able on the spot to abstract out their unifying themes and show that the papers converged in interesting and complex ways to produce a coherent picture" (McGuire, 1996, pp. 48-49).

About Hovland's own research style, Kelley observed that

Hovland would "analyze the shortcomings or special conditions of . . . prior work, identify intuitively the as-yet-unstudied factors that would reverse, undo, or clarify the problem." Kelley added, "It always seemed to me that that was his investigative forte—identifying the special conditions surrounding prior work and then expanding the design to pin down the phenomenon more clearly."

Following Hovland's death, the New England Psychological Association (of which Hovland was president in 1950) had a memorial session in which Herbert Kelman characterized Hovland as "the world's most non-authoritarian leader." Similarly, Abraham Luchins wrote me, "He was the most efficient and the least officious of people" (personal communication of May 29, 1997). And Hovland's wartime coworker M. Brewster Smith said, "My most vivid memory of Carl . . . was his unique ability to guide the development of appropriate research design by asking just the right questions—always in a tentative way that opened new perspectives or possibilities . . . I have never since experienced that degree of consultative skill . . . ." (letter of May 15, 1997). It was in this way that Hovland was, in the words of Timothy Brock, a "visionary founder of subdisciplines" (personal communication of May 20, 1997). Speaking further of Hovland's low-key and indirect style of leadership, Kelley wrote, "I know that left some people (including myself) with a bit of anxiety. But still, he was so warm, interested in your personal life, etc., that one couldn't help feeling great affection for him." Continuing, Kelley said, "As you can see, I was very fond of Carl, and also had the utmost respect for him. I regard him as one of the handful of real geniuses in psychology. . . ." (letter of June 24, 1995).

CONCLUSION

During his short life, Hovland published over seventy articles, was the editor or coauthor of seven books, and supervised at least twenty-two Yale doctoral dissertations.[5] His scientific achievements were recognized by his early election to the American Philosophical Society (1950), the American Academy of Arts and Sciences (1956), and the National Academy of Sciences (1960), as well as by conferral of the Distinguished Scientific Contribution Award by the American Psychological Association (1957) and of the Howard Crosby Warren Medal by the Society of Experimental Psychologists (1961). This last, awarded close to the time of Carl's death, was graciously received for Carl by his nineteen-year-old son David in what was recalled by another Hovland admirer, Yale professor emeritus Wendel R. Garner, as an unusually "emotional occasion" at the annual meeting of that august society (Garner, personal communication of May 17, 1997).

Beyond his earliest research on diverse problems of physiological, perceptual, and industrial psychology, and his subsequent public service and consulting work, Hovland's most influential scientific contributions emerged from the three fields on which he successively focused his principal research efforts: (1) basic processes of human learning and generalization (late 1930s), (2) social communication and attitude change (1940s and 1950s), and (3) human concept acquisition and problem solving (1950s, until his 1961 death). His work in learning is widely respected and it undoubtedly helped shape the quantitative and experimental skills that he later brought to bear on social communication. But it is his work in that second field that has had the most far-reaching impact. One can't help wondering: If Hovland's life had not been cut short while he was still at the height of his powers, might not the third line of work

he had begun on thinking and concept attainment have had a similarly profound impact on the soon-to-burgeon interdisciplinary field of cognitive science?

Like so many others, I feel boundless gratitude that I had ten years to benefit from Hovland's wise and benevolent guidance and, especially, from his example. Yet, in preparing this memoir almost forty years later, I have gained an aching awareness of how much we and the whole range of the behavioral, social, and cognitive sciences lost back in 1961 as a result of the untimely death of this gifted researcher, statesman of science, and incomparable human being.

I THANK FORMER YALE students and Hovland associates for the many thoughtful and heart-warming reminiscences they shared with me, including those I have quoted in this memoir (the most extensive supplied by Hovland's former coworkers Harold Kelley and Herbert Kelman) and those, though not quoted here, that contributed helpful information, suggestions, or corrections (from Robert Abelson, Irvin Child, Earl Hunt, Kenneth Kurtz, Mark Lepper, Edith Luchins, George Mandler, George Miller, Lloyd Morrisett, John Pierce, and Burton Rosner). Finally, I thank Hovland's daughter Kathie Hovland Walvick, his son David A. Hovland, his brother C. Warren Hovland, and his cousin Mary Hovland Jenni (who generously provided me with the wonderful material she had previously obtained from still other of Hovland's family members and colleagues—many of whom are no longer living).

NOTES

1. The principal long-term researchers in Hovland's Experimental Section of the War Department's Research Branch were Frances Anderson, John Finan, Irving Janis, Arthur Lumsdain, Nathan Maccoby, Fred Sheffield, and M. Brewster Smith. A number of others worked in that section for briefer periods, including John Butler, David Grant, Donald Horton, Eugene Jacobson, Ansel Marblestone, Alice Schmid, and Adeline Turetsky. Still others (from the parallel Survey Section of the Research Branch) collaborated in projects of

Hovland's Experimental Section—particularly Robert Ford, Edward Suchman, and Paul Wallin.

2. Researchers in Hovland's Yale attitude change project included Robert Abelson, Norman Anderson, Elaine Graham Bell, Jack Brehm, Timothy Brock, Enid Hobart Campbell, Arthur Cohen, Rosalind Lorwin Feierabend, Peter Field, Jonathan Freedman, Irving Janis, Harold Kelley, Herbert Kelman, Bert King, Doris Kraeling (now Rutz), Gerald Lesser, Howard Leventhal, Harriet Linton, Abraham Luchins, Arthur Lumsdaine, Wallace Mandell, William McGuire, Norman Miller, Jacob Rabbie, Donald Rife, Milton Rosenberg, Irving Sarnoff, David Sears, Fred Sheffield, Muzafer Sherif, Walter Weiss, and Philip Zimbardo.

3. Early long-term members of what became the Behavioral Research Center of the AT&T Bell Laboratories included the social psychologists Morton Deutsch, Harold Gerard, Robert Krauss, and Seymour Rosenberg, and the experimental psychologists Herbert Jenkins, Ernst Rothkopf, and Roger Shepard—later joined by a number of other now eminent quantitative and experimental psychologists. Long-term members of this center who have been elected to the National Academy of Sciences include Bela Julesz, Roger Shepard, George Sperling, Saul Sternberg, and the center's director Max Mathews. In addition, Edward E. David, John R. Pierce, and William O. Baker (also members of the Academy) played significant roles at high levels of the Labs in shaping and supporting its Behavioral Research Center. (For more about the history of this center, see the report prepared by Carroll, Julesz, Mathews, Rothkopf, Sternberg, and Wish, 1984).

4. Hovland's students and associates who worked on these cognitive processes included Daniel Berlyne, Albert Bregman, Hugh Cahill, Earl Hunt, Herbert Jenkins, Kenneth Kurtz, Lloyd Morrisette, Dean Pruitt, Roger Shepard, and Walter Weiss.

5. Students whose Yale doctoral dissertations on conditioning or verbal learning were supervised by Hovland were James Calvin (1939), Chester Hill (1941), David McClelland (1941), William Jenkins (1942), William Orbison (1945) Fred Sheffield (1946), and Virginia Voeks (1947). On social psychology or personality: Ethelyn Klatskin—née Elmer Potter (1948), Homer Wood (1948), and Russell Clark (1951). On attitude or opinion change: Herbert Kelman (1951) and Walter Weiss (1952). On human learning or generalization: Kenneth Kurtz (1953), William McGuire (1954), John Antoinetti (1955), Roger

Shepard (1955), Lloyd Morrisett (1956), and Hugh Cahill (1957). On prediction of performance times: Jerome Kornreich (1948). On human curiosity: Daniel Berlyne (1953). On decision making: Dean Pruitt (1957). On prediction of ratings of adjective meanings: Jonathan Freedman (1962). The dissertations of Orbison and Freedman were each jointly supervised by Hovland and another faculty member; and, following Hovland's death, other Hovland students completed their dissertations with still other members of the Yale faculty.

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