CARL SHERRICK: AUTOBIOGRAPHY

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I was born and raised in Carnegie, a small town located about 7 miles southwest of Pittsburgh, PA. I went through the public schools there, and did well enough in high school to compete for a scholarship to what at the time was the Carnegie Institute of Technology. After two-and-one-half years of attendance, the World War II draft took me into military service in the Army Ground Forces. My failure to pass the Ishihara color perception tests disqualified me for air force or naval service. I was transferred from infantry training to North Carolina State College for training in Electrical Engineering, where I was when Japan surrendered in 1945.

Within a year I had returned to Carnegie Tech, and completed my work in Chemistry in 1948. By that time, I had realized that physical science was not the consuming interest it had been, and I decided to turn to sensory and perceptual psychology. In part this was because I had had a brush with the field in an EE course in telephony (mainly in auditory psychophysics), and in part because I had taken work with Hailer Gilmer in psychology at Tech. Hailer had been Frank Geldard's first graduate student at the University of Virginia, and he urged me to go there, pointing out that I would get close supervision from a first-rate faculty, and would not be required to present a lot of courses in psychology for admission.

Through Hailer Gilmer's influence I was indeed admitted to Virginia, and quickly was incorporated into the program of research in cutaneous sensitivity that Frank Geldard had just begun. Jack Vernon, who went on to work with Glen Wever for two decades, was my fellow student throughout the period of graduate study. The fact that Jack and I studied in more or less opposing schools in auditory theory after our graduate training (those of Davis and Wever) had no bearing on our relationship. It would take more than a theoretical schism to offset the (literal) camaraderie between us; he and I and his wife Betty shared many a late-night cup of coffee after laboratory work. The study of basic sensory processes in touch absorbed me for the better part of my five-year stay at Virginia (the last was on a Post-Doctoral Fellowship from the NSF).

My first "real" job was an Assistant Professorship at Washington University in St. Louis, in the Psychology Department of the College of Liberal Arts. I soon met the people from the Central Institute for the Deaf, and began attending their research seminars. At that time, two new Research Associates had been hired there: Bruce Deatherage from the University of Texas, and Bob Bilger from Purdue. We were all of an age, and with much in the way of common socioeconomic backgrounds as well as training in psychology, made congenial and, on occasion, raucous company. In the summer of 1954 I wangled a small stipend from Washington U. to do research at CID, and tried to follow in the footsteps of Hallowell Davis and Don Eldredge to extract the mysteries of the vestibular system in the pigeon, in particular the electrical activity accompanying rotation and acoustical stimulation. As I have said elsewhere (in Hearing and Davis, 1976), I learned that electrophysiology was not the level of analysis to which I was attuned. I also learned to respect the abilities and accomplishments of my two mentors, as well as to appreciate their conservatism in interpreting the findings of neurophysiology.

Not satisfied with the mix of teaching and research schedules, I concluded that I would do better to go to full-time research at the Central Institute rather than to continue in a teaching post. I therefore was delighted to receive a Research Associateship with CID, and worked with Ira Hirsh for the next two years, during which time I completed about 5 papers on various aspects of hearing and vibrotactile sensitivity, in addition to working with Joseph Rosenstein on the problem of programmed learning for use with the children in the School for the Deaf. Joe and I also entered a competition for the best application of closed circuit television (a very new technology in 1960). We suggested a design that would make deaf children speak plainly to a monitor in which they could see (and hear) speaking to them a person who could hear but not see them. The idea was to encourage them not only to read lips and use their residual hearing, but also to speak as understandably as possible in a real-life situation. We heard nothing from the sponsors, however. Many years later, in the late 1970s, I saw that the Lexington School was doing something very similar to what we proposed. I concluded that Joe and I were quite ahead of our time.

In 1961 Frank Geldard asked me to consider becoming a research staff member at the University of Virginia, to provide the continuity needed in the program of research in cutaneous communication. The three faculty members involved, including Frank, were all part-time researchers except for the summers, and the program flagged rather badly in the academic year. Someone was needed to keep the research flywheel in motion over the hiatal period. I accepted, and within six months of the time I had brought my family from St. Louis to Charlottesville, we were again contemplating a move to Princeton, where Geldard had accepted the Stuart Chair in Psychology.

Through the generosity of the National Science Foundation and the National Institutes of Health, we were able to move some of our laboratory from Virginia, and to purchase additional equipment to supply the new quarters being renovated at Princeton. We began research there in the summer of 1963 with three undergraduates and one graduate student, and added one new graduate student every year for the next four years. Although Frank Geldard retired in 1972, he continued to do research until his death in 1984 at the age of 80. By that time the Princeton Cutaneous Project had trained six graduate students, twelve undergraduates, and three post-doctoral fellows, and published forty-four reports and sixty-seven refereed papers or chapters in books. The majority of these concern the information-processing capabilities of the skin, including problems of temporal acuity, loudness scaling, masking over the sensory sheet, apparent movement, discrimination and recognition of complex spatio-temporal patterns, and letter-, word-, or shape-coding schemes for tactile processing.

During all this time I have been able to teach on a part-time basis, consult with a number of agencies and businesses, and enjoy the intellectual atmosphere of a small college town surrounded by a very active group of research organizations. The fact that New York City and Philadelphia are within an hour's ride does not reduce the attractiveness of the area for me at all. I expect to remain in Princeton through retirement, which will take place at the end of this decade, when I hope to continue working on at least a part-time basis on problems very much like the ones I am presently encountering.

I think the most impressive memory I hold for CID was my realization of its depth of intellectual and pragmatic capability over the years of my association, including those later times when I returned to see the growth in its capacities, achievements, and personnel. I first came to know and respect the people of the Research Department, of course, but then I encountered the Clinical Department under Irv Schorr when my wife's grandmother was examined for a hearing aid. I was impressed with the excellence of

the testing program, and the wisdom of the advice given. When I worked with Joseph Rosenstein on the programmed learning project, I saw the devotion of the teachers and administrative staff to the job of educating the deaf and speech-impaired children. I was able to appreciate the graduate program in education of teachers and students in the speech and hearing science program, along with the graduate programs in physiology, psychology, and physics and electrical engineering. Finally, I saw the excellent young physicians who worked in the residents' program of the Otolaryngology Department of the Washington University School of Medicine come to CID for the seminars and to do research with the staff. I realized later that there are only a few places on earth where such breadth of experience may be realized, and where a year of training is truly priceless. In this connection, if a young researcher asked me about the chance to work for one or more years at CID, I would say there is no better way to begin a career in research, teaching, or clinical work than at CID and its affiliated organizations. I never encountered a closed door during my eight years of part- and full-time work there.

Directing the concerted efforts of physicists, physiologists, psychologists, physicians, and speech scientists toward the goal of reducing or eliminating the problems of deafness and speech impairment required people of special talents, and I learned to listen with attention to the deliberations of Dr. Silverman, Dr. Davis, and Dr. Hirsh. They applied the same intelligence and understanding of the world to administrative problems as they did to research. Only rarely have I seen an executive who gives as much care and thought to personnel decisions as Dick Silverman; his will always be the image I see when the word "Director" is mentioned, just as Babe Ruth is my associative response to the words "Baseball Star."

Frank Geldard and I often discussed at length the arguments we wished to present to the granting agencies concerning the mix of research we wanted to do. We concluded from our separate experiences--his in both academic and military settings from 1928 to the 1970s, and mine at CID, that one of the very best sources of questions for basic research is the applied problem. It commonly is regarded as second to theory in quality by many, but I must admit to a bias in favor of application. It is probably a failing, but I find more reward in the prospect of changing a single life than in that of changing a hundred minds.

Carl E. Sherrick: 192-18-XXXX
Senior Research Psychologist and Lecturer with rank of Professor
1990

DATE & PLACE OF BIRTH: October 28, 1924, Carnegie, PA, USA

UNIVERSITY ATTENDED	SUBJECT	DEGREE & DATE
Carnegie-Mellon University, Pittsburgh	Chemistry	B.S. - 1948
North Carolina State, Raleigh	Electrical Engineering.	None
University of Virginia, Charlottesville	Psychology (Experimental)	M.A. - 1950 Ph.D. – 1952

FORMER POSITIONS

Assistant Professor, Washington University, St. Louis	1953-59
Research Associate, Central Institute for the Deaf, St. Louis	1959-61
Research Associate, University of Virginia, Charlottesville	1961-62
Research Psychologist, Princeton University	1962-70
Senior Research Psychologist, Princeton University	1970-1991
Lecturer with rank of Professor	1989-1991

SOCIETY MEMBERSHIPS

American Psychological Association	Fellow, Division of Experimental Psychology
	Fellow, Division of Engineering Psychology
	Member, Division of Teaching of Psychology
American Psychological Society	Fellow
Acoustical Society of America	Fellow
Psychonomic Society	Member
Brain Research Organization	Member
Sigma Xi	Member

AREAS OF EXPERTISE

DISCIPLINES

Experimental Psychology, Applied Experimental Psychology.

TOPICS

Sensory and Perceptual Systems; Psychophysics; Human Factors in Sensory Substitution.

TECHNOLOGIES

Transducers for mechanical stimulation of the skin; electrocutaneous stimulators.

Application of mini- and micro-computers to biomedical research.

OWN RESEARCH

Information-processing capacities of the skin for simple and complex tactile displays.

Theories of the receptive process.

Temporal limits of processing; distortion and perturbation of spatiotemporal perception.

Application of simple perceptual capacities to guidance devices.

CONSULTING

Member, NAS/NRC Committee on Hearing, Bioacoustics and Biomechanics, 1981-1983.

Chair, Working Group 90 on Tactile Aids for the Deaf, 1982-84.

Member, Communicative Sciences Cluster, President's Biomedical Research Panel, 1975-76.

Member, Communicative Sciences Study Section, NIH, 1967-71.

National Research Council Committee on Prosthetics Research and Development, Subcommittee on Sensory Aids, 1973-77.

Editorial Board, Perception and Psychophysics, 1966-71.

Associate Editor, Sensory Processes, 1976-82.

Consulting Editor, Journal of Experimental Psychology: Human Perception & Performance, 1979-82.

Consulting Editor, Journal of General Psychology, 1984.

NIH, National Institute of Neurological and Communicative Disorders and Stroke, on Long-Range Research Strategies, 1978.

Co-chairman, RSA-VA Workshop on Sensory Deficits and Sensory Aids, San Francisco, CA, March, 1977.

Member, NAS/NRC Committee on Hearing, Bioacoustics, and Biomechanics Working Group 95 on Communication Aids for the Hearing Impaired, l984-Present.

Member, National Advisory Neurological and Communicative Disorders and Stroke Council, 1986-1989.

Member, Technical Committee of the Acoustical Society of America on Mo-response to vibration to 1992.

Member of Task Force on the formation of the National Institute on Deafness and Other Communication Disorders.

Member, National Advisory Deafness and Other Communication Disorders Council, 1989-91.

Consulting Editor, Journal of General Psychology

Referee, Journal of the Acoustical Society of America. Perception and Psychophysics.

Consultant, John B. Pierce Laboratories, New Haven, CT.

PUBLICATIONS

1. **Sherrick**, C.E., Jr. (1952) Experimental Variables Related to the Sensitivity of the Human Skin to Mechanical Vibration. Unpublished Dissertation, University of Virginia.
2. **Sherrick**, C.E. (1953) Variables affecting the sensitivity of the human skin to mechanical vibration. *Journal of Experimental. Psychology*, **4**, 273-282.
3. **Sherrick**, C.E. (1959) Effect of background noise on the auditory intensive difference limen. *Journal of the Acoustical Society of America*, **31**, 239-242.
4. **Sherrick**, C.E. (1959) Some factors affecting auditory detection of amplitude modulation. *American Journal of Psychology*, **72**, 606-608.
5. **Sherrick**, C.E. & Bilger, R.C. (1959) Auditory sensitivity of the guinea pig to low-frequency tones. *Perceptual & Motor Skills*, **9**, 339-344.
6. **Sherrick**, C.E. & Rosenstein, J. (1960) Self-instructional techniques applied to the teaching of the deaf. *Research Relating to Children*, Bulletin N.13, Washington, DC, U.S. Department of Health, Education and Welfare, August, p. 58.
7. **Sherrick**, C.E. (1960) Observations relating to some common psychophysical functions as applied to the skin. In: G.R. Hawkes (Ed.) *Symposium on cutaneous sensitivity*, Army Medical Research Laboratory Report No. 424, September.
8. Hirsh, I.J. & **Sherrick**, C.E. (1961) Perceived order in different sense modalities. *Journal of Experimental Psychology*, **62,** 423-432.
9. **Sherrick**, C.E. & Albernaz, P.L.M. (1961) Threshold shifts resulting from simultaneous contralateral auditory stimulation. *Journal of the Acoustical Society of America*, **33**, 1381-1385.
10. Shames, G.H. & **Sherrick**, C.E. (1963) The analysis of stuttering as operant behavior. *Journal of Speech and Hearing Disorders*, **28**, 3-18.
11. **Sherrick**, C.E. (1964) Effects of multiple simultaneous stimulation of the skin. *American Journal of Psychology*, **LXXVII**, 42-53.
12. Geldard, F.A. & **Sherrick**, C.E. (1965) Multiple cutaneous stimulation: The discrimination of vibratory patterns. 3. *Journal of the Acoustical Society of America*, **37**, 797-801.
13. **Sherrick**, C.E. (1965) Simple electromechanical vibration transducer. *Review of Scientific Instruments*, **36**, 1893-1894.
14. **Sherrick**, C.E. (1966) Somesthetic senses. *Annual Review of Psychology*., **17**, 309-336.
15. **Sherrick**, C.E. & Rogers, R. (1966) Apparent haptic movement. *Perception & Psychophysics*, **1**, 175-180.
16. **Sherrick**, C.E. (1967) Studies of apparent tactual movement. In: D.R. Kenshalo (Ed.) *The skin senses*: An international symposium, Springfield, IL, Thomas, pp. 331-344.
17. **Sherrick**, C.E. (1968) Bilateral apparent haptic movement. *Perception & Psychophysics*., **4**, 159-160.
18. Craig, J.C. & **Sherrick**, C.E. (1969) The role of skin coupling in the determination of vibrotactile spatial summation. *Perception & Psychophysics*, **6,** 97-101.
19. **Sherrick**, C.E. (1969) Visual temporal discrimination: A point of order. *Psychonomic Science*, **15**, 218.
20. **Sherrick**, C.E (1970) Temporal ordering of events in haptic space. *IEEE Transactions. on Man-Machine Systems*. **11**, MMS-1l, 25-28.
21. **Sherrick**, C.E. (1972) Arrays for skin communication. In Festschrift for Frank A. Geldard. Princeton University. Psychonomic Monograph Supplements, **4**, No. 12, 231-233.
22. Geldard, F.A. & **Sherrick**, C.E. (1972) The cutaneous "rabbit": A perceptual illusion. *Science*, **178,** 178-179.
23. **Sherrick**, C.E. (1974) Sensory processes. In L.L. Elliott and J.A. Swets (Eds.) *Psychology and the handicapped child*., Washington, DC, U.S. Government Printing Office, pp. 13-39.

24. **Sherrick**, C.E. (1974) State-of-the-art report on sensory processing capabilities of normal and hearing-impaired children. In R. Stark (Ed.) *Sensory processing in the hearing-impaired child*., Baltimore: University Park Press, pp. 9-73.
25. **Sherrick**, C.E. (1974) Current prospects for cutaneous communication. In F.A. Geldard (Ed.) *Conference on cutaneous communication systems and devices*., Austin, TX: The Psychonomic Society, Inc., pp. 106-109.
26. **Sherrick**, C.E. (Ed.) (1974) *1980 is NOW: A conference on the future of deaf-blind children*., Los Angeles: John Tracy Clinic.
27. **Sherrick**, C.E. (1975) The art of tactile communication. *American Psychologist*, **30**, 353-360.
28. Elliott, L.L. & **Sherrick**, C.E. (1976) NINCDS workshop on tactile and visual aids for the deaf., *Journal of the Acoustical Society of America*, **59,** 486-489.
29. **Sherrick**, C.E. (1976) The antagonisms of hearing and touch. In S.K. Hirsh et al. (Eds.) *Hearing and Davis: Essays honoring Hallowell Davis*., St. Louis, MO: Washington University Press, pp. 149-158.
30. **Sherrick**, C.E. (1978) Language through alternate modalities. In J.F. Kavanagh & W. Strange (Eds.) *Speech and language in the laboratory. school and clinic*., Cambridge, MA: MIT Press, pp. 181-198.
31. Gottheil., E.F., Cholewiak, R.W. & **Sherrick**, C.E. (1978) The discrimination of vibratory patterns on a tactile matrix., *Bulletin of the Psychonomic Society*, **11**, 21-24.
32. Freiberger, H., **Sherrick**, C.E. & Scadden, L. (1977) *Report of the Workshop on Sensory Deficits and Sensory Aids*, San Francisco, CA:Smith-Kettlewell Institute of Visual Sciences.
33. **Sherrick**, C.E. & Cholewiak, R.W. (1977) Matching speech to vision and touch. Paper presented to the Gallaudet Research Conference on Speech Processing Aids for the Deaf, Washington, DC, May 24-26.
34. **Sherrick**, C.E. (1979) Combinative sensory processes and modality interactions. In L. Harmon (Ed.) *Proceedings of the Asilomar Conference on Inter-relations of the Communicative Senses*, NSF Technical Report, June. Also in *Sensory World*, Spring (**34/35**), pp. 10-16.
35. Khanna, S. & **Sherrick**, C.E. (1981) The comparative sensitivity of selected receptor systems. In T. Gualtierotti (Ed.) *Symposium on vestibular function and morphology*, Berlin: Springer-Verlag, pp. 338-348.
36. Cholewiak, R.W. & **Sherrick**, C.E. (1981) A computer-controlled matrix system for presentation to the skin of complex spatio-temporal patterns. *Behavioral Research Methods and Instrumentation*, **13**, 667-673.
37. **Sherrick**, C.E. & Craig, J.C. (1982) The psychophysics of touch. In W. Schiff & E. Foulke (Eds..) Tactual perception: A sourcebook., Cambridge, England: Cambridge University Press, pp. 55-81.
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39. **Sherrick**, C.E. (1982) Cutaneous communication. In W.D. Neff (Ed.) *Contributions to sensory physiology*. Vol. VI, New York: Academic Press, pp. 1-43.
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44. **Sherrick**, C.E. (1983) Human factors research in the development of sensory aids for the handicapped. In W.H. Hawkins and D.O. Weitzman (Eds.) *Human factors applications for disabled persons*. Proceedings of a symposium. New York Chapter, Human Factors Society, 36-54.
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46. **Sherrick**, C.E. (1984) Technology and rehabilitation: Another viewpoint. In L.G. Penman and G.F. Austin (Eds.) *Technology and rehabilitation of disabled persons in the information age*. Alexandria, VA: National Rehabilitation Association, 27-31.
47. **Sherrick**, C.E. (1985) Touch as a communicative sense: Introduction. *Journal of the Acoustical Society of America*, **77**, 218-219.
48. **Sherrick**, C.E. (1985) The evolution of tactile transducers. Paper presented at the Workshop on Tactile Transducers held at Indiana University, Bloomington, IN, May 9.
49. **Sherrick**, C.E. (1985) A scale for rate of tactual vibration. *Journal of the Acoustical Society of America*,**78**, 78-83.
50. **Sherrick**, C.E. & Cholewiak, R.W. (1986) Cutaneous sensitivity. In K. Boff, L. Kaufman, and J. Thomas (Eds.) *Handbook of perception and human performance*. New York: Wiley, pp. 12/1-12/58.
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52. Cholewiak, R.W. & **Sherrick**, C.E. (1986) A case study or the tracking skill of a deaf person with long-term tactile aid experience. *Journal of Rehabilitation Research and Development*, **23**, 20-26.
53. Finger, F.W., & **Sherrick**, C.E. (1986) Frank A. Geldard: 1904-1984. *American Journal of Psychology*, **99**, 135-142.
54. **Sherrick**, C.E. (1986) Frank A. Geldard (1904-1984). *American Psychologist*, **41**, 1298.
55. Geldard, F.A., & **Sherrick**, C.E.(1986) Space, time, and touch. *Scientific American*, **254**, 90-95.
56. **Sherrick**, C.E., Cholewiak, R.W., & Collins, A.A. (1990). The localization of low- and high-frequency vibrotactile stimuli. *Journal of the Acoustical Society of America*, 1990, **88**, 169-179.