# Serendipity in Acoustics: An Early Career Journey

*Judy R. Dubno*

Serendipity in science and throughout our professional careers and personal lives takes many forms and occurs regularly. The most vivid examples are the random connections created as we, by apparent accident, meet potential research collaborators where we work, at scientific conferences, or even at family gatherings. We have learned to be open to these rare opportunities and see them as occasions for moving in new directions, developing new ideas or skills, or simply making new friends. Many of us missed these chance occurrences during the pandemic when travel and personal interactions were limited, and as a result, we have recognized their importance to our careers and to advancing science. Therefore, this is an excellent time to consider the meaning and significance of serendipity as we return to interact with the world again.

For me, the most valued and essential serendipitous event occurred very early in my scientific career, at the time when I was advancing from a master's-level education and a brief clinical experience in audiology to becoming a PhD student with a goal to study auditory sciences. In the mid-1970s, I was admitted to the PhD Program in Speech and Hearing Sciences at the City University of New York (CUNY) Graduate School and University Center where I would begin my doctoral education.

At that time, my knowledge of research topics or mentors available in the CUNY PhD program was limited, so I set about to learn the opportunities available for a new PhD student and graduate research assistant. Readers should keep in mind that this time (the mid-1970s) was before the Internet and electronic communication, so learning about PhD programs meant visiting a university library to review the academic catalog, which described the program of study, faculty, course offerings, and the requirements leading to the PhD. While at the university library, I also spent time reading scientific publications (including many from *The Journal of the Acoustical Society of America*) to become familiar with the research being conducted by CUNY faculty in auditory sciences. Armed with this information, I felt prepared to discuss potential options for research projects with one of CUNY's leading auditory scientists and a potential mentor, Harry Levitt (see bit.ly/4fjCglp). I received a letter (a paper letter in the United States mail) from the PhD Program's Executive Officer, Irv Hochberg, stating that several PhD program faculty members would be contacting me by telephone in the following few weeks to discuss my responsibilities as a graduate research assistant and describe ongoing research in the department.

After several visits to the university library, I was thoroughly prepared to carefully consider the various options and make this very critical decision at some future date. But I was surprised to learn when Harry Levitt called me the day after I received Hochberg's letter and let me know he needed my decision immediately! He then described four research projects he was directing and explained their goals and how I would contribute to each as a graduate research assistant. With that minimal information, limited knowledge of hearing aids from my brief clinical experience, and some very kind encouragement from Harry, I

**More from this author**

READ

**"Hearing and Aging Effects on Speech Understanding: Challenges and Solutions"**

**bit.ly/3XXgN86**


https://doi.org/10.1121/AT.2024.20.4.39

selected one, which Harry called the "wearable master hearing aid" (WMHA) project. From Harry's description, the project seemed quite straightforward. What I did not know at the time was that my decision would lead to Harry becoming my major advisor and chair of my doctoral committee and that the WMHA project and related subprojects would become a major focus of my scientific career for a decade or more. That telephone call with Harry was certainly a serendipitous moment.

Some months later when I entered the CUNY PhD program, I joined an incredible team of researchers working on the WMHA project, a National Institutes of Health (NIH)-funded program. The overall goal was to develop and evaluate methods for the automated selection of hearing aid specifications using the WMHA, one of the first in the analog era, using an early form of a multivariate adaptive testing strategy. During the experiment, tiny electronic modules would be inserted using tweezers into the WMHA (about the size of today's mobile phones) by the examiner (me) to modify the hearing aid's lower frequency cutoff and frequency-gain slope. Then, the combination of cutoff frequency and slope settings yielding the highest speech recognition score would be determined.

This assessment required a very sensitive measure of speech recognition, which did not yet exist. Consequently, during my first year or so on the WMHA project, I was heavily involved in the development, recording, and analysis of the CUNY Nonsense Syllable Test, which was among the first syllable tests that generated a matrix of consonant errors (from paper and pencil responses) and is still in use today (Dubno et al., 1982). I subsequently used that test as the basis for my dissertation research, which involved predicting consonant confusions by individuals with normal and impaired hearing from acoustic analyses of consonants (Dubno and Levitt, 1981).

In addition to developing speech-recognition materials and collecting and analyzing data, I assisted Harry in the preparation of NIH progress reports and presentations and agendas for the quarterly site visits from our NIH Program Officer (Lois Elliott, later Earleen Elkins); progress reports and site visits were quarterly because the project was supported by an NIH contract, an important distinction from an NIH grant. From these challenging experiences as a PhD student, I gained an early education from Harry, Lois, and Earleen about NIH-funded research and developing contract and grant proposals, which in future years helped me fund not only my own research but in advising others about supporting their research.

Looking back on my serendipitous beginning as a CUNY PhD student with Harry as my major advisor, I can honestly say that nearly everything important I know about auditory research I first learned from Harry. He didn't only teach me facts, but he taught me how to learn, how to think, and, most important, how to think like a scientist. At the CUNY Graduate School, he worked on research related to binaural hearing, sensory aids, analysis of the speech of individuals with communication disorders - especially deafness, experimental audiology, and auditory psychophysics. Harry is best known for the development and use of digital and computer-assisted technology by persons with communication disorders. These include computer-assisted adaptive testing in auditory psychophysics, computer simulation of speech, computer analysis of syntax and other language skills of deaf children, analysis of visual cues in speech intelligibility using video processing of faces, digital hearing aids, noise reduction devices in hearing aids, and the WMHA. His research at CUNY developed methods to predict speech intelligibility and enhanced psychophysical procedures, especially adaptive procedures. Indeed, one paper published in 1971 (Levitt, 1971) reporting on an adaptive procedure of the transformed, up-down type has become the second most cited paper in the history of *The Journal of the Acoustical Society of America* (source: Crossref API).

In keeping with the theme of this special issue of *Acoustics Today*, I tried to recall other serendipitous events that led me from CUNY to UCLA to my current faculty position at the Medical University of South Carolina, Charleston. Those transitions in location occurred because I became connected to people who offered postdoctoral fellow and faculty appointments that led to outstanding mentors and scientific colleagues. The ongoing expansions of my research focus through lifelong learning occurred because I was connected to people who became collaborators, mentees, and trusted advisors at all career levels, and those connections led to others, and so on. The initial sparks came about through seemingly mundane

meetings or telephone/email exchanges. Looking back, I am not sure that these connections were truly serendipitous, but they had the characteristics of serendipity. That is, they occurred by being ready and willing to take chances on unique opportunities to explore new research directions, to accept new leadership roles when offered, and generally to say "Yes."

In closing my tale of Harry's serendipitous telephone call and my early-career journey, I would like to relate a "degrees-of-separation" story that Harry told me about Albert Einstein. One of Harry's professors at Imperial College in London was Dennis Gabor (see bit.ly/4c8thQZ), who invented the hologram among many other contributions, for which he received the Nobel Prize in Physics in 1971. Despite his fame, he was most proud that he had been a student of Einstein's. Harry then told me that I could be proud that I was a student of a professor (Harry) who was a student of a professor (Gabor) who was a student of Einstein. And Harry said I should tell my students that they should be proud, too, of their link to Einstein. But, instead, I tell them they should be proud to be students of a professor (me) who was a student of Harry Levitt. That's serendipity!

## Bibliography


Dubno, J. R., and Levitt, H. (1981). Predicting consonant confusions in noise from acoustic analysis. *The Journal of the Acoustical Society of America* 69(1), 249-261. https://doi.org/10.1121/1.385345.

Dubno, J. R., Dirks, D. D., and Langhofer, L. R. (1982). Evaluation of hearing-impaired listeners using a nonsense syllable test. II. Syllable recognition and consonant confusion patterns. *Journal of Speech and Hearing Research* 25(1), 141-148. https://doi.org/10.1044/jshr.2501.141.

Levitt, H. (1971). Transformed up-down methods in psychoacoustics. *The Journal of the Acoustical Society of America* 49(2), 457-477. https://doi.org/10.1121/1.1912375.

Levitt, H., Dubno, J. R., Freeman, L., and Slosberg, R. (1977). Rate of convergence in adaptive fitting of a wearable master hearing aid. *93rd Meeting of the Acoustical Society of America*, State College, PA, June 7-10, 1977, pp. S5-S6. https://doi.org/10.1121/1.2015803.

Levitt, H., White, R. E. C., and Resnick, S. B. (1975). Development of a protocol for fitting a wearable master hearing aid. *90th Meeting of the Acoustical Society of America*, San Francisco, CA, November 4-7, 1975, p. S72. https://doi.org/10.1121/1.2002281.


## Contact Information


**Judy R. Dubno**
dubnojr@musc.edu

*Department of Otolaryngology-Head and Neck Surgery*
*Medical University of South Carolina*
*135 Rutledge Avenue, MSC 550*
*Charleston, South Carolina 29425-5500, USA*