PETER LADEFOGED

Peter Ladefoged, the most influential phonetician of his generation, died in London on January 24, 2006, at the age of eighty. He was returning to Los Angeles from fieldwork in India when he suffered a stroke at Heathrow airport. He was taken to Hillingdon Hospital where he suffered a subsequent massive, and fatal, stroke.

Peter was born on September 17, 1925, at Sutton, Surrey (now part of Greater London), in England. His father, Niels Ladefoged, was successfully involved in the business of importing Danish cheeses and bacon to Britain in association with branches of the family in Denmark (the name Ladefoged is a Danish compound meaning 'steward of the barn'). Peter was educated at Haileybury College, one of the more prestigious 'public' (i.e. private) schools in England, and then spent a year at Caius College of Cambridge University before joining the Royal Sussex Regiment in 1944 in the final year of the second World War. After serving in Italy and Malta he was demobilized in 1947 and later resumed his academic career, this time at Edinburgh University in Scotland. Because of postwar emergency regulations, Peter was able to complete his first degree in two rather than the normal three years, obtaining an M.A. in 1951. Peter had originally studied English, with the notion of writing poetry himself. He would often explain his shift to an interest in phonetics by saying that he wanted to understand why what Keats or Shelley wrote sounded better than what he was able to write.

At Edinburgh, Peter undertook a year's postgraduate work in phonetics in the Department of Phonetics led by David Abercrombie. At the end of that year he was offered employment there as a laboratory assistant with duties that included making recordings on vinyl discs, and in 1953 he was promoted to Assistant Lecturer in Phonetics. In the same year he married Jenny MacDonald, beginning a partnership much admired by those fortunate enough to enjoy the friendship of the family through the years. They had met as part of the backstage crew putting on a production of the celebrated melodrama *Maria Marten, or the murder at the red barn*, when Peter was stage manager and Jenny in charge of props. At this time he began work on vowel quality, laying the foundation for one of his life-long convictions—that articulatory and acoustic-perceptual characteristics should be given equal priority in accounting for phonetic patterns. As he succinctly put it, 'Some patterns can be explained in terms of acoustic events, others in terms of articulatory events' (Ladefoged 1971:4).

Abercrombie had arranged for Peter to work with the then-doyen of British phonetics, Daniel Jones, founder of the method of describing vowels by reference to prototypes he called the 'cardinal vowels'. Peter recorded the cardinal vowels as produced by former students of Jones's, many of them distinguished phoneticians in their own right, and had Jones rate the production as correct or not. The results showed some systematic individual shifts, but also considerable idiosyncratic effects. From this and his other work on vowels in this period (see Ladefoged 1962a, generally cited as such, though it may bear an imprint date of 1960), Peter drew the conclusion that the traditional description of vowels based on the presumed location of the highest point of the tongue (which he dismissed as 'articulatory fiction') must be abandoned and a new basis found.

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In his own summary of his career posted on his website (http://www.linguistics.ucla.edu/people/ladefoge/), Peter reports an interesting anecdote that suggests Jones was aware of the problem:

> Jones never defined what he meant by saying that the cardinal vowels were acoustically equidistant. He thought that the tongue made equal movements between each of them, even after the publication of x-ray views of the 8 primary cardinal vowels produced by his colleague Stephen Jones showed that this was not the case (Jones, 1929). Daniel Jones himself published photographs of only four of his own cardinal vowels, although, as he told me in 1955, he had photographs of all 8 vowels. When I asked him why he had not published the other four photographs, he smiled and said 'People would have found them too confusing'.

In the 1950s it was not at all a requirement to possess a doctorate in order to have a university position in Britain, but Peter became interested in the possibility of working in the US where it was expected. Following suggestions by Abercrombie, Peter's work on vowel quality was packaged together as a Ph.D. dissertation, and the degree awarded in 1959. The outside examiner for the dissertation was Walter Lawrence, the inventor of the Parametric Artificial Talker (PAT), the first parametric speech synthesizer. Through Lawrence, Peter was introduced to Donald Broadbent, a psychologist working in Cambridge. The use of synthesized speech made it possible to conduct new types of experiments on speech perception, and among the results of their collaboration was the seminal paper on 'Information conveyed by vowels' (Ladefoged & Broadbent 1957). This confirmed Peter's earlier observations that vowel quality did not depend on absolute acoustic values, but ones relative to characteristics of the voice. Identical stimuli were heard as different words when the frequency characteristics of an introductory sentence were altered. In later years, Peter would question the reliability of these results in view of the poor quality of synthesis possible at the time, but he showed they could be reproduced using a natural voice (Ladefoged 1989).

At this time Peter also worked with David Whitteridge, Professor of Physiology at Edinburgh. Both were interested in the control of the respiratory system in speech, and in developing new techniques to study the process. At the time, Raymond H. Stetson's notion that every syllable was produced with a separate muscular contraction, a 'chest pulse', was widely accepted by speech scientists (Stetson & Hudgins 1930). In several papers (e.g. Ladefoged et al. 1958, Ladefoged 1967), Peter and his colleagues were able to show that the flow of air from the lungs was not controlled at a syllable-by-syllable level, but that stressed syllables were the result of extra respiratory effort. Peter was rather surprised, and a little put out, when this work was somewhat intemperately attacked many years later (Hixon & Weismer 1995). However, with typical grace, Peter conceded that some 'egregious errors' had been made in method and interpretation. The principal conclusions nonetheless remained valid (Ladefoged & Loeb 2001).

Peter credited Whitteridge with teaching him to be a real scientist, and he adopted from him a favorite dictum of Lord Kelvin's: 'You do not really know anything until you can express it in terms of numbers'.[1] In later years, Peter would modify this by adding 'or can implement it in a computer program'.

In 1959–1960 Peter took a leave of absence from Edinburgh to serve as Lecturer in Phonetics at the then-University College of Ibadan in Nigeria. The Ford Foundation had granted a considerable sum of money for 'The West African Languages Survey'

[1] This is in fact a paraphrase of what James Thompson, Lord Kelvin, is quoted as actually having said, but is the wording Peter usually cited. The original version reads, 'When you measure what you are speaking about and express it in numbers, you know something about it, but when you cannot express it in numbers your knowledge about it is of a meagre and unsatisfactory kind'.

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and when project codirectors Joseph Greenberg and William Welmers came to Ibadan on the lookout for research to fund, Peter proposed a survey of the phonetic properties of the languages of the region. After a summer at the LSA Institute at the University of Michigan (where he and Jenny stayed in Kenneth Pike's house) and a year back teaching in Edinburgh, Peter returned to Nigeria as a field fellow for the survey and began to collect the data that resulted in the publication of *A phonetic study of West African languages* (Ladefoged 1964). Peter collected a phenomenal amount of material mostly from university students in Nigeria, Ghana, Sierra Leone, and Senegal, illustrating sixty-one languages from nine different countries. To this day we do not have any comparable study of the languages of any other area of the world. In short, elegantly written chapters, the range of contrasts within each major class of segments across the set of languages is laid out, prefiguring much of his later central work on universal phonetic contrasts and the features required for their representation. This book was also unlike any previous work in the breadth of descriptive techniques brought to bear. Peter noted this himself in his introduction:

> I do not know of any previous attempt to use data provided by palatograms, linguagrams, casts of the mouth, photographs of the lips and spectrograms all of the same utterance, supplemented by tracings of cine-radiology films and pressure and flow recordings of similar utterances of the same word. (Ladefoged 1964:xvi)

This was the beginning of Peter's enduring commitment to taking experimental phonetics into field situations.

In 1962 Peter made the wished-for transition to the US, being appointed Assistant Professor of Phonetics in the Department of English at the University of California, Los Angeles (UCLA). He actually had a choice between competing offers from UCLA and the University of Michigan, and he and Jenny would often claim that they had chosen California just because the weather was better. It was Robert Stockwell, who became the founding chair of the Department of Linguistics in 1966, who had successfully recruited Peter to UCLA, and Peter moved enthusiastically into the new department when it was founded, together with other colleagues from the Departments of Anthropology, Communication, and English. The founding generation also included Harry Hoijer, Bill Bright, Vicki Fromkin, William Welmers, and Paul Schachter.

From the beginning Peter established the memorable tradition of the UCLA Phonetics Laboratory. Despite the immense significance of the intellectual work Peter had already done and would later amplify, many of us who spent time as members of the lab would probably agree that Peter's most valued contribution may have been in shaping a unique working environment, one that was at the same time both challenging and supportive. Louis Goldstein expressed this eloquently at the memorial for Peter held at UCLA on February 4, 2006 (see http://www.linguistics.ucla.edu/people/ladefoge/remember/MemService.htm):

> Peter noted in his short autobiography, that it was never about the equipment, but rather the people. And the lab group that sprang to life, seemingly spontaneously, but actually under his careful guidance, provided a way for those people to grow, to interact creatively and critically, to support each other, and to make collective discoveries that none of us individually could have made. . . . As those of us who had this moment in the sun spread out and created our own labs, we brought that experience with us, attempted to imbue our own groups with its spirit. In my own experience, it is never as successful as the original, but it is there to some extent. (Goldstein 2006)

The first funded project of the newly founded lab was to build a working physical model of the vocal organs. The project involved wooden templates, rubber molds and plaster casts, and hair-raising experiments involving suspending Peter upside-down

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while his vocal tract was filled with quick-setting impression material. The effort to construct a model in hardware was generally unsuccessful, but the project generated valuable contributions by the first generation of Peter's doctoral students, including Vicki Fromkin, John Ohala, and Tim Smith, who were involved in describing, based on electromyographic and aerodynamic techniques, the muscular activity and associated gestures that it had been hoped would be built into the model.

Peter shifted attention to making a virtual model of the vocal tract instead, working in collaboration with Richard Harshman and Lloyd Rice on early general-purpose computers, such as the LINC-8 and DEC-11 with, by modern standards, minuscule memories. This provided the opportunity to seek an answer to the problem of the articulatory specification of vowel sounds whose traditional basis had been discredited.

Peter and his coworkers in the lab obtained x-ray images from five speakers showing the tongue positions in the middle of the vowels in a set of words illustrating ten of the vowels of American English. Tongue-to-palate distances were measured on each image along a dense grid of lines originating roughly in the center of the tongue's mass. The resulting enormous quantity of data was elegantly reduced to two primary control parameters using Harshman's PARAFAC procedure, as described in detail in Harshman et al. 1977 and more briefly in Peter's Presidential address to the LSA (Ladefoged 1980). Specifying values of these two factors, dubbed 'front raising' and 'back raising', and summing their effects could match the tongue shapes in the original data. Later it was shown that the scheme could be generalized to describe many other possible gestures of the tongue body. A further step was to predict values of these parameters from vowel formants, and hence predict the tongue shape from acoustic measurements (Ladefoged et al. 1978). Peter implemented this articulatory-acoustic relationship in a computational vocal-tract model and synthesis program, and a number of other computer models have since used similar factors to specify tongue-body shapes.

A subsequent major project in the lab, whose results are summarized in Ladefoged et al. 1988, focused on the linguistic use of phonation type. In addition to this being a topic that was poorly understood by phoneticians, Peter felt that it might be a useful corrective to draw the attention of colleagues in speech pathology to the wide range of normally used voice qualities in the world's languages. As he put it informally, 'one person's voice disorder is another person's phoneme' (Ladefoged 1983:351).

The people who were associated with the UCLA Phonetics Laboratory during Peter's years of leadership, whether as faculty, students, postdoctoral associates, or visiting researchers, amount to a veritable Who's Who of the world of phonetics. The visitors, attracted by Peter's open welcome, included John Laver, Gunnar Fant, Tony Traill, Ken Stevens, and Bjørn Lindblom—to name just a distinguished few—and they in turn enriched the experience of everyone else in the lab.

Peter notionally 'retired' from UCLA in 1991 when the university offered some enticing incentives to senior faculty members to retire early. He was pleased to be able to turn over the running of the Phonetics Laboratory to Pat Keating, whose original hiring he had personally shepherded through during his time as department chair. Freed from regular teaching obligations, Peter was able to travel and to write even more. All through his UCLA career he had frequently traveled to hear and collect first-hand data on languages in many parts of the world, and these activities only intensified. He would sometimes admit to 'trying to hear and analyze all the sounds that could distinguish words in some language or other',[2] but the deeper purpose was to synthesize the infor-

[2] This apt characterization comes from Peter's own description of his career (p. 4), which can be found at www.linguistics.ucla.edu/people/ladefoge/PLcareer.pdf.

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mation gathered into a descriptive framework that he felt was adequate to represent all of the phonological distinctions that were known to exist. The early work in West Africa had done this for a subset of the world's languages. By the time the more formal feature inventory in his *Preliminaries to linguistic phonetics* (Ladefoged 1971) appeared, he had carried out fieldwork in Mexico, Southern Africa, and India and supervised a major survey of languages in Uganda (Ladefoged et al. 1969). Around a hundred languages are cited in the language index of this work, most from first-hand experience.

But almost every year added more data to the store, and more insight into the way that phonetically informed but phonologically relevant classification might be done. A more elaborate, but still interim, scheme was set out in *Sounds of the world's languages* (Ladefoged & Maddieson 1996), where more than three hundred languages are mentioned. This book incorporated some of the early results of a project to describe interesting phonetic structures in endangered languages that had begun in 1991, but not, for example, the alveolar stop with trilled bilabial release of the Brazilian language Oro Win described in Ladefoged & Everett 1996. Peter was preparing a further statement of his views in a manuscript called 'Representing linguistic phonetic structure', which sadly will not be completed. However, an article based on this project appears in this issue of *Language*. In all, Peter published ten books and over 140 articles in his long career.

Besides his towering scholarly contributions to his discipline, Peter was also renowned as a superb teacher, a fact acknowledged by his receipt of a Distinguished Teaching Award from UCLA in 1978. At UCLA he created a very distinctive introductory phonetics course. Among its traits was the firm anchoring of phonetics within linguistics. A major requirement for students taking the course was to make a recording of an unfamiliar language and write a paper describing the sounds of this language as illustrated on the recording. Students generally found this a challenging but almost always rewarding task; and it also had the advantage of providing illustrations of numerous languages spoken in the extraordinarily culturally rich Southern Californian environment. The best were added to the field recordings in the UCLA phonetics archive and used to enrich further the sample of languages available for linguistic analysis. This model of teaching has been spread far around the US and beyond as students of Peter's have copied his inspired lead in their own teaching. Peter's textbook *A course in phonetics*, based on the content of his UCLA classes, was first published in 1975 and is now in its fifth edition. It has become the standard by which other basic phonetics texts are measured. Three other books of his are also primarily teaching texts: *Elements of acoustic phonetics* (1962b), *Vowels and consonants: An introduction to the sounds of languages* (2001), and *Phonetic data analysis: An introduction to instrumental phonetic fieldwork* (2003). In addition, he was an early advocate of computer-based teaching and developed tools for teaching basic acoustic phonetics, illustrating the relationship between articulatory and acoustic parameters, and, most especially, providing real-speech examples of sounds of many types drawn from languages around the world. These materials were generously shared with anyone wanting to use them.

Peter also served the profession in many capacities. He held, among others, the positions of Chair of the UCLA Linguistics Department (1977–1980), President of the Linguistic Society of America (1978), President of the Permanent Council for the Organization of International Congresses of Phonetic Sciences (1983–1991), and President of the International Phonetic Association (IPA; 1985–1989). He was an editor of the *Journal of the International Phonetic Association* and served on the editorial board

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of *The Journal of Phonetics* as well as other publications. During his period as President of the IPA, he initiated the effort to renew the Association's alphabet and principles through the discussions at the Kiel Congress, and he oversaw the transformation of the *Journal of the IPA* into a competitive scholarly publication, as well as the preparation of the Association's *Handbook* (IPA 1991). He designed an early IPA computer font and did much to encourage the use of standard phonetic symbols in computerized documents instead of the ad hoc 'keyboard-friendly' transcriptions that proliferated at first. In recent years he had also devoted much time to the issue of archiving in accessible form his own and others' recordings of diverse languages, many of them endangered. He was a founding member of the board of the Endangered Language Fund, which at his family's request has opened a memorial fund for him (see http://www.endangeredlanguagefund.org/ladefoged for information).

His contributions were formally recognized in many ways, including the award of the Gold Medal at the 12th International Congress of Phonetic Sciences in 1991 and a Silver Medal from the Acoustical Society of America in 1994. He was a Fellow of the American Academy of Arts and Sciences, a Corresponding Fellow of both the British Academy and the Royal Society of Edinburgh and the recipient of honorary doctorates from both the University of Edinburgh, and Queen Margaret University (also in Edinburgh). In 1985 a number of his closer colleagues, led by Vicki Fromkin, dedicated a volume of essays to him on the occasion of his sixty-fifth birthday (Fromkin 1985).

All of the foregoing summarizes many of the professional contributions of Peter's career, but it says little of what Peter was really like, and why he made such an impression on people. It was perhaps not surprising that some of the reports of Peter's death in the popular media headlined their stories with reference to him as 'the real Professor Higgins' inasmuch as he had consulted with George Cukor on the film version of *My fair lady*, where his role was to ensure that the equipment, transcriptions, and behavior fit what might be expected of a nineteenth-century phonetician. But Shaw's and Lerner and Loewe's Higgins was snobbish, arrogant, misogynistic, and socially maladroit. Peter was the antithesis of all these things—egalitarian, humble, fair to all, and charming. Part of his wish to move to the US was driven by wanting to leave behind the class structure of postwar Britain for a country where at least in principle there was equality of opportunity. Peter's respect for others is documented in hundreds of anecdotes from students and visitors in the lab who found he listened and remembered and was always ready to learn from others. It is symbolized also by the fact that from the first issue of the lab's report, the *UCLA Working Papers in Phonetics*, all members of the lab group are simply listed alphabetically by name, with no rank or function indicated. Peter never put himself ahead of others.

Peter showed an enormous and contagious zest for life. The parties at his and Jenny's house in Laurel Canyon in the Hollywood Hills were the center of a warm social life that eased the stress of examinations, tenure reviews, or the tribulations in love-life for many friends and colleagues. Around the age of seventy, with his son Thegn in a doctoral program in archaeology in Hawaii, he took up surfing, since he was becoming a frequent visitor to the islands. A favorite photograph for his family is one of him in a wetsuit with a board under his arm on a Hawaiian beach. One day at La'aloa Beach some rough surf knocked his boogie board into his shoulder, causing tendons to rupture. Despite needing several surgeries and never fully recovering the use of the shoulder, he seemed never to regret having taken up the sport.

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He was devoted to his family and provided the best kind of noninterfering support to his children, Lise, Thegn, and Katie, helping them to find what they were good at and would find pleasure in doing with their lives. As Jenny, the daughter of a missionary priest and missionary doctor, rose to be a lay Canon in the Episcopalian Church, Peter would joke that he was a founding member of Atheists for Jesus. He had no comforting beliefs about an existence beyond death, but was not afraid of dying. The following short poem he wrote in 2005 was included in the program for his memorial:

> If I should die tomorrow
> Grieve not for me
> Sorrow's fine for those
> Who leave too early on their way.
> My stay was a full time,
> Glowing like a rhyme with unexpected parts
> That starts new lines and gives
> New twists to older arts.

Our memories of Peter are admiring and tender, and many are recorded in the reminiscences from his memorial and in tributes contributed by those who knew him at http://www.linguistics.ucla.edu/people/ladefoge/remember/index.htm. We know we cannot be his equal, but we can strive. [IAN MADDIESON, *University of California, Berkeley*, and *University of New Mexico, Albuquerque*.]

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