THE ROSSING PRIZE: THE FIRST 10 YEARS

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Introduction

The Rossing Prize in Acoustics Education was established in 2003 from a grant by Thomas D. Rossing to recognize an individual who has made significant contributions toward furthering acoustics education through distinguished teaching, creation of educational materials, textbook writing and other activities.

At this point nine individuals have been awarded the Rossing Prize and a tenth will be awarded at the upcoming meeting in San Francisco. Now that 10 years have passed, it seems appropriate that this magazine should bring out a summary of all the awards that have been given to date.

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The Creator of the Award

It may be first appropriate to first say something about the creator of the award, Dr. Thomas Rossing. It was a very generous grant and was motivated by Rossing's strong belief that the Acoustical Society should do more to recognize contributions to acoustics education. Rossing himself is indisputably the ASA's most prominent educator. Besides being very active in the Society for many years, he was also active in the American Association of Physics Teachers (AAPT) and served as its President in 1991. Over the years he wrote many articles regarding the teaching of physics, and especially acoustics, and published extensively in the *American Journal of Physics*, which is the flagship publication of the AAPT.

Dr. Rossing is the principal author, coauthor, or editor of more than 16 books. More than half of his 300 publications are directly related to teaching physics. His book, the The Science of Sound, now in its third edition (coauthored with Richard Moore and Paul Wheeler), is the definitive introductory text on acoustics for liberal arts students. (The present writer owns two copies, a third was given out as a prize at a science fair.)

One of Rossings's many honors was receiving the prestigious Millikan Medal in 2001, named after the Nobel Prize winner, Robert Andrews Millikan, who coincidentally was the thesis advisor of ASA's first president, Harvey Fletcher. The Millikan Medal is the AAPT's highest award, given annually since 1963 to recognize notable and creative contributions to the teaching of physics. An inspiring encomium can be found in the *American Journal of Physics*, along with citations to five articles by Rossing in the *Physics Teacher*.

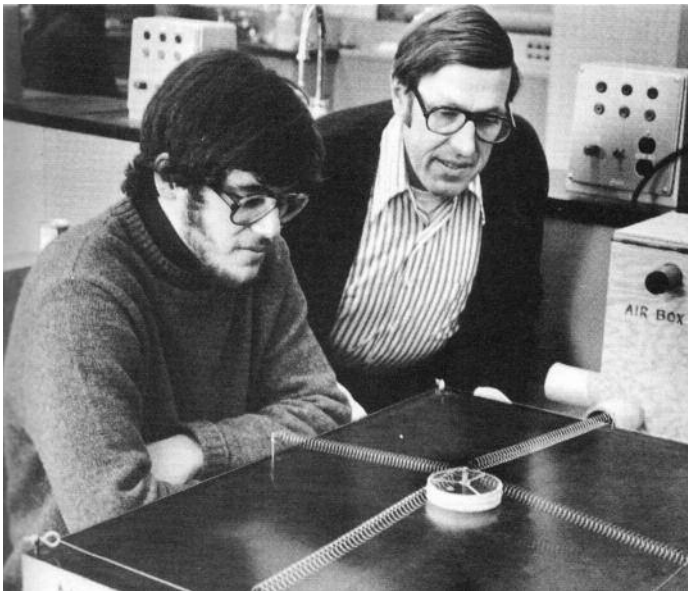
Rossing was the first person to be appointed as an Associate Editor for Education for the *Journal of the Acoustical Society* of America and served in that capacity for many years, and also for *JASA-Express Letters*. He received the ASA's Silver Medal in Musical Acoustics in 1992, and the ASA's Distinguished Service Citation in 2006, and the Society's Gold Medal in 2009. He is also the Editor of the Society's newsletter, *ECHOES*. He began this job with the Summer 1997 issue; the most recent issue under his editorship is the Fall 2013 issue.

The Rossing Lectures

One of the conditions for receiving the prize is to give a plenary lecture at a meeting of the Acoustical Society on a topic of the prize recipient's choice. There have been 9 such lectures so far, and they have generally been well attended and the audience has found them stimulating. One can, of course, not summarize all of those lectures here, but the abstracts that appeared in the programs of the meetings, and which were written by the awardees, give an interesting overview of the many facets of acoustics education. Those abstracts are reprinted below.

2004. Allan D. Pierce. Grappling with pithy problems: The education in acoustics of John William Strutt (aka Lord Rayleigh) and of the rest of us

There is a little of Rayleigh in each of us, so we might benefit from some selective emulation, and educators might adopt some of the stimulations that contributed to Rayleigh's success. As a child, Rayleigh loved dabbling in scientific experimental projects, but his formal education was greatly



Tom Rossing and a student contemplating a demonstration experiment.

influenced by the contemporary view that mathematics was a respectable alternative to the classics. When he entered Cambridge, he was "decidedly less advanced in mathematical skills than the best of his contemporaries," but this situation changed, largely due to the stimulus of the Cambridge environment, to an intrinsically competitive nature, and to the influence of one of the greatest educators of all time—Edward John Routh. Rayleigh was coached to solve problems, and he excelled at this. After graduation, Rayleigh embarked on a program of self-education and developed a strategy for combining his love of experimentation with his more recently acquired problem-solving skills. Details of this self-education are related. Extensive illustrations are given of problems such as might have been presented to Rayleigh as a student, such as he might have presented to students himself, and such as might to good purpose be presented to acoustics students of today.

2005. Katherine S. Harris. Speech neglect: A strange educational blind spot

Speaking is universally acknowledged as an important human talent, yet as a topic of educated common knowledge, it is peculiarly neglected. Partly, this is a consequence of the relatively recent growth of research on speech perception, production, and development, but also a function of the way that information is sliced up by undergraduate colleges. Although the basic acoustic mechanism of vowel production was known to Helmholtz, the ability to view speech production as a physiological event is evolving even now with such techniques as fMRI. Intensive research on speech perception emerged only in the early 1930s as Fletcher and the engineers at Bell Telephone Laboratories developed the transmission of speech over telephone lines. The study of speech development was revolutionized by the papers of Eimas and his colleagues on speech perception in infants in the 1970s. Dissemination of knowledge in these fields is the responsibility of no single academic discipline. It forms a center for two departments, Linguistics, and Speech and Hearing, but in the former, there is a heavy emphasis on other aspects of language than speech and, in the latter, a focus on clinical practice. For psychologists, it is a rather minor component of a very diverse assembly of topics. I focus on these three fields in proposing possible remedies.

2006. William J. Strong. Descriptive acoustics of music and speech

A brief background is given of "Descriptive Acoustics of Music and Speech," an introductory course taught at Brigham Young University for the past 40 years. Several conceptual and physical models used in the course are described. Some phenomena observed in music and speech are explained in terms of the models. Diagrams, sound samples, and video clips are used to illustrate the phenomena and their explanation.

2007. David T. Blackstock. Songs my students sang to me

Does the professor teach his/her students? Or do they teach the professor? While the answer to both questions is probably a qualified yes, in looking back, I see that what I know now is largely what they taught me. After a review of the research areas in which my students and I have worked, a few examples are highlighted that show that what I had expected is not how things turned out.

2008. D. Murray Campbell. From the sublime to the scientific: What musicians and acousticians can learn from each other

Many university music programs include an acoustics module, often taught by a physicist. At the University of Edinburgh, such a module has existed since the 1850s; taking over this course as a junior lecturer was my introduction to the fascinating world of musical acoustics. It rapidly became clear that a meaningful communication between scientists and musicians required humility and willingness to learn from both sides. This lecture explores aspects of that mutual learning process, focusing on some controversial areas in which the reconciling of scientific and musical viewpoints has not always proceeded in a spirit of humility.

2009. James V. Sanders. Fundamental acoustics education and applications.

Teaching acoustics at the graduate level to professional naval officers, who, after graduation, will go back to driving ships, submarines, and airplanes, as well as other professional naval disciplines, offers a unique challenge. The Naval Postgraduate School has been the home for over 50 years of the textbook, *Fundamentals of Acoustics*, originally written by Lawrence Kinsler and Austin Frey and revised in later editions by Alan Coppens and James Sanders. Updating a textbook that is suitable for undergraduate and graduate students in a multitude of disciplines at civilian institutions and also suitable for use by naval officers interested in underwater acoustics continues to be most challenging. Solutions to these and other teaching responsibilities in these environments, including long distance learning, are discussed.

2010. Jerry H. Ginsberg. Can you fit authorship of textbooks into an academic career?

It is commonly presumed at research-oriented universities that faculty teach well, so achievements as a teacher are not esteemed equally to research accomplishments. Authorship of textbooks is likely to be considered a teaching activity, and it seldom is valued at a level commensurate with the effort required to write a successful book. The consequence is that many faculty are reluctant to write books. This individual's experiences in writing textbooks on classical dynamics and vibrations are counter to these observations. Rather, the activity has been a bridge between teaching and research, with unique challenges and rewards. The author draws on his experiences to suggest a path by which others might augment their academic endeavors by writing textbooks.

2011Robert C. Coffeen. Using computer building modeling and auralization as teaching tools

Acoustic building modeling in computer programs is very useful in the understanding of room acoustics for venues of various types by architecture and architectural engineering students. Models provide calculation of reverberation time using the Sabine and similar equations as interior materials are changed. Ray tracing can be used to understand the effect of disturbing sound reflections from interior surface shapes and locations. Being able to create impulse responses in a model allows the estimation of reverberation time using Schroeder integration. And, transferring impulse responses to a measurement and analysis program allows determination of early decay time as well as T10, T20, T30 and other sound decay cutoff times. In addition, more advanced students can determine Sound Transmission Class STI, Strength G, Inter-aural Cross Correlation Coefficient IACC, and other acoustic parameters. But, one of the most useful items that can be produced by model impulse responses is auralization. This allows students to hear a simulation of room sound as reverberation time and other acoustic parameters are changed. Examples of using one of the several modeling and analysis programs are presented.

2012. Joe Wolfe. Physclips: Multimedia, multi-level learning, and teaching resources

Physclips provides multimedia resources to physics students and teachers at the levels of senior high school to introductory university. Completed volumes cover mechanics, waves and sound. Each chapter includes a rich multimedia lesson of about 10 minutes, including film clips, animations, sound files and images of key experiments and demonstrations. Contextually embedded links lead to html pages providing broader and deeper support and, where needed, to tools such as calculus and vectors. The ongoing development of the interface reflects learner feedback and our own experience and research. The architecture and presentation of Physclips is largely consistent with evidence-based guidelines in the field of educational multimedia. Often, animations and labeling are superimposed on film clips to indicate abstract quantities, thus providing the novice with the insight of the expert's 'mind's eye'. The scrollbar is indexed with keywords and images to assist learners to find and to relocate conceptually discrete segments, which facilitates revision and reference usage. Together with extensive cross-linking, this allows students to construct individual learning pathways. Teachers download animations singly or in compressed folders for inclusion in lessons, blogs etc. Physclips is supported by Australia's Office of Learning and Teaching and the University of New South Wales.

2013. Juliette W. Ioup. Time-frequency analysis for acoustics education and for listening to whales in the Gulf of Mexico

Time-frequency plots continue to be used in many varied applications. One particularly advantageous use is in acoustics courses accessible to non-science majors, students who are often frightened of mathematics and/or physics. All musicians as well as many others can read and understand music scores (time-frequency plots). Time-frequency plots are extremely useful in explaining the differences in timbre of the same pitch coming from different musical instrument families, from individual instruments themselves, and from different human voices. Examples are given from the first of a UNO two-semester sequence on the Physics of Music (textbook by Rossing!). The second semester of this sequence includes recording and reproduction of music, and time-frequency plots are again very useful. Investigation of acoustic signals for research also benefits from the use of time-frequency plots. The study of marine mammals is enhanced by analysis of underwater acoustic recordings. Examples of both the sounds of and the time-frequency plots for sperm whale clicks in the northern Gulf of Mexico are presented. Seismic airgun shots from oil industry exploration can be heard on the recordings as well as the whale clicks.

This issue of Acoustics Today should (hopefully) arrive to most readers long before the meeting of the ASA in San Francisco. Given that this is the case, and given that you attend the meeting, you are here encouraged to attend Juliette Ioup's Rossing Prize lecture at 2:05 pm, Wednesday, December 4, 2013.

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