

ACOUSTICAL SOCIETY OF AMERICA

GOLD MEDAL



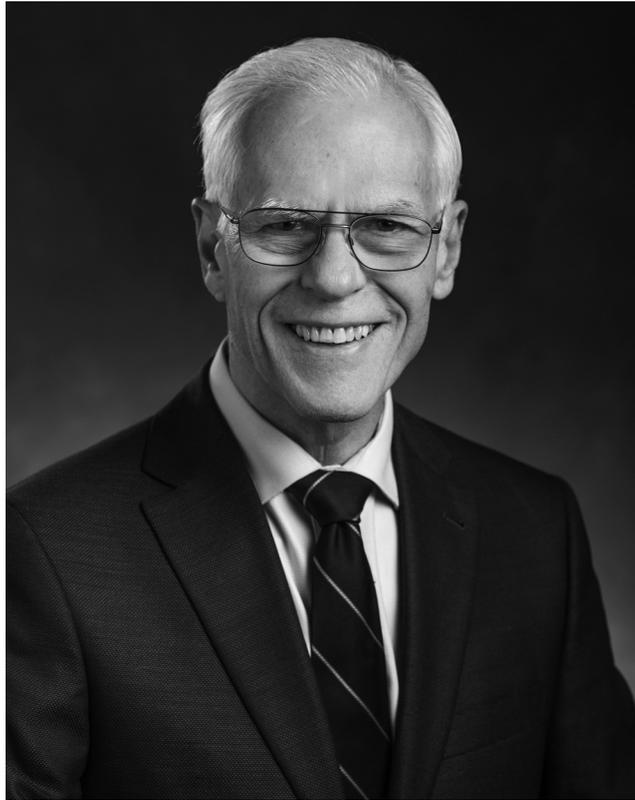
William M. Hartmann

2017

The Gold Medal is presented in the spring to a member of the Society, without age limitation, for contributions to acoustics. The first Gold Medal was presented in 1954 on the occasion of the Society's Twenty-Fifth Anniversary Celebration and biennially until 1981. It is now an annual award.

PREVIOUS RECIPIENTS

Wallace Waterfall	1954	David T. Blackstock	1993
Floyd A. Firestone	1955	David M. Green	1994
Harvey Fletcher	1957	Kenneth N. Stevens	1995
Edward C. Wentz	1959	Ira Dyer	1996
Georg von Békésy	1961	K. Uno Ingard	1997
R. Bruce Lindsay	1963	Floyd Dunn	1998
Hallowell Davis	1965	Henning E. von Gierke	1999
Vern O. Knudsen	1967	Murray Strasberg	2000
Frederick V. Hunt	1969	Herman Medwin	2001
Warren P. Mason	1971	Robert E. Apfel	2002
Philip M. Morse	1973	Tony F. W. Embleton	2002
Leo L. Beranek	1975	Richard H. Lyon	2003
Raymond W. B. Stephens	1977	Chester M. McKinney	2004
Richard H. Bolt	1979	Allan D. Pierce	2005
Harry F. Olson	1981	James E. West	2006
Isadore Rudnick	1982	Katherine S. Harris	2007
Martin Greenspan	1983	Patricia K. Kuhl	2008
Robert T. Beyer	1984	Thomas D. Rossing	2009
Laurence Batchelder	1985	Jiri Tichy	2010
James L. Flanagan	1986	Eric E. Ungar	2011
Cyril M. Harris	1987	William A. Kuperman	2012
Arthur H. Benade	1988	Lawrence A. Crum	2013
Richard K. Cook	1988	Brian C. J. Moore	2014
Lothar W. Cremer	1989	Gerhard M. Sessler	2015
Eugen J. Skudrzyk	1990	Whitlow W. L. Au	2016
Manfred R. Schroeder	1991		
Ira J. Hirsh	1992		



ENCOMIUM FOR WILLIAM M. HARTMANN

. . . for contributions to research and education in psychological acoustics and service to the society

BOSTON, MASSACHUSETTS • 27 JUNE 2017

William (Bill) Hartmann studied electrical engineering at Iowa State University starting in 1957. His (incomplete) conversion to the study of physics began in 1960 when the United States launched the Echo satellite, a large metalized balloon designed to reflect both microwave signals and sunlight so that it could be seen by the entire world. Bill was given the task of using orbital parameters from the US Naval Observatory to predict the appearance of the Echo over Ames, Iowa, which he achieved by programming the Cyclone, a five-ton vacuum-tube machine with 1024 words of 40-bit memory stored on Williams tubes. At the time, both artificial earth satellites and computing were hot topics. Perhaps this is why he was awarded a Rhodes scholarship to study at Oxford University in the UK, from 1961 to 1965.

At Oxford, Bill studied condensed matter theory under the direction of Roger Elliott. He completed a two-part thesis – neutron scattering from liquid and solid hydrogen, and infra-red absorption from defective rare-gas crystals. Ever drawn to sources of cold neutrons, Bill then took a post-doctoral position at Argonne National Laboratory (1965-1968). There, he determined how to introduce short-range order into the lattice dynamics of alloys such as copper-gold. Easily the most important result of Bill's stay at Argonne was meeting Christine Rein, a widely travelled school teacher and summer-time tennis instructor. She and Bill married in 1967 and they have been playing tennis ever since. Chris is a good friend to many members of the ASA. They have two children, Mitra, a professor of engineering at Northwestern, and Daniel, a biomechanical engineer with Eli Lilly.

Bill joined the faculty of the Department of Physics at Michigan State University in 1968. In the early 1970s, his life took a sudden turn beginning with "Switched on Bach," which got Bill hooked on electronic music. Op-amp chips made it easy to build analog music synthesis electronics, and Bill began to explore making music electronically and to teach a course in musical acoustics. In making electronic music, Bill discovered effects that did not seem to make sense. His perceptions did not square with what he knew his electronics were generating. Bill began to do perceptual experiments, mostly on pitch, to try to understand what he was hearing. By accident, he met David Wessel, then assistant professor of Psychology at Michigan State, who told Bill that there were people who made a living by studying such problems in auditory perception. Bill demanded to know where such people were and whether any of them ever wrote about what they were doing. David explained that such people could be found at meetings of the Acoustical Society of America (ASA), and that they published in the *Journal of the Acoustical Society of America* (JASA). David advised Bill to learn the tricks of the trade with David Green at Harvard University. So Bill and Chris packed up the family and spent the academic year (1976-1977) with David Green.

Bill joined the ASA in 1976 and attended the fall meeting in San Diego. He went right to work and organized a special session on electronic music for the next meeting. Bill has missed only one ASA meeting since then. His occasional performances of rap at jam sessions are not to be missed.

Bill's contributions to our field can be divided into three broad categories: research, education, and service to the ASA. We consider them in that order.

Bill's research has spanned a broad set of interrelated topics in acoustics and psychoacoustics and he has made seminal contributions in multiple areas. His work is characterized by a rigorous specification of the problem, careful measurements of complex phenomena, a rigorous mathematical description and analysis of the results, and discussion of implications for more general problems. His very considerable technical and mathematical skills enable him to perform analyses and construct models in a way that would be difficult or impossible for many others working in the same fields.

Bill has made major contributions in several areas: (1) the ability of humans to localize sounds in space, especially when room reverberation and other sources are present;

(2) pitch phenomena, including pitches created from differences in the sounds at the two ears; (3) the perceptual analysis of mixtures of sounds from different sources, often called “scene analysis”; and (4) modulation detection, including AM, FM, and mixed modulations. His more recent work includes modeling that incorporates current knowledge and ideas about processing in the auditory periphery and neural coding up to the midbrain.

As an example of the nature of Bill’s contributions in the areas listed above, we consider his substantial contributions to knowledge in the field of pitch perception. Some of Bill’s early work was concerned with the perception of frequency modulation. He proposed an influential model to explain the detection of frequency modulation. He also explored the influence of the envelope amplitude of a sound on its pitch and he measured how the pitch of a single mistuned harmonic in a complex tone was influenced by the amount of mistuning. Somewhat later, he conducted an important series of experiments on the effects of mistuning a harmonic in a complex tone on pitch perception and auditory scene analysis. Bill also showed that the “octave enlargement effect” occurs for Huggins pitch (a pitch created by binaural interaction), demonstrating that the effect was unlikely to have a peripheral origin, as previously assumed. All of these papers had a considerable influence on theories of pitch perception.

Bill’s interest in auditory scene analysis stemmed from his work on pitch perception, and he was one of the first to give a comprehensive overview of the role of pitch in auditory scene analysis. He published a highly influential paper on the factors that influence the perceptual organization of rapid sequences of sounds [Hartmann, W. M., and Johnson, D. (1991). “Stream segregation and peripheral channeling,” *Music Percept.* 9, 155-184]. He also studied the role of spatial and temporal factors that influence the ability to understand speech in the presence of other sounds.

Bill has contributed greatly to education in acoustics via his two books, *Sound, Signals, and Sensation* (now in its fifth printing) and *Principles of Musical Acoustics* - as well as many chapters in other books. In addition, Bill has educated many undergraduate and postgraduate students over the years, several of whom have gone on to become distinguished researchers in their own right. Bill has organized six special sessions at various ASA meetings. He was the ASA Technical Program Chair for the Acoustics’08 Paris meeting held jointly with the European Acoustics Association, the largest ASA meeting ever held, with over 5,000 registrants.

Bill has made many additional contributions to the ASA. He was elected a Member of the Executive Council (1992-1995), and later as Vice President (1998-1999), President-Elect (2000-2001) and President (2001-2002) of the ASA. He has served on many ASA committees, including the Medals and Awards Committee, Committee on Education in Acoustics, Investments, Panel on Public Policy, and the Technical Committee on Psychological and Physiological Acoustics. He was chair of the Technical Committee on Musical Acoustics, the Books+ Committee, and the Rules and Governance Committee. He was an active member of the Re-Creation Committee (1993-1994) and Vision 2010 (2004 and 2005), which set the direction for the future of the Society.

In 2011 the William and Christine Hartmann Prize in Auditory Neuroscience was established by the ASA to recognize and honor research that links auditory physiology with auditory perception or behavior in humans and other animals. The prize was underwritten by a substantial donation from Bill and Chris.

Bill was awarded ASA’s Science Writing Award for Professionals in Acoustics in December 2000. In 2001, he received the ASA Helmholtz-Rayleigh Interdisciplinary Silver Medal “for research and education in psychological and physiological acoustics, architectural acoustics, musical acoustics, and signal processing”, showing the diverse areas of acoustics in which he has made substantial contributions.

In summary, Bill has made tremendous contributions to knowledge and education in acoustics and he has shown outstanding loyalty and devotion to the ASA. We congratulate him most warmly on the award of the Gold Medal of the Acoustical Society of America.

BRIAN C. J. MOORE
H. STEVEN COLBURN