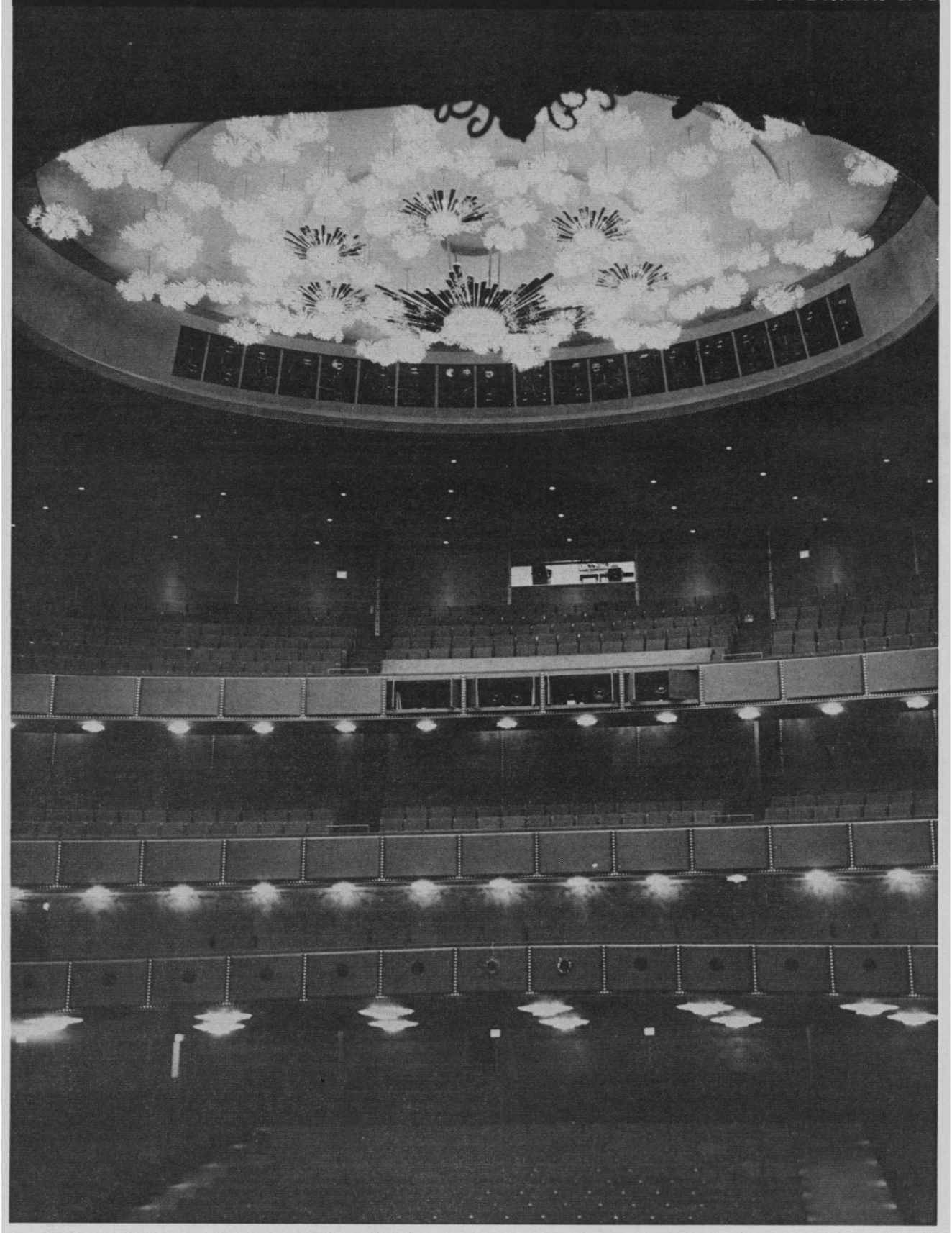
AAAS Symposia

Annual Meeting: Philadelphia

26–31 December 1971



Opera House, John F. Kennedy Center for the Performing Arts—an example of good acoustical design. [Vince Finnigan, John F. Kennedy Center]

27–30 December

Sound and Music

Sound is a complex phenomenon from its production and propagation to its reception and perception; music and noise are interrelated in a broad spectrum. The whole subject is being considered in its interdisciplinary aspects at a symposium for musical listeners and performers, for teachers and students, for musicians and acousticians.

The first session will deal with musical perception, with pitch, loudness, timbre, and rhythm—particularly psychoacoustic limitations.

Considerable progress has been made in recent years in increasing our scientific knowledge of musical instruments. Our understanding has developed to the point where it is beginning to provide direct aid to the improvement of such instruments. The interplay of scientists, craftsmen, and musicians has led to this progress. One session of the symposium will be devoted to indicating the present status with respect to instruments of the violin family, keyboard, and wind types, including physiological aspects of wind playing—all accompanied by demonstrations with actual instruments, where possible.

One session will be concerned with the acoustics of concert halls or theaters. Particular attention will be given to the acoustics of great historical buildings and their importance for modern designs. In this connection the future of sound-amplification technology will be discussed. A drama expert will present the relations of acoustical requirements to other essentials of a theater.

Computers have been applied to several quite different aspects of the art of music—musicology (analysis of existing music), the composition of new music by means of an interaction between a person and a computer program, and the actual playing of music (that is, synthesis of a soundwave form with a computer). The last process can be done either by pure digital synthesis, where the computer directly controls the motion of a loudspeaker cone, or by the computer control of a digital analog synthesizer (for example, Moog synthesizer). All these aspects will be discussed, and tape-recorded musical examples will be played. In the evening there will be a special program (tickets $3) on "Computer Theater and Music" in the Zellerbach Theater of the University of Pennsylvania. It will include "Phosphones," a dance by the Mimi Garrard Dance Company with choreography by Mimi Garrard, together with computer music and light composition and with computer light control. The precision and speed of light changes, which are perfectly synchronized with the sound, create effects never before achieved. There will also be "Olympia," a film with computer images and music. The perfect control of the computer images and the smoothness of their motion interpret both the struggle and the grace of running man. The "Computer Suite" from "Little Boy," composed by Jean-Claude Risset for a play about Hiroshima, is an acoustic tour de force in which the computer creates not only conventional sounds but also sounds that have never been heard before. "Computer Music for Percussion on Tape" will be performed by a percussionist and electronic equipment reproduced from a magnetic tape. The program, which will include other pieces, will conclude with the "Requiem," a brief dramatic tone poem for computer sound. The music was created with the Groove real-time program, which makes use of a small computer-controlling and analog-sound synthesizer. The expression and nuances of fine performance are combined with the virtuosity and flexible memory of a computer to achieve the stark emotional impact of "Requiem."

Sound, it is true, is all about us—to inform, relax, stimulate, harm, or annoy. In recent years, unwanted urban and industrial sound has created an ecological problem which can reduce our quality of life. Noise created by construction, manufacturing, power machinery, aircraft, traffic, home appliances, recreation equipment, rock and roll bands, and firearms can disturb sleep, disrupt communication, reduce creativity, induce tension and nervousness, impair hearing, or merely cause annoyance. Two sessions will analyze major environmental noise sources in the community and review the technology that can be used to control the environmental pollutant. In this connection noise standards and problems associated with the management of noise abatement will be covered.

The symposium will conclude with two sessions dealing with the teaching of sound in its relation to music. One session will consider the general problem of education in acoustics for undergraduate and graduate students, particularly those concentrating on music or speech. The session will be followed by an interdisciplinary panel discussion with panelists representing college and secondary schools, musicians and acousticians, as well as listeners old and young.

RAYMOND J. SEEGER
American Association for the Advancement of Science, Washington, D.C.

Speakers and Topics

27 December (afternoon)

Acoustics of Orchestral Musical Instruments

Arranged by Arthur H. Benade (Case Western Reserve University).

Daniel W. Martin (D. H. Baldwin Co., Cincinnati), *Acoustical Research on Keyboard Musical Instruments.*

Carleen M. Hutchins (Catgut Acoustical Society, Montclair, New Jersey).

Arthur H. Benade, *Physics of Wind Instrument Tone and Response.*

Arend Bouhuys (Yale University Lung Research Center), *Performance Limitations Imposed by the Human Body.*

28 December (morning)

Musical Perception

Arranged by W. Dixon Ward (University of Minnesota).

William Poland (Ohio State University), *The Perception of Sound as Music.*

Arthur H. Benade, *Relation of Musical Instrument Spectra to Timbre and Useful Loudness.*

Paul C. Boomsliter (State University of New York, Albany) and Warren Creel (Albany Medical College), *Toward a Theory of Melody.*

Albert S. Bregman (McGill University), *On the Perception of Sequences of Tones.*

Norman Cazden (University of Maine), *The Systemic Reference of Musical Consonance Response.*

28 December (afternoon)

Architectural Acoustics

Arranged by Robert S. Shankland (Case Western Reserve University).

Theodore J. Schultz (Bolt Beranek and Newman, Inc., Cambridge, Massachusetts), *Modern Acoustical Designs for Concert Halls and Theaters.*

George C. Ozenour (Yale University), *Design of Auditoria for Multiple Use.*

C. P. Boner (C. P. Boner and Associates, Austin, Texas), *Large Halls and the Developing Role of Electroacoustics.*

Robert S. Shankland, *Acoustics of Great Historical Buildings and Their Relationship to Modern Designs.*

29 December (morning)

Environmental Noise and Its Control

Arranged by Ronald L. Bannister (Westinghouse Electric Corp., Lester, Pennsylvania).

Environmental Noise: Joseph F. Pizzirusso (Scott Paper Company, Eddystone, Pennsylvania), chairman.

Laymon N. Miller (Bolt Beranek and Newman, Inc.), *Human Response to Noise.*

Alexander Cohen (National Institute for Occupational Safety and Health, U.S. Public Health Service, Cincinnati), *Industrial Noise and Its Effect on Hearing.*

Paul Borsky (Noise Research School of Public Health, Columbia University), *Effects of Noise in the Community.*

Theodore J. Schultz, *Community Noise Ordinances in the United States and Europe.*

James H. Botsford (Bethlehem Steel Corp., Bethlehem, Pa.), *Proposed American Standard for Community Noise.*

Clifford R. Bragdon (Georgia Institute of Technology, Atlanta), *Community Noise Management: A Social Evaluation.*

James J. Kaufman (Dully, Marks, Corbett, Tanenbaum, Reifsteck, and Potter, Attorneys and Counselors at Law, Rochester, New York), *Legal Aspects of Noise.*

29 December (afternoon)

Environmental Noise Control: Rocco A. DiTaranto (PMC Colleges, Chester, Pennsylvania), chairman.

Harvey H. Hubbard (NASA Langley Research Center), *Generation and Control of Aircraft Noise and Sonic Boom.*

William N. Scott (Chrysler Corporation, Detroit), *Vehicular Noise.*

Grant S. Anderson (Bolt Beranek and Newman, Inc.), *Urban Highway Planning for Minimum Noise.*

George E. Winzer (U.S. Department of Housing and Urban Development), *Design of Noise Control in Housing.*

William W. Lang (International Business Machines Corp., Poughkeepsie), *Product Noise and Its Control.*

George M. Diehl (Ingersoll-Rand Co., Phillipsburg, New Jersey), *Noise Control of Construction Equipment.*

Paul B. Ostergaard (Ostergaard Associates, West Caldwell, New Jersey), *Can Industrial Plants be Adequately Quieted?*

29 December (afternoon)

Computers and Music

Arranged by Max V. Mathews (Bell Telephone Laboratories, Murray Hill, New Jersey).

Lejaren Hiller (State University of New York, Buffalo), *Composition and Analysis of Music by Computer.*

Jean-Claude Risset (University of Paris, Orsay, France), *Direct Digital Synthesis of Music and Sounds and Catalogue of Computer Synthesized Sounds.*

F. Richard Moore (Bell Telephone Laboratories), *Computer-Controlled Analog Synthesizers.*

Max V. Mathews, *The Future of Computer and Electronic Music.*

30 December (morning)

Education in Acoustics

Arranged by Mary L. Harbold (Temple University).

R. Bruce Lindsay (Brown University), *The Science of Acoustics.*

Eugene Watson (Pennsylvania State University), *Musical Acoustics as a Motivating Force in Scientific Research and Education.*

William J. Strong (Brigham Young University), *A Course in Descriptive Acoustics for Music and Speech Students.*

John C. Johnson (Pennsylvania State University), *Education in Acoustics: Status and Need.*

30 December (afternoon)

Panel discussion arranged by Joseph F. Pizzirusso.

Panel members: Richard Winchester (Children's Hospital of Philadelphia), Louis G. Wersen (Philadelphia Board of Education), R. Bruce Lindsay, Raymond J. Seeger (AAAS), David E. Connor (David Connor Architect and Associates, Philadelphia), and Herbert Silverstein (University of Pennsylvania).

27 December

Science and the Humanities

In his essay entitled "Science and Humanism," Erwin Schrödinger warned of the dangers inherent in specialization and in the isolated knowledge obtained by specialists. Moving further into the topic, Schrödinger reminded us of Ortega y Gasset's words about the specialist in science: "He is a person who, of all things that a truly educated person ought to know of, is familiar only with one particular science, nay even of this science only that small portion is known to him in which he himself is engaged in research." He continued with the strong advice: "Never lose sight of the role your particular subject has within the great performance of the tragicomedy of human life; keep in touch with life—not so much with practical life as with the ideal background of life, which is ever so much more important; and, *Keep, life in touch with you* [Schrödinger's italics]. If you cannot—in the long run—tell everyone what you have been doing, your doing has been worthless."

Our educational programs in the sciences and the humanities have paid scant attention to these admonitions. In an era when specialization is far more extensive than in the periods of y Gasset or Schrödinger, many students graduate from college insensitive to the role of their disciplines in the synthesis of new understanding for man. Our undergraduate courses in the sciences frequently succumb to the increasing pressures of preparing students to qualify for graduate programs while smothering any vestige of appreciation for the creative insights and elementary philosophical implications of such matters as quantum mechanics, relativity, evolution, or the Debye-Hückel theory. On the other hand, in the humanities, presumably concerned with "who we are," students pursue a dispassionate gathering of knowledge while shunning the personal and social implications of what they learn. Like the scientist, the historian does not speak to the philosopher; the student of literature speaks rarely to the musician. Moreover, the humanities student's ignorance of the impact of science is often monumental. He frequently exhibits childlike faith in the potential of science to "save man."

In view of these developments, this symposium will deal with attempts by several individuals to encourage meaningful exchange between faculty and students in the sciences with those in the humanities. The scope of these efforts varies and spans programs designed to heighten awareness for the scientific basis of environmental concern, develop relationships between science and nonrepresentational art, examine literary and scientific responses to great scientific theories, and deal with the relative merits of science and the humanities in their attempts to understand the human condition.

At North Carolina State University (Raleigh), Henry A. Bent encourages students to seek some of the common goals of science and art. In a program entitled "Chemistry and Nonrepresentational Art," he seeks to make visible selected features of reality. In courses designed for students who are not science majors, Bent attempts to connect the sociological, political, economic, and religious attitudes in our society with the ecological facts of life as science now understands them.

At Westminister College in Pennsylvania, Frederick D. Horn (English) and Robert P. DeSieno (chemistry) collaborate in the design of courses that bring students from the humanities together with those from the sciences, to re-