who became interested in speech communication, I have recognized that this kind of quantitative background in acoustics is an important requirement for developing models of how humans produce speech, how they perceive and understand speech, and how children acquire these skills. Speech production involves sound sources produced by a nonlinear mechanical system and by noise arising from turbulent airflow. Sound is propagated in a vocal tract with yielding walls, and acoustic coupling is introduced by lossy resonators attached to the vocal tract, including the trachea and the nasal cavity. These acoustic principles of sound generation create an inventory of sound types that give rise to distinctive responses in the ears and brains of listeners. The solid grounding in acoustics provided by Dick Bolt and his leadership have helped in the formation of this linkage between acoustics, speech physiology, linguistics, and human perception.

10:35

3aAA5. Richard H. Bolt—Mentor and colleague. Ewart A. Wetherill (Shen, Milsom & Wilke/Paoletti, 649 Mission, San Francisco, CA 94105, rwetherill@sf.smwinc.com)

Of his many accomplishments in acoustics, perhaps one of Richard H. Bolt's greatest legacies will prove to be his contribution, both directly and through his teaching, to everyday hearing conditions in buildings. In a discipline that attempts to bridge the technical and cultural gap between a pure science and the pragmatic and often-haphazard process of building design, he combined a deep understanding of both professions with an ability to communicate complex ideas that is reminiscent of Wallace Clement Sabine. His welcoming enthusiasm and humility enabled him to attract and to work well with people of complementary talents, in both theoretical research and the gritty details of a consulting practice, as well as to envision the potential of still-unexplored subjects. A logical outcome of this combination was the profoundly influential technical group known as BBN, whose pioneering integration of acoustics with building technology is echoed by many consulting groups throughout the world.

11:00–11:40

Panel Discussion

WEDNESDAY MORNING, 30 APRIL 2003 ROOM 201, 7:55 A.M. TO 12:05 P.M.

Session 3aAO

Acoustical Oceanography, Animal Bioaoustics and Underwater Acoustics: Bioacoustic Resonance Spectroscopy

Orest I. Diachok, Chair

Naval Research Laboratory, Code 7420, 4555 Overlook Avenue Southwest, Washington, D.C. 20375-0002

Chair's Introduction—7:55

Invited Papers

8:00

3aAO1. Acoustic swimbladder resonance spectroscopy: Fundamentals in scattering theory. David T. I. Francis (Dept. of Electron., Elec. and Computer Eng., Univ. of Birmingham, Birmingham B15 2TT, UK) and Kenneth G. Foote (Woods Hole Oceanogr. Inst., Woods Hole, MA 02543)

A history of the physics of acoustic resonance is given. The primary, low-frequency, resonant scattering model for air bubbles in water [Minnaert (1933)] is reviewed. Subsequent applications to swimbladdered fish, including models by Andreeva (1964), Love (1978), and Feuillade and Nero (1998), among others, are developed. Reference is made to exemplary measurements of backscattering by Holliday (1972) and Loevik and Hovem (1979), and of forward scattering, or absorption, by Weston (1967) and Diachok (2000), among others. High-frequency resonances are also described, with presentation of both analytical and numerical results for the immersed air bubble. Comparison of these validates the numerical, boundary-element method (BEM). The BEM allows high-frequency resonances to be studied for swimbladders of realistic shapes under pressure and for typical wave-number-swimbladder length products of order 10–40. Implications of high-frequency swimbladder resonance for auditory function in fish are mentioned. [Work supported by ONR.]

9:00

3aAO2. High-frequency acoustic scattering from gas-bearing zooplankton. Andone C. Lavery, Timothy K. Stanton, Peter H. Wiebe (Woods Hole Oceanogr. Inst., Woods Hole, MA 02543), Mark C. Benfield (Louisiana State Univ., Baton Rouge, LA 70803), and Charles H. Greene (Cornell Univ., Ithaca, NY 14853)

High-frequency acoustic scattering is well-suited to the synoptic investigation of marine organisms that inhabit the water-column, such as zooplankton and fish. However, the scattering characteristics of the organisms can be highly complex, and one must look for ways to distinguish one type of organism from another when interpreting the received echoes. From an acoustic scattering perspective,