More Than You Wanted to Know about Sound Fields

Testing in the sound field has been a part of audiology for more than 60 years. As early as 1944, Ray Carhart began to evaluate hearing aids on World War II veterans by seating them in a sound-treated room and delivering speech and noise signals via a single loudspeaker. In those days, there was only the body aid. Since it was ordinarily carried either in the shirt pocket or in a harness under the blouse or dress, no one was quite sure where to put it during the testing. Carhart’s solution was to mount it above the veteran’s head on a piece of acoustic tile serving as a baffle board.

Today everything is a bit more sophisticated. We have multiple loudspeakers to simulate signals coming from different directions, and the aids are mounted in or over the ears where they are actually located in real-life listening. And we have come a long way in the development of more elegant test procedures than the venerable 50-word PB lists delivered by live voice. Finally, the evaluative process has evolved from a comparison among different brands of aid to an assessment of signal-processing strategies and methods. But throughout this half century of development we have, as a field, paid little attention to one of the most critical elements in the equation, the sound field itself. We all know that the walls of the room should be more or less absorptive, but that is, typically, about the limit of our understanding and concern.

In this issue of JAAA, two papers provide much-needed tutorials on this important topic. In the first, Robert Ghent, of Sonic Innovations in Salt Lake City, explores the fundamentals of soundfield characteristics in enclosed spaces. Based on strict definitions of idealized acoustic spaces, he explores the interactions between practical sound fields and the enclosures that contain them. Then he applies complex soundfield theory to audiometric test rooms and considers the inherent limitations that must be addressed in actual test chambers.

In the second paper on this topic, Michael Nilsson, Robert Ghent, and Victor Bray, of Sonic Innovations, and Richard Harris, of Brigham Young University, describe the development and evaluation of a new test environment specifically designed to measure performance differences among different hearing aid signal-processing features.

These two papers remind us that, as we develop ever more sophisticated signal-processing algorithms, we must ensure that the adequacy of the testing environment keeps pace with the evolution of new testing methods and procedures.

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