

REVISITING THE PERENNIAL QUESTION

What is the “best” hearing aid

Here's what you've been waiting for. You've asked again and again: "What is the Best Hearing Aid?" We all want a *Consumer Reports*-type comparison. Here is the word from a world-renowned audiologist. You can bank on Mark Ross' answer.

By Mark Ross



DIRECTIONAL MICROPHONES

COMPRESSION AMPLIFICATION

FEEDBACK MANAGEMENT

NOISE REDUCTION CIRCUITS

MULTI-BAND AMPLIFICATION

MULTIPLE MEMORIES

SPEECH-TO-NOISE RATIO

REDUCE ACOUSTIC SQUEAL

CONTROL BACKGROUND SOUNDS

DIRECTIONALITY INDEX

FREQUENCY RESOLUTION

TEMPORAL RESOLUTION



This is a question that I've been asked ever since I became an audiologist. When faced with two or more devices that ostensibly do the same thing, it is reasonable for somebody to wonder if one would produce better results than the others.

If this comparison is made with other kinds of devices, and we see from the many examples in *Consumer Reports* that indeed it does, why then shouldn't this same logic apply to hearing aids? Well, as a matter of fact, in the early days of audiology, it did. In those days, the common practice (the "Carhart method") was to compare a person's performance with three or four pre-selected aids and recommend the one for which the person obtained the highest speech discrimination scores. The one that achieved this status was considered "best" for that particular person.

The method had the kind of face validity that appealed to clients and professionals alike and it was practiced until well into the 1980s. However, we should recall that at this time hearing aids were generally simple amplification devices, certainly compared to what is available nowadays. In such instances, one could directly compare the performance of hearing aids, since relatively few electroacoustic variables were involved.

Even though the procedure seemed to make sense, in the way it was practiced the actual results proved to be unreliable and too time-consuming. In its time, the Carhart method generated literally hundreds of research articles, in a constant search to perfect it, until it finally died a natural death at about the same time digital hearing aids (and some advanced analog ones as well) were being introduced.

The Essential Point

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Manufacturers spend a lot of money with their marketing appeals to develop brand recognition and loyalty, and they do this for understandable economic reasons. But we should keep in mind that all hearing aids serve the same purpose; they all respond to input acoustic signals and deliver amplified output sounds into the ear canal. It is what the device does between these two stages, and how well it accommodates a person's unique communication needs that should be the essential question, not the brand name of the hearing aid.

The major dimensions of amplification can be adjusted in most, if not all, modern digital hearing aids; every major manufacturer makes hearing aids that can be programmed to meet "prescribed" amplification targets. Right now, several such prescriptions are generally recognized as optimal, at least during the initial selection process. By virtue of meeting these prescriptions, it can be assumed that all of these aids would be functioning in similar fashion.

Where differences will occur is the skill with which the audiologist responds to a user's listening experiences in determining desirable modifications of the basic prescription and in their ability and willingness to accomplish this goal. In addition, the existence of numerous special features included in modern hearing aids complicates still further attempts to find just the "right" one for a person.

Major Common Features

Though they may be labeled differently, all the leading manufacturers make available in some fashion all of the major special

features that have been developed in recent years (e.g., directional microphones, compression amplification, feedback management, noise reduction circuits, multi-band amplification, multiple memories, etc.). I say "in some fashion" because these features may be implemented and labeled somewhat differently by the various manufacturers. While all may express the same basic intention in describing a specific feature (e.g., to improve speech-to-noise ratio, reduce acoustic squeal, or control background sounds), they often go about it differently and accomplish their goals with different degrees of effectiveness. But, and this is the central point, it is difficult to ascribe consistent and significant superior listening performance to the totality of the features of any one manufacturer's hearing aids compared to another's.

For example, the evidence may indicate that a particular feature in one brand may be more effective than another's (e.g., noise reduction or directionality index), but less effective with a different feature (e.g., feedback suppression).

Which aid would be the best overall (and here I am referring to improvements in speech perception, the reason people acquire hearing aids in the first place)?

Would the superiority of one feature in a hearing aid offset the somewhat poorer performance of a different one? We don't know. To complicate matters still more, in considering any specific feature, the reality is that newer ones are being introduced each year, while existing ones may be upgraded or somehow modified.

Automation

More and more it seems the question of the best hearing aid (or amplification pattern) is being defined by the inclusion of the various features that are included in an aid. From what I can see, however, the advantages generally ascribed to these new features mainly refer to improved "automaticity," where the aid makes decisions regarding specific settings

continued on page 10

The Hearing Healthcare Team

Audiologists

Audiologists are highly educated (with master's and doctoral degrees), healthcare professionals qualified to do a thorough evaluation of your hearing. The audiologist can determine the type and degree of hearing loss and whether or not you can be helped by hearing aids and, if so, what type of hearing aid would be best for you. Based on the results of a professional evaluation, the audiologist will recommend a treatment program to assist you with your communication needs and may recommend a medical evaluation, when indicated.

Ear Specialist (Ear, Nose and Throat Physician-Otolaryngologist, Otoligist, ENT)

Otolaryngology (pronounced oh/toe/lair/in/goll/oh/jee) is the oldest medical specialty in the United States. Otolaryngologists are physicians trained in the medical and surgical management and treatment of patients with health issues of the ear, nose, throat (ENT), and related structures of the head and neck. They are commonly referred to as ENT physicians.

Hearing Aid Specialists

Hearing aid specialists assess hearing and select, fit and dispense hearing aids. They provide instruction in the use and care of hearing aids and related devices to enhance communication. The nationally accepted credential for hearing aid specialists is board certification by the National Board for Certification in Hearing Instrument Sciences.(BC-HIS.) Hearing aid specialists are licensed or registered in all states.

What is the "Best" Hearing Aid? *continued from page 9*

(volume control, noise settings, etc.) and not necessarily in speech perception abilities.

But, even given that a particular hearing aid, incorporating certain features, is preferred objectively and subjectively by some individual, this does not mean that the same positive result will be obtained by another person. This is an important caveat and one that generally applies, in spite of all the glowing testimonials offered in support of a specific product, and no matter how heartfelt and how applicable the testimony may be for a particular person.

About all we can say that people with hearing losses have in common is that they all have some sort of hearing loss. I don't intend to be facetious, but sometimes we seem to overlook this basic fact. In reality, it is not just a question of someone falling into the generic category of "hearing loss," but the type, nature, and severity of the auditory disorder displayed by that specific person. This will have major implications in determining what kind of hearing aid the individual should use and how well he or she does with it.

We're all somewhat familiar with the basic dimensions of a hearing loss, as visualized in an audiogram. From this chart, we can see how much of a hearing loss a person has across the frequency (pitch) range. The pattern displayed by an audiogram can vary considerably between people, with probable significant behavioral implications for the larger variations. Generally, for example, a person with a severe high-frequency hearing loss will not function in the aided condition as well as someone with a moderate flat hearing loss (equal hearing loss at the different frequencies).

In other words, the same hearing aid will not result in equal performance for these two people. This occurs because the upper limit of possible performance is set by the nature of the auditory disorder and not by the hearing aids; because people differ in the severity and

nature of their hearing loss, so will their aided performance.

Individual Results Differ

As crucial as it is, however, the information provided by an audiogram offers us only the most superficial information about other aspects of an auditory disorder. Two people with exactly the same audiogram may, and often do, demonstrate completely different listening performance in other auditory tasks, such as their loudness discomfort thresholds and speech comprehension in noise.

For example, one such person may find the limits of acceptable loudness to be 80 dB, while the other person with a similar audiogram finds that sounds of 100 dB are easily tolerable. These different tolerance limits will certainly affect how a hearing aid is fitted and how successfully a person performs with it. Such individuals may also differ in how well they understand speech in the presence of noise, though there may be little difference in their speech perception scores in a quiet environment.

In other words, auditory disorders and their observable consequences encompass more than what is displayed on the audiogram. These would include, among a number of psychoacoustic factors, the ability to detect small time differences within and between speech sounds (temporal resolution) as well as their ability to separate out the individual components in a complex sound (frequency resolution).

Individual differences in these and other psychoacoustic dimensions help explain why hearing aid users with the same audiogram and the same hearing aid may perform differently.

Is There a Best Hearing Aid?

But the question still remains; given the nature of some specific individual's auditory disorder, is there a best hearing aid (or amplification pattern) for that particular person?

Certainly, we know from the experiences garnered by consumers and professionals over the years, people do perform better, or worse, with one amplification system over another. But is the hearing aid a particular person is now wearing, or contemplating purchasing, the absolute best for that person?

I don't know and furthermore I don't think the question is answerable at this time for this reason: we have no way now of determining what a person's potential speech perception capabilities are to which we can compare his or her actual performance.

How do we know when we've reached the best possible performance? There is no equation that can predict the highest score a person is capable of. Further, given the awesome flexibility now incorporated in modern hearing aids is it possible that the consumer would do somewhat better if one or more of the hearing aid's electroacoustic dimensions were varied in some fashion? I'd say the possibility exists, but there is no way at present that we can be certain.

Mark's Advice

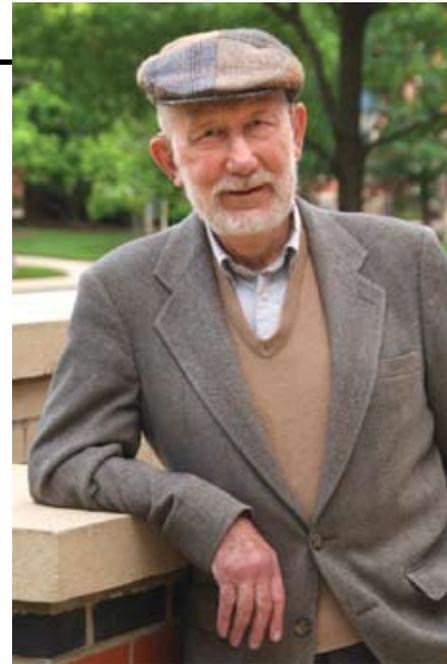
It seems to me that rather than focus on the best hearing aid, potential hearing aid purchasers could more fruitfully spend their time and energy looking for the right audiologist or hearing aid specialist, one who is competent, caring, and conscientious. This is the person whose job it is to select the best possible amplification system for a hearing aid user, one who can maneuver between the myriad possibilities now offered by modern hearing aids.

Such a person will not only keep up with new hearing aid developments, but will also consider and respond to the totality of a client's communication problems. The hearing aids recommended by these professionals should ensure that their client's performance falls into the best possible "zone" of performance, one consistent with the person's hearing loss, the audiologist's personal experiences and the research evidence. The inclusion of any special

On the Cover

Mark Ross, Ph.D., could easily be called "The Father of Audiology." Or as he says in reply to that, "Maybe the grandfather." Mark's writings in *Hearing Loss Magazine* have been a key element of this publication. He writes under the auspices of a grant awarded from the Department of Education to review ongoing developments in hearing aids and other hearing assistive technologies, with a particular emphasis on reviewing clinical research studies for the benefit of consumers. He also updates consumers on the research being conducted by the RERC researchers. *Hearing Loss Magazine* is fortunate to be a recipient of his writings from this grant. HLAA is also part of the grant as a lead facilitator on technology training across the country for consumers with hearing loss.

A staunch proponent of amplification and aural rehabilitation, Mark has received numerous industry awards for his work. Most recently, he received a Lifetime Achievement Award from the Hearing Loss Association of America for his work as both an audiologist and as a consumer who understands deeply the issues of people who wear hearing aids. Mark has worn hearing aids since the 1950s and received a cochlear implant last year. ■■■■



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(and expensive) feature will have to be judged by the likelihood of a positive cost/benefit ratio for the hearing aid user. This, too, is part of the audiologist's responsibilities.

So now how do we find this professional paragon? I don't have a specific answer to that question either; I wish I did. The experiences of other hearing aid users are one major source, as are the recommendations from other professionals (otologists, etc.).

A good place to start would be looking at the professional members of HLAA. You can find one by clicking on the "Finding Your Hearing Healthcare Professional" box on the opening page of the HLAA website (www.hearingloss.org). Obviously, I can't vouch for the technical proficiency of any of the audiologists on the list, but I can say that their membership in HLAA suggests a consumer orientation that would put them on my personal short list. Someone, in other words, who functions more like a professional

and less like a salesperson. One who recognizes that the implications of a hearing loss can be pervasive and profound and that the search for the best hearing aid should ideally be viewed as just one step, albeit a crucial one, in the effective overall management of a hearing loss. ■■■■

Mark Ross, Ph.D., is an audiologist and associate at the Rehabilitation Engineering Research Center (RERC) at Gallaudet University. He was awarded the HLAA Lifetime Achievement Award in June 2008. He and his wife, Helen, live in Storrs, Connecticut. To find more Dr. Ross articles on technology for consumers, go to www.hearingresearch.org.

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