20Q: What is Old is New Again - Why Hearing Loops are Back to Stay

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From the desk of Gus Mueller

If you’re an audiologist fitting hearing aids, it’s always fun to talk about new features and technology when you get together with colleagues. Which company’s noise reduction algorithm does the best job? Is there really an improvement in speech understanding? Do some adaptive directional products work better than others? How much added stable gain are you getting with your patients when you activate the automatic feedback reduction? And of course, there is always that lengthy discussion regarding the latest in telecoils. Telecoils? Okay, maybe not so much.

It’s ironic and somewhat unfortunate that the special feature that has the potential to provide the most benefit for many patients is one that often receives the least attention. In fact, it’s entirely possible that the same audiologists who are concerned about the best DNR, directionally and feedback reduction systems might not even include telecoils in the majority of hearing aids that they dispense.

The “potential benefit” I’m referring to is the use of telecoils with hearing loops. These loops could be installed somewhere as simple as the patient’s living room, or made available in public listening locations like banks, hospitals, airports, auditoriums, places of worship and taxis. The list could go on and on (and maybe some day it will). All the patient needs is telecoils in his or her hearing aids. For a variety of reasons, the U.S. is far behind many other countries in the use of hearing loops. But hopefully that is changing. One person who is making it change, room by room, in her part of the world is this month’s 20Q guest author.

Juliëtte Sterkens, Au.D. has a private practice in Oshkosh, Wisconsin, and serves on the HLAA/AAA Hearing Loop Task Force. Because of her continued efforts for hearing loop advocacy on a local, state and national level, she has received numerous awards including the Wisconsin Audiologist of the Year, and the prestigious Larry Mauldin Award. I was struck by Dr. Sterkens’ enthusiasm and dedication regarding “Looping America” (or at least most of Wisconsin), so I asked her to describe how she got started in this area of audiology. Here is her reply:

I moved to Wisconsin from the Netherlands where hearing loops were already in use in the school for the deaf and the hard of hearing where I did some of my student teaching. In October, 2008, sitting in the back row of a session at the Wisconsin HLAA meeting, I heard David Myers give a presentation about the success of hearing loops in places like Holland and western Michigan, where over 400 hearing loops have been installed. As probably the only audiologist in the room, I realized that I could be the person to bring these loops to Wisconsin. My engineer husband Max, who deserves much of the credit, offered to retire and become a hearing loop installer. We are proud that there are now over 12 trained hearing loop installers in the state, and the A/V companies are now routinely recommending hearing loops for auditoriums, meeting rooms, churches and libraries.
During our first hearing loop dedication my husband and I sat tense and excited in the back of the church. One of my severely hearing impaired patients looked back at me and I nodded that he should switch his power BTE to T, which he did. He then spoke in a loud booming voice (he just turned off his mic so he could no longer hear and monitor his own voice): “Wow, I can really hear now”, and turned around and gave us a big thumbs up sign.

I suspect that Dr. Sterkens has gotten the “thumbs up” sign from many others, as her work has led to close to 100 hearing loop installations in her community and other areas of Wisconsin, a number she hopes to double by the end of 2012. Perhaps after reading her excellent article, you’ll want to set a similar goal in your area.

Gus Mueller
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1. I keep hearing more and more about these things called hearing loops. What exactly is a hearing loop?

Hearing loops are large area listening systems that broadcast sound from a microphone wirelessly to hearing aids. The hearing aids need only to have a telecoil, which acts as the receiver for the magnetic signal from a wire that encircles (hence the name hearing loop) anything from a small ticket window area or TV room to a large auditorium or worship place. The hearing loop, combined with the telecoil receiver turn any hearing aid into a small ear-worn speaker for the acoustic system, which nearly always results in a significantly improved signal-to-noise ratio (SNR). Importantly, this benefit is attainable in the very listening situations that we all know can be problematic for hearing aid users.

2. But I already fit most all my patients with directional microphone technology. Doesn’t that do about the same thing?

Not at all. I recommend directional microphone technology for my patients too, but compared to a loop, the SNR improvement with directional hearing aids is actually quite small. Even with an excellent directional microphone system, your patients probably won’t obtain much more than a 3-4 dB SNR improvement in a typical real-world listening situation. And to achieve this, the patient has to be positioned correctly. The benefit will be less if the talker of interest is farther away, if there is increased reverberation, etc. In contrast, consider that the SNR improvement from a loop/telecoil might be anywhere from 10 to 25 dB. Previous research has demonstrated the SNR enhancement by FM with neckloop systems that use the T-coil. The associated SNR improvement has been dramatic (Fabry, 2010; Lewis, Crandell, Valente & Horn, 2004; Luetzen, 2007). Hearing loops, much like FM, help to “bridge” the distance between the talker and the listener. In addition to the supporting research, sometimes “hearing is believing.” There is a pretty impressive demo of how all this works at the hearingloop.org web site. Just click here and listen for yourself.

3. You’re right, I just listened and that is impressive. But isn’t all this “old technology?”

Yes, the basic principles are old, but that doesn’t reduce the benefit. Like electronic computers, magnetic induction loop technology began some 70 years ago. It is now available, however, in newly developed forms (with new amplifier and telecoil technologies, and new computer-modeled designs for complex installations). Moreover,
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we also are seeing many new and innovative applications.

4. What do you mean by “new applications?”

There are many examples. Hearing loops in much of Europe and now increasingly in some areas of the US can be found in trains, taxi-cabs, ticket windows, cathedrals, airports, and even in a 14,000 seat basketball stadium in Michigan. Also, thanks to modern digital hearing aids with easy to access multiple memories, a separate memory can now be devoted to a telecoil setting in most instruments. Of course, the hearing aid must first have a telecoil, which in the past has been a problem, but this also is changing. According to recent statistics (Myers, 2010) over 60% of all instruments dispensed in this country come equipped with a telecoil, including some of the mini models, so that is good news, or at the least improving news, for our hearing aid patients.

5. But what about all the new wireless connective technologies in hearing aids. Don’t they work better?

New wireless technologies, including Bluetooth, do some helpful things, such as enable bilateral phone listening and broadcast music or signals from the TV or wirelessly to hearing aids. But, Bluetooth isn’t an assistive listening answer. It requires significant battery power and has limited range. Should an alternative assistive listening solution that is directly hearing aid compatible come along, it would need to satisfy many requirements. For example, it must be: a) inexpensive, with essentially little or no cost to the consumer, b) capable of covering a wide listening area, c) universally accessible; d) sufficiently miniaturized so that it can fit in nearly all hearing aids. In addition, it must have minimal, or at least acceptable battery drain (telecoils require no additional power) and be simple to use. Ideally, there should be no need to fuss with, pair with, or wear extra equipment. At most, the technology should only require the push of a button. The overall operation should be effective, whatever the venue . . . from a TV room to an airport gate area to a large auditorium. Hearing loops meet all these requirements!

6. That’s a lot of requirements! You’re building a strong case for using loops, but I’ve heard that your systems tend to have interference and pick up noise? Not true?

Mostly not true. And by the way, they are not my systems—I think your patients will quickly tell you that they are their systems! But to answer your question, yes on occasion there is some noise interference. Typically this magnetic noise interference is caused by a problem with the wiring or dimmer switches in a facility that should be corrected anyway. In any case, this is rare and usually solvable, and has to be addressed in the installation. I personally have been involved with over fifty installations, and can tell you that interference-free installation is almost always possible. Thousands of systems are functioning effectively in the UK, the Nordic countries, and in my home country the Netherlands. I know that there are many working very well in Western Michigan too!

7. I’ll put western Michigan on my vacation schedule! Is loop technology expensive?

It varies considerably depending what type of loop we are discussing. Costs range from $75 for a direct plug-in neckloop, $200-$300 for a home TV room loop or wireless (neck) loop device like the Sennheiser 830S or a WilliamsSound TV Talker, to $2500-$5000 for small-to-medium meeting areas. In the latter case, many times the wire can be installed underneath the floor in the dropped ceiling of the basement. Some installations require extensive carpet work or wire installations in the grout of the tile floor. This of course increases the expense. As you might guess, hearing loops are most easily installed during initial construction, remodeling or recarpeting.

8. Can most anyone install a hearing loop?

Although a TV hearing loop can be installed by a relatively handy person in an hour or two, a public hearing loop installation needs to meet a standard and the installer should have been trained in proper hearing loop installation. There are different kinds of loops available, and the complexity in installation does vary.
9. What do you mean “different kinds of loops?”

I’m not sure we need to go into all the details now, but here are some examples. In a small venue, like a small meeting or TV room a single wire wrapped or looped around the area may be adequate. As the venue gets larger a figure 8 configuration may be necessary. If there is a significant amount of metal in the structure a multiple loop or phased array may be necessary. These installations can be quite complex in order to meet the standard. A trained installer will be able to test the venue and determine what loop configuration is appropriate. The design of the loop pattern and the location of the loop wire is critical to meeting the IEC (International Electrotechnical Commission) standard. To be specific, it’s IEC standard 60118-4. Think of this IEC standard as something similar to the ANSI standards for audiometric testing. Induction loop systems that are used in Europe and in other parts of the world are required to meet this standard. This standard defines the strength of the magnetic field, a frequency response of 100-5000Hz, and the methods of measuring these requirements. It also specifies the maximum levels for electromagnetic background noise and requires that this background magnetic noise or interference is thus measured and addressed before a loop is installed.

10. Are hearing loop installers in the U.S. adopting the European standard?

No regulatory organization in the U.S. has set a standard but it only makes sense for U. S. installers to adopt a standard that would make their installations compatible with European hearing loops. Compliance with this standard allows the same hearing aid user to worship at Ione Abbey in Scotland, attend a basketball game at the at Michigan State University Breslin Center, enjoy a performance at the Opera House in Sydney, Australia or hear their granddaughter perform in a play at Alberta Kimball auditorium in Oshkosh, Wisconsin—all by merely switching their hearing aids to t-coil without ever having to make a volume adjustments!

11. Is there anything else audiologists should know about this IEC standard?

Yes, I should probably elaborate a little on how the magnetic signal relates to the telecoil measurements that you see on hearing aid manufacturer specification sheets. The standard sets the average signal level to 100mA/m with peaks up to 400mA/m. I know I am getting a bit technical here but bear with me. For reference, a 100mA/m magnetic signal is the equivalent of an acoustic signal of 70 dB SPL. This ties in with the telecoil response as observed on the ANSI spec sheets. The average hearing loop signal of 100mA/m should be perceived by the hearing aid as a 70 dB SPL acoustic sound input. In other words, the telecoil response in a loop should closely match the output of a hearing aid for a 70 dB SPL input.

12. So if the loop meets the standard, we can be fairly certain “all is well?”

That’s only part of it. We all know that the loop itself can be functioning perfectly, but some individuals may experience problems because of the function of their telecoil.

If the user has been properly fit with hearing aids that include telecoils that are vertically positioned, have appropriate gain and output for the key frequencies, and the telecoil Equivalent Test Loop Sensitivity or ETLS values that are 0 or greater, you can be assured that all will be well.

13. Wait, I don’t think I have ever heard of the ETLS value. Can you elaborate on this?

I would be happy to. It is important to know that for listening in a hearing loop it is best if the telecoil is located vertically in the hearing aid, but testing of the telecoil isn’t always conducted that way. The ANSI test 3.22 – 2003 specifies two telecoil tests; one in an optimal position for a magnetic telephone signal called the HFA-SPLITS test and the relative simulated equivalent telephone sensitivity (RSETS also known as STS in Europe); this is the test that is usually conducted and shown on the hearing aid spec sheet. The second measurement compares the reference-test gain to the telecoil gain in a vertical field called the HFA-SPLIV and this measure is important for this discussion. This latter measure establishes the relative ETLS when this response is subtracted from the Reference Gain Test values and compares how the telecoil and the
microphone responses differ. If the telecoil is vertically located, the RSETS and the ETLS values should match. By definition, an ETLS value of 0 establishes that the telecoil gain with 31.6mA/m input equals the output of a hearing aid in the microphone position with 60dB SPL input. If hearing aid manufacturers would provide this test, but would compare the 100mA/m input (you will recall this is the average hearing loop field strength I spoke of earlier) and 70dB SPL acoustic input it would be even easier yet to choose telecoils. Hélas, that last test is not in the ANSI specs at the moment, but the ANSI committee has been petitioned to change that.

14. Thanks for the explanation. Is there anything else I need to know about telecoil programming?

There is, as even if the ETLS is appropriate, programmability of the telecoil setting in the software is important, too, so that the gain of the telecoil and microphone can be increased or decreased relative to each other. Some of my patients ask me to decrease the microphone response in the MT setting; this allows them to hear voices close by but it reduces background noise pick up, or they require the telecoil setting linked to the frequency transposition processing in the hearing aid to improve speech perception. I like hearing aids that offer bilateral coordination so that the telecoils in both hearing aids can be activated at the touch of one button. I have also found that voice prompts can really be helpful for patients who have difficulty with cognitive issues or memory problems.

15. Any other tips on programming?

Depending on the degree of loss and the loop application (home use versus meeting room), I program a “telecoil only” program for those with open-canal fittings for situations where all they do is listen, and an MT setting for watching TV and talking with friends and family. That way, the hearing aid user can hear others talking in the same room (the strength for each setting can be adjusted in the programming). For patients with more severe losses, who typically have closed ear molds, I often offer two hearing loop programs: one that includes a blended MT program, and one for telecoil only. Some individuals may have a very specific listening situation, where their frequent companion always sits on one side or another (e.g., movie theater, meeting, church, bingo, etc.). In these cases, I’ve found it’s usually best to program “MT” on the “direct speech listening” side, and T-only on the opposite ear. This way the listener will hear less background noise.

16. You’ve been pretty convincing. How could I get more involved with “looping” in my daily practice?

In my practice, we familiarize each patient with the telecoil and the potential use of loops prior to ordering the hearing aids. Then, at the time of the hearing aid fittings, we offer a hearing loop handout that includes area hearing loop installations and instructions on how to switch hearing aids to the telecoil mode. We take a couple of minutes to demonstrate the loop that we have installed in our waiting room. If you don’t have a loop in your waiting room, that could be your first step! A sign in the waiting room, e.g., “Can’t hear the TV? Turn on your T-coil. Don’t know how? Just ask”, is helpful. As you might guess, this brings attention to loop technology in the waiting room for patients who come in for follow-up care. In my area, we have close to 50 hearing loops, so it’s common for new patients to come in referred by very satisfied hearing aid users and they often ask for this telecoil or “antennae” feature at the first visit.

17. How do you go about getting various local venues looped?

You probably want to start with the venues that you know best, where you have some contacts, and hopefully you’ll have success. A lot of my initial work was with churches and frequently my patients were the ones who brought the technology to the attention of church councils and ministers. You might want to work with service groups, government facilities, theaters, or libraries. Once hearing loop users have experienced loop technology and the significant hearing improvement, they are eager to share this information with family, friends and managers of venues.

18. What else can I do to bring attention to hearing loops?
It is easy to bring attention to hearing loops in communities by presenting a “Get in the Loop” lecture to service clubs, local HLAA chapters or senior centers. The Sertoma (SERvice TO MAnkind) organization has recently started the Sound Investment Campaign to improve access for the hard of hearing in the communities they serve. Articles in the newspaper or patient newsletter can be very effective, too.

19. Have you found that the news media and professional journals have been interested in hearing loop technology?

Very much so. Publications are aware of how the aging baby boomers are changing America’s demographics and boomers are more willing to speak up about hearing loss. They are looking for solutions that hearing loops can offer in large areas. There has certainly been interest in this “new” directly hearing aid-compatible assistive technology. There also has been considerable national attention: articles on hearing loops recently have appeared in Scientific American, on NPR radio, in the Chicago Tribune as a front page story, and in an article in Sound & Communications for audiovisual professionals (Myers & Sterkens, 2010). Dr. Pat Kricos, past president of the American Academy of Audiology and Brenda Battat, executive director of the Hearing Loss Association of America (HLAA) are chairing a joint “Get in the Hearing Loop” Task Force. This Task Force launched a campaign back in 2009 to encourage consumers, audiologists and other hearing professionals to "get in the loop" for hearing assistive technology, with a primary focus on hearing loops and telecoils, in order to improve accessibility for the 36 million Americans with hearing loss.

20. So maybe I should “get in the loop?”

Of course. Why not? I personally have attended over 40 hearing loop dedications to assist hearing aid users and to explain how the hearing loop works. I have learned that the difficulties that our patients report with understanding speech in places with reverberation and background noise are not exaggerated. I think we often underestimate how much trouble they have in these situations, or we see it as an effect of their hearing loss that they need to accept. An interesting sideline is that my involvement with looping has made it so much easier to counsel my patients. They now understand that in some places hearing aids are of limited benefit, and that is precisely where they need to activate their telecoils. It’s nice to be able to offer them a solution.

For more information

1) www.hearingloop.org/articles.htm contains a wealth of reference related to professional and public media articles pertaining to looping.

2) For practical handouts, talking points and a PowerPoint slide show for consumers, visit these links from the American Academy of Audiology.

3) The Sertoma organization’s A Sound Investment looping campaign contains general information about looping as well as ways to get involved with the campaign.

4) For a complete comparison of hearing loop vs. Bluetooth, please visit www.hearingloop.org. From the homepage, go to “Questions about Hearing Loops” and click the link under “Might Bluetooth be a more effective assistive listening technology?”. This will pull up a document that addresses this issue in detail.

References


**About the Author**

Dr. Juliëtte Sterkens, an audiologist in private practice since the 1980’s, has received the Wisconsin Audiologist of the Year, the Hearing Industry Larry Mauldin Award, HLAA National Technology Access Award and the HLAA-WI Humanitarian award for her hearing loop advocacy on a local, state and national level. She is reaching out to consumers, hearing care professionals, architects, A/V professionals, ministers and venues. She serves on the HLAA/AAA Hearing Loop Task Force. Her work has led to close to 100 hearing loop installations in her community and other areas of Wisconsin, a number she expects to double by the end of 2012.