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Evidence-based Technology: The Research Behind ReSound Sensia

Presenter: Megan Quilter, AuD

Hello, my name is Megan Quilter and I am from GN Hearing and the title of my talk today is Evidence Based. The Research behind ReSound Sensio. For good quality audio. I'm going to go ahead and turn off my camera and I'll turn that back on at the end for Q and A. I just want to go through some of our learning outcomes here to start. Number one, after this course, you will be able to describe at least two fundamental differences between traditional hearing aid signal processing and DNN-based signal processing approaches.

Number two, after this course, participants will be able to identify how DNN-based processing and directional signal processing can influence access to a target talker in complex speech environments. And number three, after this course, participants will be able to apply evidence from laboratory and clinical research to identify potential. I'm sorry, potential clinical implications of advanced DNN-based hearing aid processing for patients who experience difficulty communicating in complex listening environments. So those are our three outcomes today. Going through some limitations and risks.

Just take a moment there to read through some of that.

This course doesn't cover all possible risk factors, diagnostic methods or treatment options. And complex cases may require additional considerations. I thought that one was pretty important, so let's go ahead and move on. We've recently launched our newest product, ReSound Sensia, and this particular product is packed with research. For this course, I want to talk about the journey that got us to ReSound Sensio.

As you all know, hearing in noise remains the number one challenge that we have in this industry. And this has really stayed constant since from the moment I became an audiologist. Hearing in noise remains the number one challenge. So we definitely have our work cut out for us. In fact, if you look at the market Track data from 2025, you'll notice that 90% of people still struggle with conversations in a noisy background environment.

Of that 90% you can think of, 80% of them are actually challenged with conversations when there are more than people talking. And if you ask me, that's life. It's rare that we aren't surrounded by other people who are talking. So the 80% challenge in conversations with two or more, this has also been around and you also may think about the cocktail party problem with this particular scene. So again, we've got life is messy, life is dynamic, life is loud, and life is filled with people.

So we know that things are noisy and we want to make sure that our patients and our clients can hear the best that they can when they're out in these situations.

In spite of all of the market track data and in spite of those percentages, I think that we shouldn't really be discouraged, though we have made some significant progress with hearing in moderate levels of noise and also in very loud environments. That cocktail party effect is still very difficult, but we're making great strides to do there. I think the best way to start this presentation is to talk about our old hearing instrument, the ReSound Azure. This particular instrument was the instrument that started with asymmetrical directionality. Now, ReSound can't take full credit for the asymmetrical directionality idea.

This idea actually came out of Walter Reed Medical center from a gentleman, a researcher named Brian Walden. Now, Brian Walden, back in the day thought that veterans who were in directional programs were being too cut off from sound. They weren't able to kind of get a sense of what's happening around them because they're just too cut off.

Brian ended up thinking, what if you put omnidirectional on one hearing aid and you put directional on the other? That way you're kind of giving them the best of both worlds. Well, lo and behold, Brian decided to go out and do a really interesting study. He took more than 100 veterans, and he fit them with three programs. He fit them with program one of omnidirectional, program two with directionality, and program three with one of each omni on one side and directional on the other.

Now, he sent out over 100 vets with notebooks back in the day. They didn't obviously have that AI assistant. He sent them out with notebooks and asked them to make all the notes that they can and where they were in, what environment and what program they were in, and if they liked it.

The study went on, and at the end of it, they collected tons and tons of data and tons and tons and tons of notebooks. What they found was that in fact, a majority, over 80% of these veterans really, really appreciated having Omni on one side and directional on the other. But we also knew that there were times that people would come in and they could also sort of sense the difference between one side or the other. They could sense that it was turning on. And we wanted to make sure that that wasn't going to be the case.

Now, our head of research, Andrew Gipburner, back in the day, who is still our head of research, came back and said, we have to absolutely have this technology. This is fantastic. We have to do this for our hearing instruments. We have to incorporate this, but also need to pay close attention to making sure that this works correctly in the most natural sense possible.

That is when we leaned on and came out with our band split asymmetrical directionality. So that is where we have the low frequency staying in Omni and being able to kind of really preserve that good natural own voice. That's when we decided to have our band split with our ReSound Alera and our ReSound Live, our hearing instruments.

We then moved into ReSound Lynx and ReSound Verso. And this is where the industry and these products introduced the ear to ear communication. Now Ear to ear communication really opened a lot of doors for hearing instruments. Ear to ear communication essentially allowed us to have hearing aids talk to each other from talk to one side to the other. And we could also transfer sound from one side to the other.

So ear to ear communication was really a huge game changer. And that came with ReSound Linx and ReSound Verso.

Moving on into our ReSound Link squared, we have the ear to ear with spatial sense. This is where we've started to incorporate those facial preservation cues. Moving on down the line, we've got ReSound Lynx 3D and ReSound Quattro. Now there's a little known secret about hearing instruments. And when you have two hearing instruments on your ear, there's a little bit of a back shadow that gets slipped away or just doesn't get noticed.

It doesn't get amplified.

With the ear to ear communication opening up, we are now able with The ReSound Lynx 3D and ReSound Quattro to be able to fill in the space that shadow was at. Using that ear to ear communication we could use and we could fill in the amplification there. So we don't have that blind spot anymore. We don't have that, that shadow that allowed us to enhance our omnidirectionality. So if you have those people who are in Lynx 3D or those quattros and you're hard to get them, it's difficult to get them out.

That may be why.

And moving forward, this was also around 2020 and this is at the time of the pandemic. This is when we released ReSound 1, ReSound 1 also at the time released the Marie receiver. And this is where we also released a weighted 4 mic beamformer. Now, as you know, there's huge differences between 2 mic beamformers and 4 mic beamformers in terms of benefit for a mic beamformer. I believe the research is around 2 to 4 decibels of benefit there.

When you're moving into something of a more 4 mic beamformer that's where you're starting to see the 8 to 10 decibels, benefits and improvements. So we do see a huge difference between two mics and four mics in terms of beamformers. I don't want to turn this into a directionality study or a directionality talk, but we have some amazing information on the 2 versus 4 mics. Please check that out and if you need any of that, please let me know.

Next up, we have our ReSound Nexia and our ReSound Omnia. And this offered a 360 degree with 8.6 SNR benefit like we were just talking about. That brings us to a little bit more modern times, a little bit more up to date here. And that is where we have our ReSound Vivia. ReSound Vivia has been out for about a year, a little over a year, I believe, and ReSound Vivia is the instrument that introduced our DNN and our separate denoising chip.

Dnn, as we know, is the hot buzzword in the industry right now. And our ReSound Vivia product was the first to introduce our dnn. Our DNN works off a completely separate chip in this industry. We have two opportunities to get DNN so far, and we either have one chip or two chips. If you have one chip and you want to do dnn, then you're most likely carving out of your physical chip and overlaying that DNN chip there.

Although we decided not to do that, we wanted to go with a separate physical denoising chip. So we have a second chip. We have a unique stack method that we do in our hearing aids that allowed us to have a separate second chip but still remain the smallest AI hearing instrument on the market. So that is with ReSound Vivia. That's where we're at today until about two weeks ago when we introduced ReSound Sensio.

Let's jump into that.

Now. We know that there are some challenges and our original ReSound Vivia has our DNN placed in the second program.

There are a couple different things, though, that the hearing aid has to do and the reason why we kept that in program two. First off, we want to always empower the human to decide what to hear rather than having the hearing aid decide for them. We wanted the person to decide when they wanted to use that DNN and to go into program two. So we wanted to force the person to make that decision, not have the technology decide for them. The other challenge is we want to make sure that we're using the DNN and it's being used in the correct way.

In order to do this, we kind of have to go back to the basics. With classifying hearing instruments, there's definitely a challenge when we want to automate everything, and it requires a few things. First, you have to accurately classify the environment, and then you have to make sure that the features are being accurately activated. So in order for automation to happen, you really kind of have to start from the basic and you have to make sure that you're classifying things correctly. Another reason why we did not put our DNN in program one was because it is very aggressive.

We do employ our DNN with our beam former and we're the only manufacturer that does that. So the last thing that also is important is that we didn't necessarily put DNN in our first program because we were on the watch for the severe to profound population. And there's mixed evidence out there that shows benefit with DNN with this population. So we want eye on that as well. But nonetheless, given the challenges of making sure that program one is automated correctly, we definitely listened.

We listened to everyone out in the industry that came back and said quotes like this automatic denoising would be a game changer. I like the idea of your new technology always having DNN processing so the patient doesn't have to necessarily fiddle with making adjustments and such. So we knew that the industry wanted this and wanted DNN in the first program, but we needed to make sure

that we could automate this correctly, and we needed to make sure that we were doing it correctly. So let's talk about that for just a moment. We wanted to make sure that we went from automation to natural listening.

We want to make sure that everything we put out is as natural as possible for the listeners. So first, the automation had to be built around our success of listening strategies that we've built over the years. And these include three different listening modes. The three different listening modes are going to be spatial awareness, better ear advantage, and speech clarity and noise.

Now, let's take a look at this figure here.

This figure isn't necessarily looking at classifier accuracy. What this is looking at is how we support natural listening. If you look in the low frequencies here, you can kind of think of this as our band split. If you look in the low frequencies here, we've got Omni. Omni.

And this is going to be with that spatial cue preservation. This is allowing our patients to stay aware of your surroundings. So we've got Omni. Omni. In the lows, you can see as you kind of move more into Those mid frequencies.

This is where we introduce that better ear strategy. This is where we're letting the brain do the work. This is where we start to see a little bit more directionality come out. Whereas before in the lows we were in omni. Now when the environment gets much louder and things become way more complex, we go into speech intelligibility mode.

This is where we focus on the voices that matter around us. This is where you've got high environmental noise and this is where you're beam forming is going to kick in and you're going to benefit from that. So we need to preserve these three spatial, these three listening modes. And you can

probably guess which mode we've integrated the DNN in. So we've got spatial cue preservation.

Think omni and lows. We've got better ear strategies. And then in those high frequencies we've got that speech intelligibility mode. Spoiler alert. We've integrated our DNN into that speech intelligibility mode.

And you can probably guess that because that's where the environment is going to get much higher.

And that's where our patients are truly needing that extra, that extra help, that extra benefit.

Now we had to definitely consider our three listening modes, but we also wanted to make sure that the right noise reduction for every situation was happening. This brings us to our pnr. Our perceptual noise reduction is used for everyday listening. You can think of Noise Tracker 2, and this is phenomenal. This does its job day in and day out.

This is think of the daily living noise reduction. Now the biggest differences from going from a PNR to a dnn, excuse me, Is the Deep Neural Network is trained. It's trained to look for speech, whereas the PNR is also analyzing noise. The DNN is trained and always looking for speech. That is its job.

For even the toughest listening moments, that DNN is activated. It's in loud, complex environments and it is looking for speech. It's focusing on the speaker in front, so not just the loudest voice. And we do this and allow this by combining our 4 mic beamformer with our DNN. We've got two noise reductions going on.

We've got our PNR, our perceptual noise reduction. You can think of just regular daily life noise reduction. And then we have our DNN chip.

But remember we were talking about the veterans that came back and they could kind of hear a difference between omnidirectional on one side and directionality on the other. That tells us that we

need Absolute seamless natural transitions. And in order to have some seamless natural transitions, the best thing that we can lean on is our band split directionality. You can see here in the low frequencies where we keep our omnidirectionality. This is allowing the natural own voice to come through.

This is why you probably don't hear any of your patients coming in with complaints of my voice sounds like it's in a barrel. Now in those mid frequencies you can see this is where we start to apply our bilateral beam former. And this is going to maximize that snr. Now there's an adjustable mix directional mix between the low and the mids. And in those high frequencies we've kept and preserved that fixed directionality.

So this is going to allow better sound localization to those patients. Being able to keep omnidirectionality in the low frequencies is what allows us to have that seamless transition that allows us to go into that DNN and not have that be heard or be so jarring to the person. Because remember, we want to keep things as natural as possible. So we are leaning on our multi band split directionality in program one, working with our DNN in order to not have it to be so jarring. And for our patients, last thing we need to consider, and a huge consideration is that we need to have power that lasts all day, especially, well, not just for everyone, but especially in that severe to profound group.

We know that they rely on these instruments day in and day out. We need to have power that lasts all day. DNN is power hungry. There's only one more thing hungrier than DNN and that is classic Bluetooth. So we wanted to make sure that we have power that lasts all day, be able to have a rechargeable device and be able to keep things as small as possible.

We don't want to have any trade offs between performance and battery. And with that I'd like to introduce you to ReSound Sensio.

You ReSound Sensia brings a number of different things to the table. And the first feature I want to talk about is our new acoustic feature. It is our environmental plastifier. It's named Acoustic.

Now, any function with hearing aids that adapt or change according to the input that it's given is going to be considered automatic. Now such features can fundamentally they can be as basic as application of different amounts of gain for different input levels. Other features require a more complex analysis of the input that's given to the hearing instrument. Now an example of this might be classifying noise levels compared to signal levels in determining when to move in or between different directional modes. So all of these features rely on the concept of sound classification.

Now, sound classification, what it's doing is it's looking for patterns or different types of structures of signals at the input of the hearing aid and then it uses these to essentially detect patterns or structures to identify the source of those signals. So it's essentially classifying the environment. So the hearing aids environmental classifier is technically what determines the overall sound environment that the hearing aid user is actually in. So it's knowing where it's at in space. And it does this by using sound classification to essentially identify the source signals and their relationship with each other.

And then it dissounds on the sound environment.

It's essentially, like I said, it's the hearing aid knowing where it's at in space. And you're going to find that all modern hearing aids have some form of environmental classification. Environmental classification, it's really kind of doing two jobs. It's classifying the environment and it's engaging those features.

When you think about it, you really have to go back to the basics with this. It has to get it right from the beginning because if it doesn't, it can create a snow, snowball effect and you have no idea what that listener or what that user is going to be listening to at the end. Let's dive into acoustic a little bit more

here. We've got a ton of research out in this industry about, about environmental classification. In fact, there are several studies that have been done.

We've done some internal research and there's some external research as well floating around out there. My two colleagues, Jennifer Groff and Tao Chiu, had been studying environmental classification going back to 2017. They had done an experiment with hearing instruments and test boxes. And it's very, very simple. You essentially put the hearing aid in the test box, you introduce it to whatever signals you or different scenes that you're interested in.

And then you're basically running it for 24 hours and then comparing it against the data logging. My colleagues did that in 2017 and found that we were far more accurate than the other manufacturers that are out there. In fact, we were hovering around 90% accuracy. And we noticed with other manufacturers that they weren't even close to that. So that was a head scratching moment for us.

For just a moment we couldn't figure out necessarily what was actually going on. So we dove in a little bit deeper and started looking at environmental classification a little bit more specifically. Now, if there's anything that's Fantastic. That came out of this pandemic. In 2020, 2021, there was some research that was launched.

This came from a fantastic researcher. Her name is Anusha Yalamsetti, and I believe she's out of San Jose State still. She had done some research on environmental classification, looking at all manufacturers, and she also came up with some skewed results. Her hypothesis was that music may be skewing some of the environmental classification.

When we looked at this, it made great sense to us because. Because Roseanne personally does not. We don't classify music. So we believe that music is intentional and that when someone wants to go and listen to music, it is their intent. We don't believe that when people want to go out to dinner with

their friends and their family, and they walk into a restaurant and they sit down to dinner and there's some background noise of music, we don't consider that the intent of going out and listening to music intentionally.

We believe that's a scene where people are going out and they're in the presence of noise because they're going out to dinner and looking to have conversation. If you're looking for music, we want to make that very intentional. So therefore, we do not classify music in our automatic programs. Now, hearing instruments that are classifying music seem to not be reaching anywhere near the accuracy that we are. So if you can think of it as music, so be it.

But the biggest challenge is the identification of music versus speech, because when our patients go out to dinner with their friends, we want them to be able to have a great night that they were expecting and not just have to hone in on the music the entire time. So our colleagues went back to the drawing board and thought, surely from 2017, with the release of all the new instruments, we've had our eye on classification for a while. Certainly, classification has gotten better. Well, Moving forward into 2023, they replicated that study, and we're still hovering at 91% accuracy, which is fantastic when we compare ourselves to the rest of the hearing instruments that are out there. And again, we are going to attrib this to not classifying music.

Our environmental classifier with acoustic is delivering 91% accuracy with classification, so that you know that when your patients are out in that restaurant, they are listening to speech, they are not being challenged with listening to that background, that background noise. We wanted to do some internal research with this. We have a hypothesis. The accurate classification alone is not enough. And if it doesn't translate into the right feature activation, Remember environmental classifiers, they're kind of have a twofold job.

They have to accurately classify the environment and then two, engage the correct features. Our study investigated how the top six premium hearing instruments in the industry automatically activate their directional microphones and gain agents in response to different sound scenes and to estimate the accuracy of feature engagement. So you can see our study set up here. We used six premium hearing aid brands, eight real world sound scenes, and we used three environment types.

Excuse me, Accurate classification is only half the job. We have to engage the correct features. And you can see that with the ReSound sensia, we are reaching 100% for feature engagement accuracy. This means that the classifier is doing its second job. At 100%.

You can trust that this instrument is engaging the correct features for your patients when they're out in those complex environments. Now, looking at the feature engagement by scene type, let's take a look there for just a moment. If you can see there, we've got purple bars, our voices in quiet. The blue teal bars are going to be speech and noise and red bars are going to be true noise. You can see acoustic reached 100% on feature engagement by scene type.

100%. And you can see that brand A and brand D did fairly well with voices and quiet. Take a look though at brand A, they don't even have a noise bar. That particular instrument wasn't even recognizing a noise environment to kick on the correct features. So again, environmental classification has two jobs.

It's one job is to know where it's at in space and accurately classify where that hearing aid is and what environment it's in. And the second job is to engage and activate the correct feature set for the environment that that person is in. We have 91% accuracy in terms of environmental classification. We want to be able to analyze precisely the exact environment that that person is in. And then we are engaging in activating our feature sets 100% of the time.

This leaves us 88% with 88% greater accuracy over our closest premium brand competitor. So when you're thinking about the basics of hearing science and hearing instruments, you have to really think about environmental classification. If you don't get it right from the beginning, how do you know that the end sound is going to be great for your patient?

All right, let's move on. We've got some more research to cover.

We've got a trio of technologies that work together. We've got our acoustic feature, our DNN and our beamformer all working as one automatically. And we've renamed this intelligent all around Program one, let's dive into what this hearing instrument can also do. When we started this presentation, I mentioned something about the cocktail party problem. Well, I like to put a spin on the cocktail party problem and I like to think of the cocktail party problem as a neuroscience miracle.

Think about that. You've got competing talkers, competing noise, competing music, you've got competing friends, you've got all of that happening in front of you and you just want to listen to your friend talk. Your brain does all of this in noise and it performs an extraordinary act of getting all of this together, enhancing one voice, suppressing all the others, predicting linguistic patterns and filling in the gaps in milliseconds. Our brain is able to do this in milliseconds if you have good hearing. We know that our patients go south quickly in cocktail party problems, so we wanted to address that.

We know that different manufacturers are running different DNN processing schemes and it remains an open question which manufacturer is implementing the DNN strategy to best support speech intelligibility in these cocktail party problems. We looked to Horzentrum Oldenburg in Germany, the acoustic test house, to help us out and to explore this investigation. The research question is which hearing aid strategy provides the best intelligibility of single target talkers and turn taking talkers in the presence of interfering speech in the front hemifield. Now, I realize that is a mouthful. We wanted to essentially look at different manufacturers, DNN strategies in a cocktail party problem and see if one

could outperform the others.

To do so, we use the concurrent Oldenburg sentence test, or what's called the CC UCLA. This is an adaptive test from the Matrix speech test.

This particular test is very difficult. It looks at real world listening and it uses competing speech in speech, which I think is really important for this test. In a cocktail party problem, you're rarely up against trying to listen to your friends in front of you with an island STS signal on the side of you. This particular test also engages selective and divided attention. Now, selective attention you can think of as just listening to one stream of communication, honing in on one stream.

Divided attention is where you're listening to multiple streams of communication and you've got your attention on all of them. You can kind of think of that as multitasking for your hearing. The CC UCLA uses higher ecological validity, it uses plus or minus 4 DBs, and it captures cognitive listening effort as well. This particular test is a dual type paradigm and it calls for a call sign task detection. Now you can see here we've Got the setup with the person in the middle and we've got three talkers in front of them.

We've got two males at negative 22.5 and plus 22.5. And we've got a female talker at 0 degrees with a babble noise at 45 degrees off there to the side.

Like I said, we're looking for selective and divided attention in this particular task.

And what the task is, is they need to be able to listen ahead of them, listen to their friends and listen to the conversations. And what their job is, is to listen for a person call the name Kirsten. Now, when that person hears the name Kirsten called, their job is to repeat back the last three words of that person's sentence. They do so while they're still continuing to listen to the passages and listening for the next person to say Kirsten, so that they can repeat the last three words of that person's sentence. And

they're doing all of this in the presence of noise.

So you can see this is a very difficult task. This particular test sort of reminds me of an APD test, which we know is also very difficult.

Individual SRTs are measured with the adaptive CC ulcer prior to starting. So each person serves as their own control. And they're essentially in the middle of this, doing this particular task, listening to all of the. And they're also fatigued.

Let's take a look at some of the results. What you're seeing here in front of you is a benefit graph. Now, with the benefit graph, you'll notice that we've got divided attention on the left and we've got selective attention on the right. On the y axis, we've got percent points on the x axis. Access, we've got ha2, ha3 and ha4.

For a benefit graph, what you can think of here is that zero line. You can think of the zero as your. As your anchor line. This is going to be ReSound sensio. Now, everything that falls above that zero anchor line means that ReSound outperformed that particular instrument.

Everything below that zero anchor line means that the competitor outperformed the ReSound instrument. We've got divided attention on the left and we've got selective attention on the right. One thing I do want to point out is that divided attention does serve as the baseline for this particular test. And you'll notice if you. You'll notice here that divided attention is generally scored lower than selective attention.

And that would make sense because you're doing two things at once. Whereas selective attention, you're Honing in on just one thing at a time. For this, we're going to hone in on selective attention. And you can see that we have outperformed our competitors, hearing aid 2 and hearing aid 3 and hearing

aid 4. Now, with these devices, hearing aid 2 and hearing aid three, we see some statistically significant differences.

We have outperformed Hearing Aid 2 and Hearing Aid 3 with statistical significance. We've also outperformed Hearing Aid 4, but this one did not reach statistical significance. But what does this mean? What does this tell you? This means, and this tells you that when your patients are fit with ReSound sensia and they're in that difficult, competing, complex noise environment, that cocktail party problem, that when your patients are fit with ReSound sensia, they are able to selectively attend to that target talker, their friend, with a significant performance advantage over the other three hearing instruments.

So you can feel confident that you're sending your patients out for success in those cocktail party problems when you're fit with this product. We've got a white paper on this particular investigation. If you'd like access to that, please let us know and we'd be happy to get that over to you.

But with dnn, we also see and have a new struggle.

Like I said earlier, DNN is always looking for speech and it's trained specifically to do so. So I want to bring up two quotes that have made its way around the industry. These are two real quotes. The first one is from Audiology Facebook. What programming changes do you make for the.

I can hear everyone talking at the table around me, but I can't understand the people at my table complaint. I seem to be getting this more and more with the newer technology that came through Facebook. And this particular second quote here is from Eurotrack Hearing Tracker. Just yesterday I was in an eight hour lecture with some obnoxious people sitting right behind me who kept chit chatting. Every time they chatted it was like the lecture was muted and all I could hear were these people chatting in my ear.

If you ask me, that was, that was me last week in the airport. We've all been in situations where this has happened and I hate to say it's always the obnoxious person on the side because it's not always that obnoxious person. They might just be a loud talker and you could also just be with a quiet talker as well. But nonetheless, we've all found ourselves in that situation. And what we're relying on now in our instruments is dnn.

But remember, DNN is also trained to listen to speech, to pick that, that up. So we do have a little bit of a new struggle here. We wanted to research this and we took this in.

We wanted to look at our hearing instruments and make sure that that target talker was always being heard and not the obnoxious person over there on the side to do so. We took 20 people, we brought them into our office and we set up a really easy study. It was just us and our other competitor that uses another denoising chip. And we wanted to just basically set people in the booth, set them up around speakers and just ask them one very simple question. Who is most audible?

We found that over 80% of people in our office were selecting. With our product, we're selecting people from the front and we believe that is due to the beam former. We wanted to have this validated with third party research though. So we decided to take this back to Horse and Trum Oldenburg. And you can see they made what we had as a very simple test into something far more complex.

You can see they have taken 24 participants with moderate bilateral hearing loss and they have two different sound scenes. We took Verzound Sensia and we went up against our leading premium RIE competitor with a DNN denoising chip. We have two complex scenes, scene A and scene B. And then we've got a diffuse cafeteria noise with 16 speaker loudspeaker setup. And the task of the participant was very simple.

Just identify which talker is most audible. We had distractors set up for our internal study and for the external study in two scenes. Scene 1, or Scene A for that matter, used equal level talkers. So the distractors, those obnoxious people, are all going to be at the same level in scene A. In scene B, this is where we make the distractors, those, those talkers louder.

So now we have a setup where you've got the most obnoxious going on. So we've got louder distractors than the target talker. And again, the person's job is to just simply identify which talker is most audible.

Is that audibility coming from the target, the desire talker, or is that audibility coming from that distractor talker?

Here are the loudest talker effects. On the left hand side you can see that the setup was with the equal distractor talkers. What you can see here is on the y axis we've got percent correct, so just straight percent. And on the x axis we start with the side, the front and the back. And that's consistent across Both graphs on the left hand side, you can see Sensia in the red box here.

And we've reached statistical significance. What this is showing you is that when the talker is in the front, the target talker is in the front. Sensia is picking up that target talker in the presence of equal distractors, more so than our competitive device. You can see the competitor here. They are most often picking the audibility to the side.

If you look at the front for Sensia and the front for the competitor, you can see that Sensia is outperforming that instrument when the target talker is in the front with equal distractors. Now let's take a look at the best audible talker with louder distractors. So even in the presence of very loud background noise, hearing instruments are still going to struggle. Even those with normal hearing are still going to pick up the obnoxious people in the restaurant. Even those with hearing instruments can

pick up the loudest obnoxious person in the restaurant.

You can say, actually the hearing aid is doing its job at that point to one extent or another.

But if you take a look and you're always having the target talker in front of you, which is natural because we naturally look at the people we want to talk to. In fact, we generally tend to lean into the person we want to hear and talk to. Even in complex noises, we still see things trailing off to the side. But your best chance of listening to your target talker with louder distractors in the mix is going to be with Sensia. And you can see that right there.

It clearly outperforms the competitor where their device is always going more, I should say more often going to the side. And again, that's with louder distractors.

We have a white paper that is available on this. Please let us know if you'd like a copy of that as well. Rest assured, you can tell that when your patients are out in those cocktail party problems, if they're fit with Rosalen Sensia, you have got them covered. They are able to pick up speech from the front. They are able to decipher what's going on around them, and they are one happy camper.

Not only are they hearing very well, but they're also feeling very well because we have some all fit domes that have just been released with our new sleeve dome. I want to just put out there that we don't just throw domes out there into the wind. We also have research with them as well. This is our new sleeve dome and if anyone has ever met me, they know that hearing Aids are very uncomfortable for me until the sleeve dome. I tried the sleeve dome a couple months back and I have to say this was probably the first time I have ever forgotten that hearing instruments were in my ear for about 90 minutes.

So I had 90 minutes of absolute freedom. And I attribute that all to the sleeve dome. But domes are really important because we don't really necessarily know what's happening once that gets into the ear. And if the dome is too small, then the gaps. It has gaps and it's not meeting that canal wall.

It may even fall out. If it's too large, you may see a crumpling or folding, which makes me a little bit nervous about tulip domes because I tend to use those quite a bit. We also knew that there are some wax issues with some previous domes and we wanted to be able to take care of that. We put out domes and we do questionnaires, we do multiple questionnaires. I just wanted to highlight these are some of the things that we think about and then we ask people, before we put out our sleeve domes and our other dorms domes that are on the market, we look at things like, are the ears full?

Are they blocked? Do they feel rough? Is it smooth? Does it feel loose? Does it feel tight?

Is it tolerable? Is there pressure? Is there no pressure? We even look down to seeing if things are attractive to the user. So we don't just put out domes just for the heck of it.

We do act. We'll research behind our domes as well, as I'm sure everyone does us. So if you haven't tried a sleeve dome from us yet, please try that. If you need any of the research and the data behind the domes, we have that as well for you.

And with that, we have a brand new family. We have hearing aids that are designed to fit everyone's lifestyle. We've got DNN in the first program because we listened to the industry and we knew what you wanted. We have been able to keep DNN in the first program while maintaining the smallest AI rechargeable hearing instrument on the market. This guy is packed with research, packed with features.

We have a brand new acoustic feature classifier that is classifying things accurately and engaging features appropriately for your patients. And you can feel confident that your patients are going out and listening to the best that they possibly can because sensia is the best that there is out there.

This particular instrument has got it all right. It senses all the sound correctly. It's focusing on speech, it's tuning out the rest. We've got denoising happening in automatic programs as well as program two, and your patients are covered when they need it. Thank you very much for listening to this course.

I do want to let you know we've got references on the next page, so we've got that for you there. If you're interested in any of the white papers, please let me know if you're interested in any of these references. I also have these on hand and can send those over quickly. Thank you very much and please let us know if you have any questions. And happy fitting sensia.

Thank you.