RealTime Conversation Enhancement: How Signia's Integrated Xperience is Redefining Hearing Aid Technology

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Welcome to today's course Real Time conversation enhancement how Signia's integrated experience is redefining hearing aid technology by Dr. Navid Taghvaei this month on Audiology Online, we are celebrating innovation in the hearing industry with our fifth Industry Innovation Summit. Thank you for joining us today and we hope to see you in other Summit classes this month. I would also like to thank our title sponsor, CareCredit, and all of the companies participating with us in this year's Industry Innovation Summit. It is now my great pleasure to turn the microphone over to Dr.

Taghvaei. Thank you very much. Melissa hello everybody wherever you are. Welcome to our presentation today. Just a quick reminder on everything my friend and colleague mentioned in terms of Q and A.

If you need captioning and earning CEUs, that information is here. Also regarding technical assistance if there's anything needed. Also, I'd like to point out the risks and benefits for the course. You're welcome to review it. It will be available with the handouts.

And once again, my name is Navi Taglai. I'm a Lead Clinical Education Specialist for Signia, for which I receive a salary and no relevant non financial relationships to disclose. Our course is titled Real Time Conversation Enhancement How Signia's Integrated Experience is Redefining Hearing Aid Technology. Here are the learning outcomes I'd like to share with you. They're also available with the listing of the course.

Please feel free to review them as you wish.

Okay, without further ado, I want to point out and ask you a question. First of all, what comes to mind when you hear Signia? Would it surprise you that we are the industry leader in research and development now over 1100 engineers dressed in the R D department and the holder of most patents of any manufacturer for the upcoming years in the hearing space. As you can see, most the three areas

of focus for us are specifically speech and noise in our RD and the innovations that we're looking at, connected experience and also form factor design. These are things that of course you and your patients have requested and sometimes have concerns about.

And so we want to focus on those specifically a little bit of history before we get started. 140 years in the industry for Signia and many many worlds. First we have seven research hubs and as I mentioned, over 1100 engineers just in our R&D; department to serve you and your patients with innovation and 160 million in annual investment in technology and R and D and as probably a lot of, you know, pioneer of innovations across design, Connectivity and Rechargeability, W.S. audiology parent company of Signia, is the number one patent applicant for conventional assistive hearing technology. And something that surprised me even when I read it.

25% a quarter of the hearing aids globally are powered by Signia technology. So very proud to bring you this information. In 2024, we were recognized in the industry as leaders, winning numerous innovation awards for our groundbreaking integrated experience technology, which is what I'm here to talk about today, and for our unique and versatile form factors like Silk Charge and Go ix, Stylito IX and Pure Charge and Go ix. We were also recognized for our excellence in customer service, which is a testament to our amazing staff's commitment to service excellence. We know that conversations in large groups and conversations and noise are the biggest difficulty for people with hearing loss.

It can be hard to hear due to the surrounding environment or because of the way conversation flows between multiple talkers, moves so quickly. Real conversations, as you know, are dynamic. People change positions, locations, they talk at the same time. Conversation can really come from any angle. Individuals many times find themselves falling behind, asking for repetition, or sometimes unfortunately disengage altogether.

So then it results in missing out on the moment and it can affect their ability to contribute to the conversation. And you know, what we really don't want to see, of course, happens. And, and so it can lead to frustration, isolation and, you know, withdrawal from work or social activities. They don't feel confident in being able to handle those situations. There are in the industry or there were two traditional approaches essentially on addressing this, and honestly, they fall short.

They're kind of stuck in the past with two primary approaches that you see here for better hearing and noise. Those are narrow focus and broader focus. Narrow focus. Talking about an approach that's proven actually to be effective in speech and noise tests, it works well for improving those signal to noise ratios. As the front speaker can be heard clearer in noise, noise is reduced, of course.

And another approach is the broader focus. So that's allowing the patient to be more aware of their surroundings. But this approach is relying on the brain pretty heavily to pick out or extrapolate that speech of interest. And this approach may work for some, but for many it really requires a lot of listening effort, a higher listening effort, and results in greater auditory fatigue, which of course we don't want. We began to change the game with our split processing in terms of the solution for this problem.

And this was on our augmented experience platform. Many of you probably remember augmented experience. We still have instruments on this platform. Augmented experience hearing aids were the first hearing aids ever to actually Separate speech from the noise at the input stage. Then processed two signals separately, completely separate tracks, so that the speech signal and the ambient noise signal can be optimized and adjusted completely independently.

Augmented experience hearing aids were the first ones, first technology ever to separate speech from noise at the input stage. They then processed the two signals separately, completely separate tracks, so that the ambient noise and the speech signal can each be optimized. They can be adjusted completely independently, eliminating that compromise I just mentioned in how speech and ambient

noise can be processed. So what you have is a separate or split processing resulting in very clear acoustic contrast between those two signals and the speech and the noise or the ambient sound. This makes speech very prominent and more separated from the ambient sound.

And that's how it creates that contrast and speech pops out well in comes integrated experience. Now it continues this split processing approach. Now taking another step, really a leap towards what we can do in this realm and leap forward really in the industry in terms of processing speech and noise and auditory scene. So let's talk about this first of all with this revolutionary three stage process. Now with this real time conversation enhancement that's really the bread and butter of this technology, you have three stages.

The analyze, augment and adapt in real time. It all starts with the deep analysis surrounding conversation environment system processes an astounding 192,000 data points. Every second allows for a really precise analysis, accurately presenting, representing real life conversations with these 192,000 data points. Conversation analysis can really be described in two parts, the source analyzer and the dynamics analyzer. Source analyzer pinpoints those number of talkers and their locations.

The conversation dynamics analyzer adds more dimensions to the analysis, captures if you will, turn, taking rhythm, timing, analyzing noise levels, even including locations of pure noise between the speakers. So we have state of the art precision analysis now of the soundscape. But how do we use this? Right? This is where our next breakthrough stage kicks in.

So essentially the three core components of this real time conversation enhancement are analyze, augment and adapt. As I mentioned. And here we're looking at the step by step process of this real time conversation enhancement in addressing these dynamic conversational challenges in noisy environment. And this of course was the first stage, the analyze stage. Primary purpose of this analyze step and real time conversation enhancement is to identify and locate identify the locations of speakers

and environmental noise.

And the data that's being processed by real time conversation enhancement to contrast real time auditory map is the locations of speakers turn taking behavior and noise dynamics. So now the next stage, the stage I just mentioned Kicks in. And that stage, of course, is the augmentation. So by augmenting the sound scene, by enhancing those individuals and using our split processing I just mentioned, to keep the surrounding sound present, but not distracting. Really a critical part of this precision enhancement is another breakthrough, these dynamic focus streams.

The focus streams use the analyzed data to enhance multiple speakers individually first time ever. They combine binaural beamforming and noise reduction to lock on and to enhance each speaker with precision. So it really sets them apart from those traditional beams that I mentioned. They operate instantly, they operate simultaneously. Unlike traditional systems, which have to slowly change, you know, the width or direction of a single beam to prevent those dramatic changes in sound quality, or, you know, wide open beam to, to let in more noise, which is not, of course, something that we want because all of our dynamic focus streams operate simultaneously and instantly.

They avoid these trade offs. Traditional directionality has the dynamic focus streams make sure that targeted enhancement of speech and reduction of noise at the same time, our split processing technology is making sure that everything is balanced and comfortable and the entire conversation scene is enjoyed. So the third stage now is this adapt stage. We bring everything together. Dynamic focus streams that I mentioned are instantly adapting to changes in the conversational scene, updating their position and enhancement a thousand times per second.

So they'd react in real time to changes in the environment, effectively focusing, fusing together. Those live everything into one live auditory space or an auditory scene. So that means that no matter where you turn or where the talkers move, you're always part of the conversation, Always remaining fully

immersed in your surroundings. The technology adapts to the conversation for you. So all you have to do is enjoy the conversation naturally, right?

So the question, you know, I get all the time is how, how often does does the adapt step of this real time conversation enhancement update the soundscape to ensure this real time optimization? And as I mentioned, it's happening at a thousand times per second.

With Signia IX hearing aids, patients now can effortlessly engage in conversations without reading or needing to focus on who they're facing. Or wait, if you will, for the hearing aids to adapt. Even when turning their head or changing conversation partners, Signia IX technology handles this in real time. So this allows the users to immerse themselves naturally in conversations, stay fully present in those conversations, contribute effectively, and really enjoy the moment without having to wait for the hearing aid to slowly adapt or guess the intent of the wearer. So those key benefits that real time conversation enhancement has to provide the to provide comparison or traditional to those traditional directional hearing aids Is this simultaneous enhancement of multiple conversation partners.

So I do want to go through some really multimodal research approach that Signia has always to make sure that the innovation lands in your lap and is efficacious and efficient right away and that you're confident in presenting that information to your patients. Just want to take a quick look at the signia's global research network. As I mentioned, our technology is proven through a multimodal approach and it takes place all around the globe. And that research I'm bringing you today. So we'll take a look at some of that with these research partners.

We use both subjective real life testing and we use objective neural and behavioral research like EEG data for example, lab studies, behavioral studies with a focus on both individual and group conversation dynamics with proof behind it. Now CIGNA is delivering cutting edge solutions to help foster the power of conversation in the most complex of the environments. And I actually want to point out this white

paper that I'll be talking about in just a moment. Please feel free to reach out to your Signia sales managers or your inside sales managers or myself. And I'm more than happy to provide this.

It's also in our signal library, but I'll be talking about it today. Now first of all, the typical testing scenario that we see in in the industries as such where you know, you have one speaker in the front, one speaker in the back and the speaker in the back is giving noise and the speaker in the front is giving speech and you know, that's how they, you know, very efficacious signal to noise ratio and directionality. But group conversations of course are not your typical type of scenario. This is from a paper that you can see here listed also in the slide and it shows objective human performance tests. We showed actually in that objective performance test and 95% of wearers had improved performance in noisy group conversation scenario.

To better reflect the real if you will to to we used alternative speakers that real conversation environment alternating speakers instead of just one single speaker in the front to just show like strong efficacy for directionality for example. So it gives us great confidence that we prove that these technical benefit we see with this real time conversation enhancement actually translates to human performance gains. And it shows the importance of a multi parameter approach validate your data. So objective data is great. Of course it can precisely control the parameters and as such very high experimental validity.

And as you can see, we have endeavored to really simulate these real life situations as best as we can even in these controlled environments. And as I mentioned, the Real time conversation enhancement is backed by industry leading research designed to mimic how conversations occur in the real world. So here what you see is using two alternate speakers to emulate a dynamic group conversation not just in the front but also from the side with these additional noise speakers from behind and around. So we recorded the output of hearing aids in a Kemar mannequin, calculated that SNR of the integrated experienced instruments compared to four premium competitor devices. So let's see what we got here.

So in this scenario we showed a remarkable 4.1 dB SNR improvement compared to the absolute best the competition has to offer. We can really see the power of real time conversation enhancement and its ability to track enhance multiple speakers even if you are not facing them. Right. So beauty of this study is that it's directly assessing the technology and hearing aids. There is no human error or movement or you know, cutting edge hearing.

And it's, it plainly shows that we're superior in enhancing, enhancing multiple speakers from multiple directions. So we have really endeavored to make this as ecologically valid as possible in our methodology using alternating speakers to mimic real time group conversations. And it really gives us good confidence that we can prove that human performance gains we see are backed up by objective technical information, technical data compared to our competitors. So really highlights that are cutting edge technologies providing that unique benefit that you're looking for for your patients. And of course the importance of a multi parameter approach to validate our data.

And I'll show you some actual real life type of information and research, not just in controlled lab studies, but I want to also go through an update. So basically I just want to point out that patients and participants we showed here to be able to compare the performance outcomes of real time conversation enhancement and the difference between the traditional directional hearing aid technologies and using evidence based metrics. And this is how we're or gaining this knowledge. Right. So the study is designed to.

This study is an update to what I just mentioned, reflecting the dynamic situations our patients face in real life and really testing how hearing aids perform in most of these challenging environments. Right. So in a dynamic group conversation in background noise, Signia IX provides as you can see, 8.1 dB improvement in signal to noise ratio SNR as we all know it compared to the unaided listening situation. And then it outperformed our Competition with a 3.2 DB higher SNR that the very best of the top four

competitor hearing aids had to offer. So Signia IX is delivering in this case more than twice the speech enhancement benefit in noisy group conversations.

Than the closest competitors. Even including those AI co processor driven platforms. The SNR boost here is expected to enhance speech understanding. It enables Signia IX patients to contribute effectively actively, even in those busiest of the conversations. And of course Signia IX's superior speech enhancement is powered by the advanced split processing as I mentioned and the now multi stream processing available in the IX platform, allowing IX to independently enhance speech process noise.

And unlike competitor systems that can only do this in a single stream. So if your patient has issues and busy conversations in noise, Signia IX is proven to be the best at capturing speech in dynamic conversations. As you probably know, a 3dB increase in SNR that corresponds to doubling in the ratio between the intensity of speech and intensity of noise. So that that's twice the speech enhancement benefit that I mentioned. As you can see here, objective performance data confirms that twice the speech enhancement objective technical data resulting in comparing the Signia IX to the leading competitors.

So this was actually a study where 27 participants were fitted with both Signia IX and Brand A1 that you see there, the best performing competitor hearing aid. So this simulates the group conversation in noise using alternating speakers as I mentioned, I just mentioned with the studies, not just a speaker in the front. And the result was highly replicable with 77% of the participants performing better with Signia IX than with the competitor and showing the strong benefit of real time conversation enhancements, ability to track and enhance multiple talkers in real time, really delivering better outcomes in noisy groups than even the leading competitor powered by an AI co processor. As I mentioned, objective data is fantastic. But how do these hearing aids perform in real life, in real life situations?

So this is a study from the University of Western Ontario. As you know, it's a leading university with audiology and hearing research. Dr. Susan Scully is an internationally renowned researcher publishing a large number of scientific papers. And Signia provided the hearing aids and the fitting software for this study.

So all hearing aid fittings and testing were done by the UWO staff, not by Signia. There was real ear measurement verification to make sure that audibility was acceptable and the best practice was done. And actually this was published in a peer reviewed scientific journal, American Journal of Audiology, just this last year. So this was testing when this technology was on versus when it was off. So I'm super simplifying here.

You have the methodology and the specifics of the study here and of course the paper also available. But to break it down into its main components, we tested this technology in a real life type of situation. So what we did was the real world environment used in the study was a food court in a busy mall located at close to uwo. Participants and then two testers, one female, one male. They were seated at a round table surrounded by other tables with other people sitting and eating and talking.

And to ensure similar test conditions right across participants, there was a script of a conversation between the testers that was carried out a variety of similar topics like food and weather and travel, weekend activities. The scripts were created to make sure there's frequent turn taking and equal amount of speaking time for the two talkers after each of the three conversations. Then the participants were asked to make a number of ratings that you're going to see here in this next slide. So really interesting strong results. Some of the key takeaways here that I want to point out.

Participants had statistically significant preference for real time conversation enhancement in all aspects tested. So they preferred real time conversation enhancement on for speech clarity, understanding conversation partners, feeling conversation partners were more prominent, reduction of

background noise and the amount of effort needed for following conversations. So with an overall performance preference to close to 2, which on a 7 point scale this is quite the feat. In fact it's actually not shown here. But 80% of all the participants indicated an overall preference for this real time conversation enhancement and its sound quality.

So really of particular interest, you know, the relationship between preferring real time conversation enhancement for reducing background noise and making conversations more prominent is what we're looking at. And of course the strength of the preference for the feeling that the conversation partners were more prominent is much more for and it's much more than for reducing background noise, which is really interesting to see. But this is exactly what we would expect from the real time conversation enhancement. Our underlying split processing as well. And the technology makes sure that background sound, yes, it's reduced, but it is still present.

On top of this you have the focus streams that enhance individual speakers. Overall feeling should be that you're immersed in your surroundings, but speech pops out above and above that background noise. And this is exactly the impression we see coming out of the results here. In fact, an impressive 75%. Excuse me of the participants said that they felt speech was more prominent with real time conversation enhancement on.

So an excellent result for real time conversation enhancement and signia integrated experience.

As I mentioned, this technology was preferred 80% of the time results in line with the controlled lab results that I just presented to you. And the main observation really is this preference rating. So real time conversation enhancement was preferred for all items and all mean ratings were significantly different. From 0 with a value of 0.05 statistical value of significance. And so the findings are in line with the previous IX Evidence lab studies that I presented to you showing that the benefits of this real time conversation enhancement is observed in lab and also observed when testing in the real world.

So really a providing a comprehensive foundation of evidence of the benefits of the Signia IX with real time conversation enhancement.

Okay, so I also want to point pointed that I wanted to point out real quick before we run out of time that we also have an excellent cross system which is unique in the market. It's specific to Signia with skewed directionality which is absolutely loved by our customers, by our wearers. Unique to Signia skewed directionality. If you have patients with unaided ears and are candidates for Crosby CROs systems, I encourage you to have a look at our Signia CROs systems. Here's a quick look at the Signia portfolio.

Very comprehensive portfolio based on patient needs. Something for everyone. Stylish, modern, easy to use for either from a mild all the way to a profound hearing loss, including a superpower that will give you 82 peak gain and last 61 hours on a single chart. So I think it's time for your patients to experience Signia unleashing the power of conversation. And really this is the mission, right?

We believe in the power of hearing enhancement to improve lives. Not just listen, but contribute to life's wonderful moments. And I want to thank you very much for joining us. I have my email address here. Please feel free to reach out and hope to see you very soon at another one of our AO or in person meetings.

Have a great rest of your day.