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INNOVATION

The Hand

ID DAY ■ BEAUTILITY ■ WESTCOTT TRIBUTE





By Eunji Park and Stephanie Morgan
eunji@kartendesign.com ■ stephanie@kartendesign.com

Designing Hearing Aids

AGING HANDS & MINDS

Don, a 73-year-old hearing aid user, has removed his hearing aid from his ear and is holding it in his hand; he needs to change the battery. He removes the dead battery from its compartment and, with seemingly methodical precision, takes a fresh battery between his index finger and thumb and attempts to insert it into his hearing aid. There is a sudden lapse in his dexterity, and he loses hold of the battery, allowing it to slip between his fingers and out of his hand. That the battery is too small for his aging eyes to easily detect is not the only problem. Because Don was not wearing his hearing aid, he has absolutely no idea in which direction the battery rolled away because he could not hear it hit the ground.

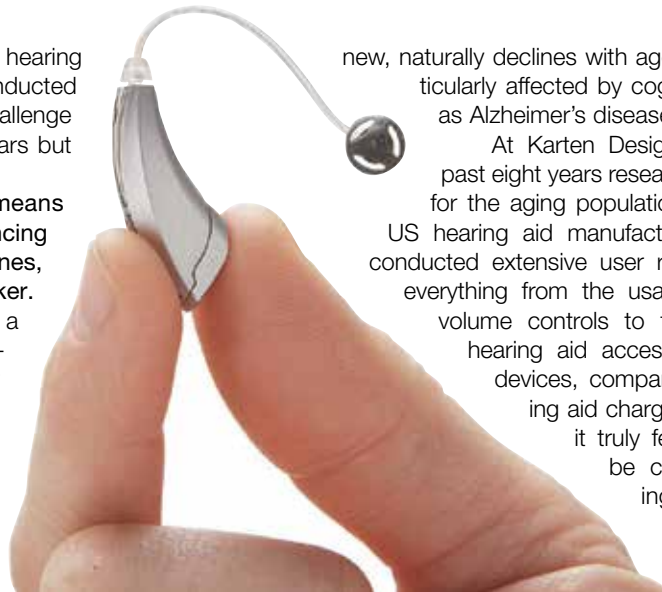
Don is perhaps one of the most impactful hearing aid users with whom our team has conducted research. He opened our eyes to the challenge of creating hearing aids not solely for ears but also for aging hands and minds.

Designing for aging hands means designing for people who are experiencing an overall physical decline—whose bones, muscles and joints are becoming weaker. The hands, in particular, experience a reduction in nerve endings, making it difficult to sense pressure, temperature or pain as precisely.

Designing for aging minds means designing for people whose brains process information more slowly, making the task of learning something new exponentially more difficult. The ability to retain information, be it familiar or

new, naturally declines with age as well, but is particularly affected by cognitive ailments such as Alzheimer's disease.

At Karten Design, we've spent the past eight years researching and designing for the aging population as a partner with US hearing aid manufacturer Starkey. We've conducted extensive user research to examine everything from the usability of hearing aid volume controls to the development of hearing aid accessories—such as TV devices, companion mics and hearing aid charging devices—to how it truly feels for someone to be categorized as hearing impaired. We've also spoken with the stakeholders involved in the



Starkey Zon Hearing Aid

THE HAND



Starkey S Series Hearing Aid

hearing aid ecosystem, including patients, caregivers, audiologists, industry experts and dispensers.

And what we've come to understand is that while designing for aging hands and minds is not easy, it's not impossible. We'd like to share some of the insights and strategies we've developed during our partnership with Starkey to show how a deeper understanding of the complexity of the needs of seniors can lead to more meaningful products that holistically improve the hearing experience.

Functional and Cognitive Considerations

The following are physical design attributes that we have identified as being the baseline requirements for a successful hearing aid and related devices that specifically address the needs of declining dexterity and cognitive function.

Instinctive Accessibility of Controls. The majority of elderly users with declining dexterity and loss of sensitivity in their hands and fingers experience difficulties locating the control on their hearing aid. Various age-related physical

and mental conditions also aggravate usability challenges. Therefore, controls with an obvious protrusion and distinctive edges become the baseline in quality design to enable easier and instinctive usability. However, when optimizing the protrusion and tactility of a control, the discreetness of the overall design should also be considered to satisfy both the user's functional and aesthetic preferences.

One-Handed Operation. A misplaced control often leads to misuse. If a control is positioned too low on the device, users will unintentionally push the hearing aid off their ear when trying to operate it. Elderly users also have difficulties stabilizing their fingers on the hearing aid and applying the right amount of force on the control while wearing the device, necessitating frequent removal to adjust settings. To alleviate this frustration and facilitate efficient operation, the control should be easily manipulated by one hand without needing to take the device off or ask others for help.

Clear and Effective Feedback. Once a control is triggered, users have difficulty identifying their current and desirable setting because of unclear feedback. Furthermore, individual health limitations among users drive and often complicate the type and the amount of feedback that is effective for them. For example, users with limited dexterity in their fingers often have difficulty with hearing aids that solely rely on vibrations or other tactile feedback. To alleviate frustrations and enable seamless interaction, selective sensory feedback that responds to the user's action should be integrated into the controls.

Minimal Training and Everyday Assistance. Elderly hearing aid users with declining memory abilities have difficulty remembering multiple steps and operating controls with their hands. **A successful hearing aid control embraces commonly established gestures and ranges of motion that align with each function.** At the same time, it should require that users undergo minimal initial training and need little to no assistance to operate the product. Reducing the amount of mental processing power needed is one of the key considerations for enabling intuitive usability of hearing aids and related accessories.

Eunji Park, a senior design researcher and industrial designer at Karten Design, identifies the macro context of people and the world they live in through technology and social and cultural lenses and translates that into strategic product development opportunities. Her recent research focuses on the digital health space where consumer technology and medicine intersect. ■ A design researcher at Karten Design, **Stephanie Morgan** thinks about how people think. She uses her background in cognitive science to explore the role cognitive activities, such as learning, memory, attention and decision-making, play in how people perceive, interact with and experience products in real-life contexts.

Social, Psychological & Emotional Considerations

Functionally optimizing a product for aging hands and minds is not enough to fully resolve the design challenge that creating a successful hearing aid presents. To elevate the user experience, researchers and designers must go beyond focusing on pure tangible interactions with the product and understand the social, psychological and emotional contexts in which the device is experienced. The following key insights reflect this notion and are integral to the meaningful design and ultimate adoption of hearing aids and related products.

The Social Stigma of Hearing Loss and Hearing Aid Use. We discovered that there is an overwhelming amount of stigma attached to hearing loss and aging. Most hearing aid users acknowledge that they do not want to publicly exhibit their use of hearing aids. For example, when in a social setting, some users visit the restroom to adjust the volume to avoid being identified as wearing a hearing aid or feeling embarrassed for having impaired hearing. As such, hearing aid users, their caregivers and hearing professionals are drawn to the idea of using a smartphone to discreetly control and adjust a hearing aid or related devices. Similarly, prospective hearing aid users with limited dexterity like the idea of a voice-controlled hearing aid, similar to Siri, as an option.

Conflicting Level of Adoption and Attitudes Toward Newer Technology. While new innovations promise overall improvement of hearing aid functions, adapting to new features can be a roadblock. **We identified that seasoned hearing aid users are often reluctant to switch to a new hearing aid, even if it provides better usability.** They are often dependent on—and emotionally attached to—their current hearing aid and fear they would need someone else to help them learn how to use a new device. Because of this emotional barrier, some audiologists reported that hearing aids without traditional features (such as rotary volume control) can negatively affect the sales of hearing aids, especially with senior groups (typically 75 and older). However, younger baby boomers (early 50s to late 60s) are likely to

be up to date with technology and much more comfortable with using newer devices. This division between senior users and younger users should be kept in mind when designing hearing aids as it could even necessitate the development of two different devices.

Caregivers and Spouses Are Undiscovered Users. Although caregivers are not currently targeted as primary hearing aid users, they are often directly involved in the product's acquisition and use, and are directly impacted by the overall hearing aid experience. A caregiver is the one who typically makes an effort to bring the hearing impaired person to the audiology office and convinces them to purchase a hearing aid when hearing loss develops. The caregiver assists with the everyday use of hearing aids, such as identifying functional errors that the hearing aid user might not notice. Frequently, a hearing aid user's spouse appreciates hearing accessories like a companion microphone more than the hearing aid users themselves because these devices can improve their everyday communication and relationship. However, we learned that caregivers who are actively engaged in navigating, manipulating and troubleshooting hearing devices experience as much frustration and stress as the hearing aid user. When designing for diverse hearing aid users, designers should also consider caregivers as extended users—who can provide rich insights for improving the design, even if they are not the primary user.

When we first started working on hearing aids, it made sense to assume that our primary area of focus was going to be the human ear. However, it wasn't until we investigated the complexity of the user experience that we realized that designing hearing aids is really about designing for aging hands and minds. It takes a lot of effort to develop a contextualized understanding of a user's experience with a product. It involves examining social, psychological and emotional components and being able to interpret that information into action through design. Once you've developed a holistic understanding of the design problem, the potential to create meaningful products for the end user is ever so much greater. ■