

Real world outcomes for basic and premium hearing aids: Is there a difference?



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In 2014 and 2015, the Hearing Aid Research Laboratory (HARL), University of Memphis, Tennessee, published the results of their investigation into the question “Do premium-feature hearing aids yield better outcomes than basic-feature hearing aids for older adults with mild to moderate sensori-neural hearing loss?”^{1,2} They concluded “It should not be assumed that more costly hearing aids always produce better outcomes. With contemporary hearing aids from two major manufacturers, the subjects obtained as much improvement in speech understanding and quality of life from lower-cost basic-level instruments as from higher-cost premium-level instruments.”

The results of the HARL group research and the implications of their findings for audiologists were summarized in an article by one of the research team, Dr Jani Johnson, in *Audiology Now* 61, Winter 2015. The HARL group studied 45 subjects and recommended further investigation using self-report outcomes (“the gold standard for hearing aid effectiveness”) for a larger group of people using basic and premium technology hearing aids.

The EARtrak³ hearing aid satisfaction survey process generates a large database of self-report outcomes. Initial analysis of outcomes across the whole database (5863 hearing aids, fitted between 2012-2015) for basic, basic-enhanced, mid-range and premium technology indicated significantly higher satisfaction for premium technology, compared with basic technology, for “hearing in small groups”. There was no significant difference for “hearing in large groups”. (Table 1). This would seem to indicate there is some evidence for better outcomes for premium technology, although the profile of the EARtrak group was not matched to the HARL group.

Technology level	Basic	Basic-enhanced	Mid-range	Premium
Small groups	82.6%	86.6%	89.1%	91.2%*
Large groups	35.2%	35.3%	32.2%	36.3%
n = aids fitted (2012-2015)	2899	1034	1266	664
Total = 5863				

Table 1/ Analysis of EARtrak database for client satisfaction with hearing aids, by technology level, in small and large groups. (* $p < 0.01$ Premium compared to Basic).

Further analysis was done to investigate whether the results of the HARL research could be verified. The results were summarized at the Audiology Australia National Conference in May, 2016. This article gives further detail on the method for collecting and analysing the EARtrak data, and of the findings.

METHOD

Clinics using the EARtrak process to monitor treatment effectiveness send the EARtrak survey to their clients 6 months after hearing aid fitting. At the same time, these clinics send client demographic and technology data to EARtrak. This data is linked (via a unique number code) with the survey returned to EARtrak by the client. The EARtrak data for basic and premium technology hearing aid fittings was filtered to match (as closely as possible) the profile of the group

studied by HARL. (Table 2). This filtering generated a sample size of 434 subjects from the EARtrak data, compared to 45 for the HARL study.

The HARL group studied four dimensions where it might be assumed that premium technology would deliver better outcomes, compared to basic devices - speech understanding in noise (soft, moderate and high levels of competing noise), listening effort, localization and sound acceptability.

The EARtrak survey questions most closely measuring these dimensions were related to client satisfaction with listening:

- in small groups (soft background noise), car (moderate background noise), and large groups/restaurant/café (high levels of background noise),
- localization

	HARL Group (2015)	EARtrak Group
N	45	484
Age (years)	70 (average)	60-79
Hearing status	Bilateral mild to moderate loss	Bilateral mild to moderate loss
Fitting status	Binaural	Binaural
Technology	Basic/Premium	Basic/Premium
Manufacturers (N)	2	8
Self-reported outcomes survey	One month post-fitting	6 months post-fitting

Table 2/ Comparison of HARL and EARtrak research groups.

- clarity, sound of own voice and comfort with loud sounds (sound acceptability)
- Listening effort is not directly measured on the EARtrak survey.

Two important differences between the HARL & EARtrak groups were:

- the different time-frame for surveying the self-reported outcomes and
- the HARL group were blinded to the level of technology they were using, whereas the EARtrak group were aware if they were using basic or premium technology.

RESULTS

Understanding speech in background noise indicated significantly higher satisfaction with premium technology for small groups, compared with basic technology. There were no significant differences in outcomes for the other background noise situations. (Figure 1)

There was no significant difference between basic and premium technology in ability to localize sounds.

	HARL	EARtrak
Speech understanding in noise - soft/ moderate / loud	Not significant	Not significant, except Premium significantly better in soft background noise.
Localisation	Not significant	Not significant
Sound acceptability	Not significant	Not significant, except Premium significantly better for sound of own voice.
Listening effort	Not significant	?

Table 3/ Comparison of HARL and EARtrak results for Basic and Premium technology.

Satisfaction with the sound of one's own voice was significantly better for premium technology. There were no differences between basic and premium technology for sound clarity and comfort with loud sounds. (Figure 2).

A comparison of the results for the HARL group and the EARtrak Group is summarized in Table 3.

INITIAL CONCLUSION

Analysis of EARtrak group data of real

world outcomes for basic and premium technology provides some evidence supporting the conclusions of the HARL research, with no significant difference between basic and premium technology on most of the measures. There was some evidence supporting better outcomes for premium technology for small groups and the sound of one's own voice.

FURTHER ANALYSIS

Further analysis of the EARtrak database is ongoing. Two interesting findings have been -

- People wearing premium technology hearing aids use their devices for significantly more hours per day than do those wearing basic technology hearing aids. (Figure 4)
- Satisfaction with listening one-to-one is significantly higher with premium technology. (Figure 3)

So, if people using premium technology hear better one-to-one and in small groups, and if they are more satisfied with the sound of their own voice, perhaps they will use their hearing aids more? It could be argued that, if the goal of hearing aid fitting is that communication is significantly improved with devices that are physically and acoustically comfortable, then longer daily usage should be a desirable outcome. This enables more consistent sound enrichment, and facilitates retraining of listening skills.

ARE WE ASKING THE RIGHT QUESTION?

Rather than focusing on aspects of the client and the technology, maybe we should be asking "Is who fits the hearing aids more important than what is fit?"

The EARtrak data shows there is considerable spread of outcomes across clinics. The same manufacturer

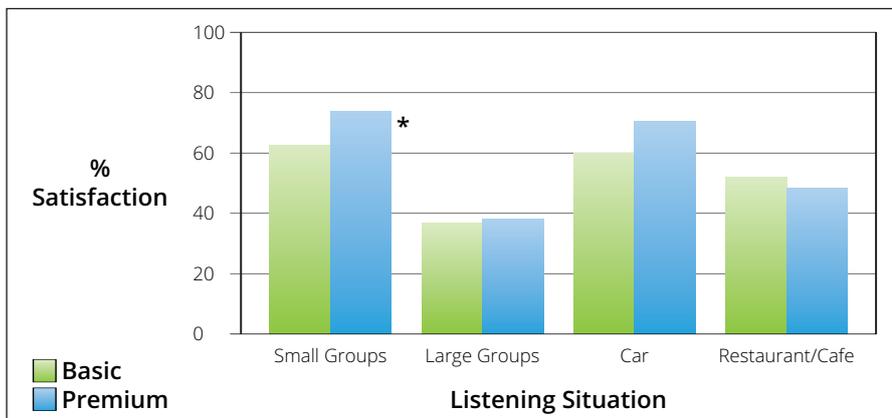


Figure 1/ Client satisfaction with speech understanding in noise for Basic and Premium technology - EARtrak results (* $p < 0.001$)

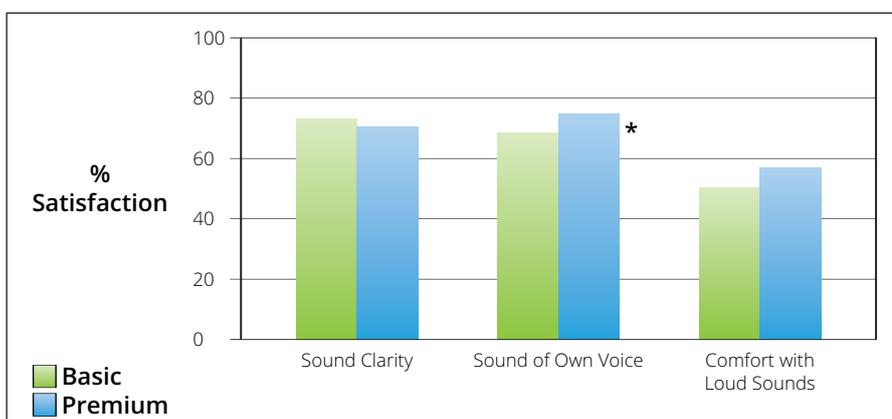


Figure 2/ Client satisfaction with sound acceptability for Basic and Premium technology - EARtrak results (* $p < 0.01$)

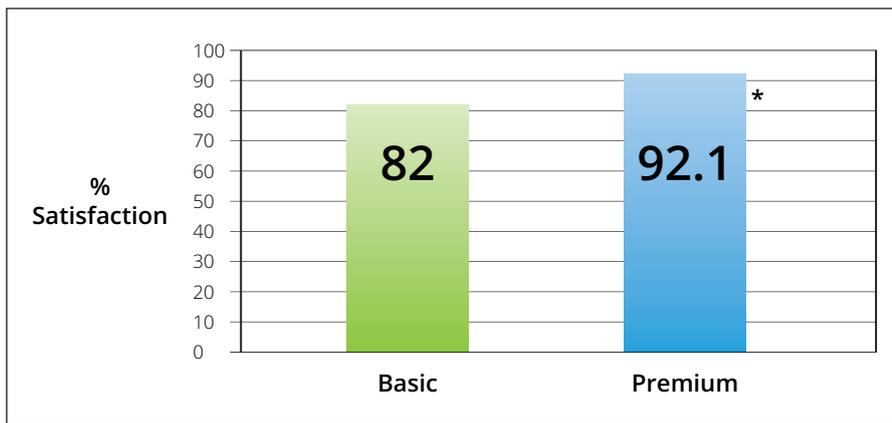


Figure 3/ Client satisfaction with listening one-to-one with Basic and Premium technology - EARtrak results. (* $p < 0.01$)

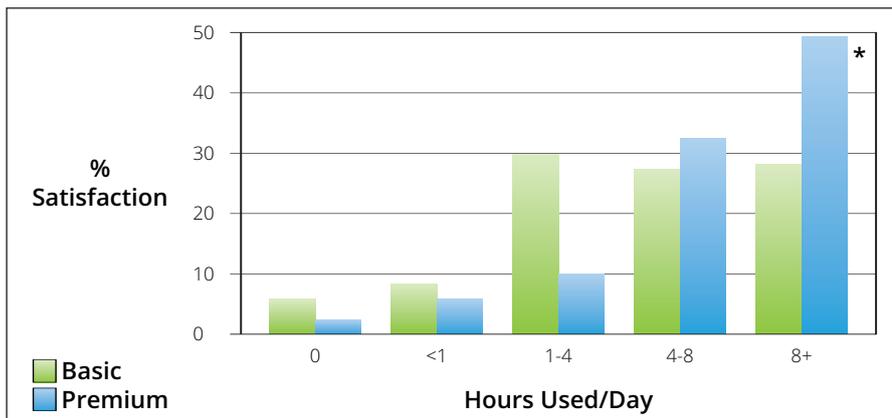


Figure 4/ Daily hearing aid usage for Basic and Premium technology - EARtrak results (* $p < 0.001$)

and model can generate up to 40% difference in client satisfaction, depending on the clinic where the fitting was done.

This analysis highlights the importance of the audiologist in mediating a successful outcome from hearing aid fitting, regardless of the level of technology. Basic technology can yield satisfactory outcomes if carefully fit to fulfill the needs of the client. Premium technology can only deliver its optimum potential when individually fit to meet the needs of the client. Neither level of technology will deliver satisfactory outcomes if the audiologist and the client do not work together to establish realistic expectations, including use of “gold-standard” procedures for fitting, verification and validation, supplemented by ongoing support and auditory training. ●

REFERENCES:

1. Cox R, Johnson J, & Xu J Impact of advanced hearing aid technology on speech understanding for older listeners with mild-to-moderate, adult-onset, sensorineural hearing loss. *Gerontology*, 2014, 60(6), 557-568.
2. Cox RM, Johnson JA, & Xu J Impact of hearing aid technology on outcomes in daily life 1: The patients' perspective. *Ear & Hearing* 2016,
3. www.eartrak.com

Premium or Basic? A recap of the Cox study

The paper by Robyn Cox and the HARL team, funded by a US government grant, attracted much attention. The work was reported in *Audiology Now* issue 61 and the implications are explored further in this issue. The findings are compared to outcomes measures by Susan Clutterbuck and the methodology is reviewed by Chris Whitfield. To provide context for readers, a summary of the original paper is given here.

This was a single-blinded, repeated cross-over trial in which the participants were blinded. The study consisted of 25 participants who used carefully fitted bilateral hearing aids for one month. They were asked to provide data to describe the changes they noted in hearing in daily life.

Each participant trialed a basic and premium device from each of 2 manufacturers, in different orders. All aids were given a fully automatic program, a noise program and a speech program. The aid benefit was evaluated in the laboratory and using “gold standard” outcome questionnaires. Results for the questionnaires are reprinted here from Issue 61.

All audiologists are encouraged to review the article in Issue 61, the original work by Cox et al published in 2014 and the follow-up paper in 2016 and make an informed decision when selection the best technology level to meet the needs of their individual client. ●

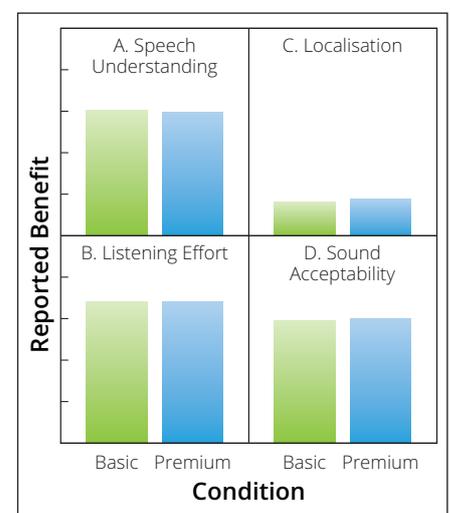


Figure 1/ Mean real-world aided benefit outcomes for the two aided conditions. Taller bars indicate more benefit.