

# Fifty “man-years” of listening

## News from Eriksholm

*Graham Naylor Ph.D.  
Research Director, Oticon A/S  
Eriksholm Research Center, Denmark*

In March 2006, two articles\* appeared in the International Journal of Audiology. Both authored by Professor Stuart Gatehouse (UK Medical Research Council's Institute of Hearing Research), Graham Naylor (Head of Oticon Research at Eriksholm) and Claus Elberling (Senior Scientist, Oticon A/S). These two articles represent the culmination of one of the largest hearing aid studies ever carried out.

Fifty hearing-aid users from Scotland participated in the study. Each participant wore experimental hearing-aid fittings for 50 weeks. Every ten weeks they completed questionnaires and objective speech-in-noise measurements before having their hearing aids re-programmed with the next experimental prescription. This research protocol kept two audiologists busy for 18 months!

The result was an enormous set of data allowing comparison of the relative benefits of five different prescription approaches. The emphasis was on contrasts between linear and non-linear amplification and between different release-time configurations in non-linear amplification. Just as important as the outcome measures were the fact that all subjects had been through a series of measurements of ‘predictor variables,’ which we hoped might correlate with outcome measures. Predictor variables included; standard audiometric variables, psychoacoustic factors (such as temporal and spectral resolution), cognitive function and ‘auditory lifestyle’ (listening conditions experienced in daily life).

Some of the collected data support generally held beliefs, while others do not. On average, non-linear amplification provided better performance than linear, but a substantial minority of subjects (about 20%) performed best with linear amplification (not due to the volume control). Better performance with linear fittings was associated with flatter audiograms, wider

auditory dynamic range and smaller differences in dynamic range between low and high frequencies, and with more restricted auditory lifestyles.

One key purpose of this study was to evaluate compression release-time. Previous research seemed to provide conflicting evidence about whether fast or slow-acting compression is best. We found that on average, slow-acting compression was a little better for comfort, whereas fast-acting compression was a little better for intelligibility. However, by looking beyond averages to individual differences, and then coupling

Cognitive function may be just as important as hearing thresholds in determining performance in complex listening situations

them to the predictor variables, an interesting trend was seen. People tended to do better with fast-acting compression (relative to slow-acting) if they possessed higher cognitive function and/or auditory lifestyles with rapid variations in sound levels.

These results are preliminary, but they clearly indicate that to accomplish truly optimal fittings of advanced hearing aids, we must look beyond average preferences and audiograms.

Many of the results noted above have since been re-confirmed at Eriksholm. In particular, we have found that a person's level of cognitive function may be just as important as their hearing threshold in determining their performance in complex listening situations.

\*References:

Gatehouse S, Naylor G and Elberling C “Linear and non-linear hearing aid fittings – 1. Patterns of benefit”, Int. J. Audiol., 45, pp 130-152, 2006.

Gatehouse S, Naylor G and Elberling C “Linear and non-linear hearing aid fittings – 2. Patterns of candidature”, Int. J. Audiol., 45, pp 153-171, 2006.