

Field Study News

A comparison of Lyric with digital hearing aids

Proven to be equally effective

Abstract

A study was conducted at the "Hörzentrum Oldenburg" (Hearing Center Oldenburg) in Germany to compare Lyric with digital hearing aids. The 12 participants in the study were experienced users of digital hearing aids. These subjects underwent various tests at the beginning of the study while wearing their own digital hearing aids. The same tests were readministered after the subjects had been fitted and experienced a brief adaptation period with a Lyric device. The test battery consisted of speech tests in both quiet and noisy situations, a localization test and a measure of the listening effort required under varying noise conditions. The results showed that Lyric performed as effectively as the digital hearing aids. Despite its analog technology and comparatively limited adjustment options, Lyric did not present any disadvantage for the user. It was also revealed that Lyric is not suitable for every user due to its requirement to fit the anatomy of the ear canal. In terms of wearing comfort, however, Lyric is rewarded with a high level of customer satisfaction thanks to its invisible appearance and the minimal handling it requires.

Introduction

The analog signal processing of Lyric appears to be simple compared to that of modern digital and multi-channel hearing aids. The latter offer a variety of possible settings and technical features which can often adapt to the user's actual hearing situation or use directional technology. By contrast, Lyric offers limited adjustment options and no adaptive features. However, the positioning of the Lyric device deep inside the ear canal offers the opportunity to take best advantage of the natural acoustic effects of the pinna and the ear canal. These effects play a significant role in achieving the best and most natural sound quality and good speech intelligibility.

Purpose of the study

The aim of the study was to answer the following question: Can Lyric, despite its analog technology, offer its wearers benefits equal to those of digital hearing aids? To answer this

question, several tests were conducted with a focus on objective measurements.

Set-up of the study

In an initial appointment, all measures were carried out on the 12 test subjects while wearing their own digital hearing aids. During a second appointment, subjects were fitted with Lyric devices. This was followed by a check-up three days later to assess the wearing comfort of Lyric and to perform the Freiburg Speech Test. Subjects continued to wear Lyric approximately one week longer, following which the remaining measures were completed at a final appointment. For the speech measures, the Freiburg Speech Test in quiet was carried out at a presentation level of 50 and 65 dB SPL. The Oldenburg Sentence Test (OISa) was used to assess speech intelligibility in noise under the following two conditions:

1. with the speech signal and background noise coming from the front (SONO)
2. with the speech signal coming from the front and background noise from behind (SON180).

For this test, the subjects switched their digital hearing aids to the customized noise program as set by their hearing care professional when the device was fitted. Results were recorded as the average signal-to-noise ratio at which the subject correctly understood 50% of the words in a sentence. The localization test was carried out with 8 loudspeakers evenly spaced in a circular formation. A one-second, 60 dB SPL burst of speech-simulating noise was randomly emitted from one of the eight loudspeakers. Subjects then identified which loudspeaker the noise had come from. Every direction was checked twice in this test. Results were recorded as average deviation from correct angle of incidence. To measure the test subjects' listening effort, they were presented with sentences from the Oldenburg Sentence Test at various signal-to-noise ratios (-6 dB, -3 dB, 0 dB, 3 dB, 6 dB, 9 dB, 12 dB) under the SONO test condition. The subjects then rated their listening effort on a 13-point scale ranging from "not strenuous" to "extremely strenuous."

SNRs of 0 dB to 12 dB were used for the test situation involving no

hearing aid, while responses were recorded for an SNR range of -6 dB to 6 dB for the situations involving hearing aids.

Test subjects

12 males with an average age of 65 (ranging from 30 to 81) took part in the study. Test subjects with hearing loss falling within the fitting range for Lyric were selected. Three subjects returned the devices before completing the study and therefore did not take part in all of the measures. The number of Lyric data records included in each case is indicated in the caption for each figure.

Results of the speech tests

The results of the Freiburg Speech Test shown in Fig. 1 indicate that, on average, the test subjects achieved equal results with Lyric compared with the digital devices for both presentation levels. A clear improvement is discernable with both devices compared to the situation involving no hearing aid at all.

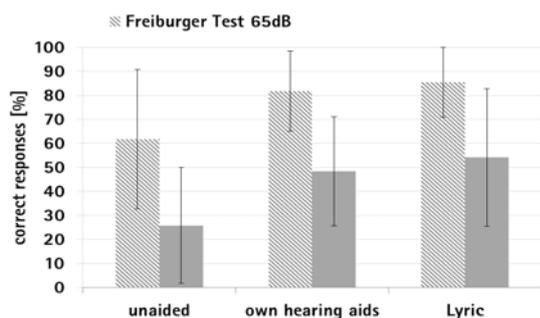


Fig. 1: Averaged results of the Freiburg Speech Test with standard deviations at 50 and 65 dB (n=12, Lyric n=11)

The results of the OISa (Fig. 2) indicate that a lower SNR was achieved with Lyric, particularly under the test condition involving speech sounds emitted from the front and background noise from behind. An improvement was also observed with both devices compared to without a hearing aid.

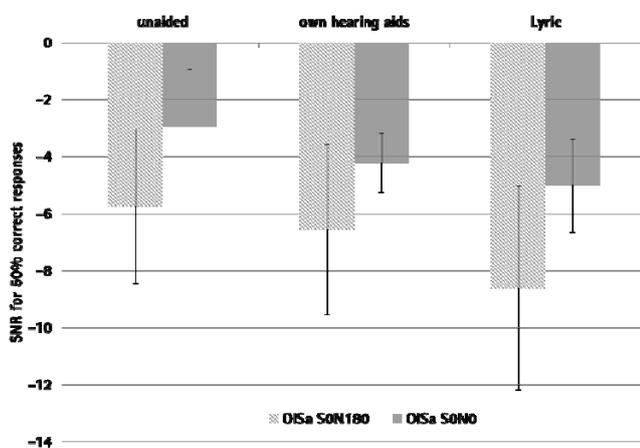


Fig. 2: Averaged results of the OISa with standard deviations for all test conditions (n=12, Lyric n=9)

Other results

The localization test showed, on average, a smaller deviation with Lyric (see Fig. 3), as the test subjects were better able to attribute the test signal to the correct loudspeaker, especially in the case of signals from the front and a diagonal frontal angle (0 and 315 degrees). Both devices produced equal results in the localization of signals from behind (180 degrees) and to the side (90, 270 degrees). With sound emitted from behind in particular, both showed a clear improvement compared to the result without a hearing aid.

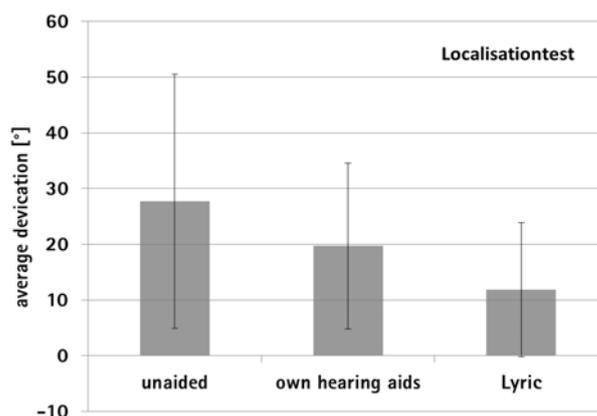


Fig. 3: Average deviation of the selected and actual directions in the localization test (n=10)

No difference between the various test conditions could be identified from the results of the listening effort evaluation. Lyric and the digital hearing aids produced equal results on average.

Conclusion

Due to its analog signal processing, Lyric offers considerably fewer adjustment options and technical features compared to digital hearing aids. Within the context of measures used for this study, however, Lyric has been shown to be on par with the digital hearing aids. The results clearly reveal that Lyric's technological differences do not present any disadvantages for users with regard to speech intelligibility in quiet and noisy conditions or in localizing sound sources. Overall, the results present a balanced picture. The question posed in the introduction – querying whether Lyric is capable of offering users equal benefits compared to digital devices in spite of its analog technology – can therefore be answered in the affirmative.

The study also demonstrates that Lyric is not suitable for every ear canal or patient and requires specific anatomical conditions, which are not relevant for conventional hearing aids. In terms of offering satisfactory wearing comfort, however, Lyric is able to generate exceptionally high customer satisfaction thanks to its invisible appearance and the minimal handling it requires.

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