

# DSP in hearing aids

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# 1 DSP in hearing aids

## 1.1 Hearing impairment

Our hearing can be impaired, either from natural causes or by accidents.

Causes can include:

- Old age
- Hereditary causes
- Infections
- Acoustic trauma

Luckily we are not reduced to use the old hearing horns or conversation tubes. We have DSP!

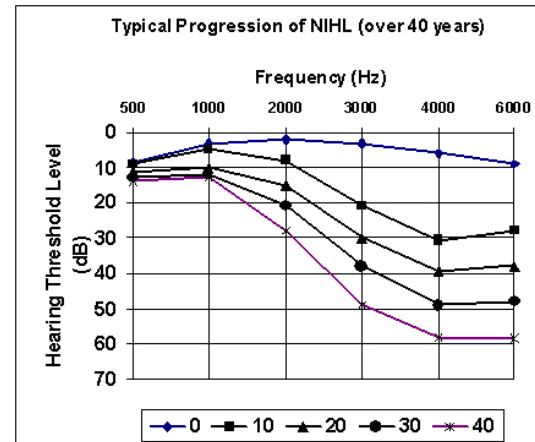


Figure 1: NIHL: Noise Induce Hearing Loss

## 1.2 DSP to the rescue

As can clearly be seen in the figure above, a straight amplification of all frequencies would be inappropriate as it would make frequencies in which the impaired had no loss of hearing sound too loud. Amplifying only the frequencies which the impaired have a hearing loss makes much more sense.

Singling out these frequencies and amplifying them can perhaps be done using analog devices, but it would mean a bulky hearing aid and one that could not easily be adopted to different types of hearing loss.

A digital hearing aid can be loaded with different profiles according to the specific need of its wearer.

## 1.3 All this and brains too

DSP can not only help us make easily configurable hearing aids, the technology can also improve on the sound delivered from the microphones in the device.

Some sounds are undesirable, like wind noise. There is a reason why reporters have big fluffy microphones when interviewing people in windy conditions. A big fluffy microphone would look awkward on a sleek digital hearing aid. Not to mention the fact that it would not be needed indoors. DSP can help us here too, as specific noise-profiles can be reduced and further help the wearer hearing what is important.

Other examples of reduceable noise:

- Paper
- Running water