Digital hearing aids
for beginners

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A digital hearing aid

- What you are thinking is quite correct, they can look just the same as analogue hearing aids!
How does a digital hearing aid work?

- A digital hearing aid has a computer inside to control it.
- The computer memory stores settings for its user.
- The computer program uses the stored settings to tailor the hearing aid sound to suit the user.
What happens?

- The computer programme monitors the sound through the hearing aid and ‘instantly’ adjusts the way that the hearing aid amplifies the sound.

The objective is, as usual, to adjust the sound to be within the user’s ‘window of hearing’.
Different digital hearing aids work in different ways, but usually...

The speech spectrum is split into frequency bands or slices

- Computer technology allows for precise matching of each ‘slice’ for the specific hearing loss
Each slice may be programmed differently e.g. more gain where there is more hearing loss

- Soft, medium & loud sounds can be treated differently
Quieter sounds can be amplified more than loud sounds to make them audible - compression.

Louder sounds can be limited so that they are kept comfortable.

Different profiles can be stored for different situations.

Speech, music, high noise, fm etc.
What about user control?

- A choice of programmes to suit different situations
- Usually chosen by a switch or button on the aid
- Sometimes there is a remote control device
- Sometimes all programmes are set the same for younger people
What about volume control?

- Sometimes there is no volume control wheel on the hearing aid (!)
- If there is a volume control it may not have been activated
- Some volume controls operate with a limited ‘up a bit’ or ‘down a bit’ adjustment
How does a hearing carer do a listening test with no control?

Always use an attenuator when listening with a stetoclip for daily testing.
So how is a digital hearing aid programmed?

- Take a computer
Add some software

hearing aid software is called NOAH – after all, we are all in the same boat!

module for your specific hearing aid/manufacturer
Add an interface

- Connection to the computer is via a Hi-pro universal interface
- Hearing-instrument programmer

e.g.
Connect up the equipment

- The digital hearing aid needs to be connected to the hi-pro box.

- Now unfortunately that’s not quite as easy as it sounds as virtually all hearing aids require a different connection lead!
Connecting leads

- Some hearing aids are connected using a lead and special shoe
Connecting leads

- Others have a miniature connector hidden under a cover plate...
So we have ....

Computer to Hi-pro to hearing aid
What happens next?

The audiologist needs to …

- tell the computer software details of the hearing loss
- use software to generate targets
  - use their expertise
    - to measure individual ear variations
    - to tweak the hearing aid to suit the user
- verify that soft, medium, loud & v loud sounds are both audible & comfortable
What happens next?

The audiologist can activate different options within the hearing aid:

- Directional microphones
- Feedback control
- Noise reduction
- Multi-memory – to cater for a range of listening situations or simply to select FM

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What does the audiologist see when programming & what can they change?

Some example computer screen displays follow ....

But do not worry too much about specific details as they vary from hearing aid to hearing aid.
What has been chosen for programme 1? Will the volume control work?
How has the volume control been programmed?
Programme 2 selections .... plus .... what noise cancellation is selected?
Will the hearing aid microphone be live for direct input?
Choose ‘FM+M’ for start up program for little ones. Older children may want to switch to ‘FM only’ for lecture style classes.
Well what does this all mean?

- Mind boggling options
- The ability to closely programme a hearing aid to suit an individual user
- No chance of knowing what to expect unless you are told how an aid has been programmed
- Access to features not previously common on hearing aids
Return visits to the clinic may be required

- We are all individuals and fittings can often be improved as a result of real life evaluation by users, parents & teachers
- The possibility of human error (sorry) with using new technology
What can be achieved?

- In many cases noticeably improved listening experiences
- More hearing aids left turned on!
- *but* it takes time to explain the operation, understand the possibilities and get used to a different sound
What must we learn?

The need for communication is paramount

*Between …*

Hospital → User

Carer → Education

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Do not forget

A new digital aid is only part of the story

Also needed are …

- Good earmoulds
- Access to fm equipment
- Continued audiological support
Is it all worth it?

- There is only one answer
- A positive \(\text{yes}\)
Thank you for your time

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Some buzz words explained

- DSP = Digital Signal Processing
- WDRC = Wide Dynamic Range Compression