REROUTING SIGNAL IN SINGLE SIDE DEAFNESS

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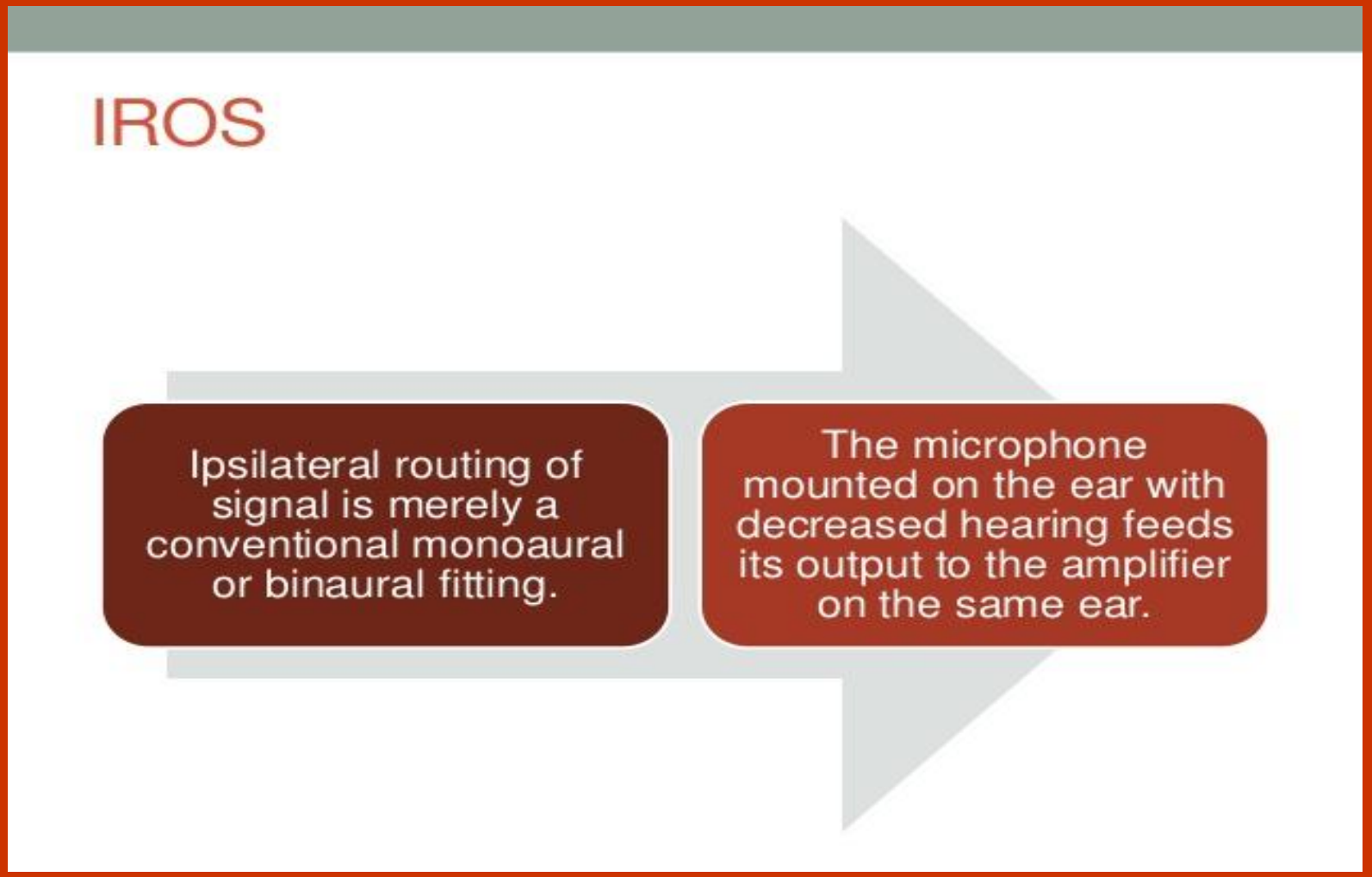
ROUTING OF SIGNALS

Routing Of Signals

1. IROS
2. CROS
3. BICROS
4. Stereo CROS (CRIS-CROS)
5. Transcranial CROS

IROS


IROS
Ipsilateral routing of signal is merely a conventional monoaural or binaural fitting.
The microphone mounted on the ear with decreased hearing feeds its output to the amplifier on the same ear.

CROS

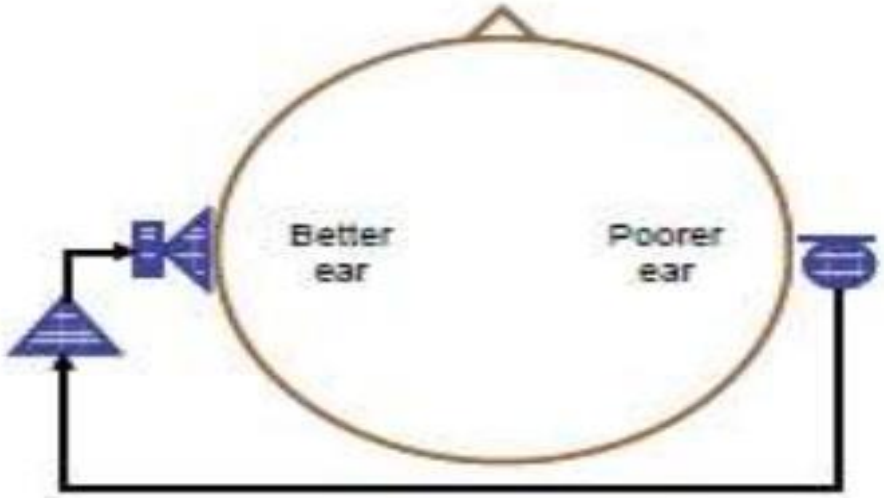
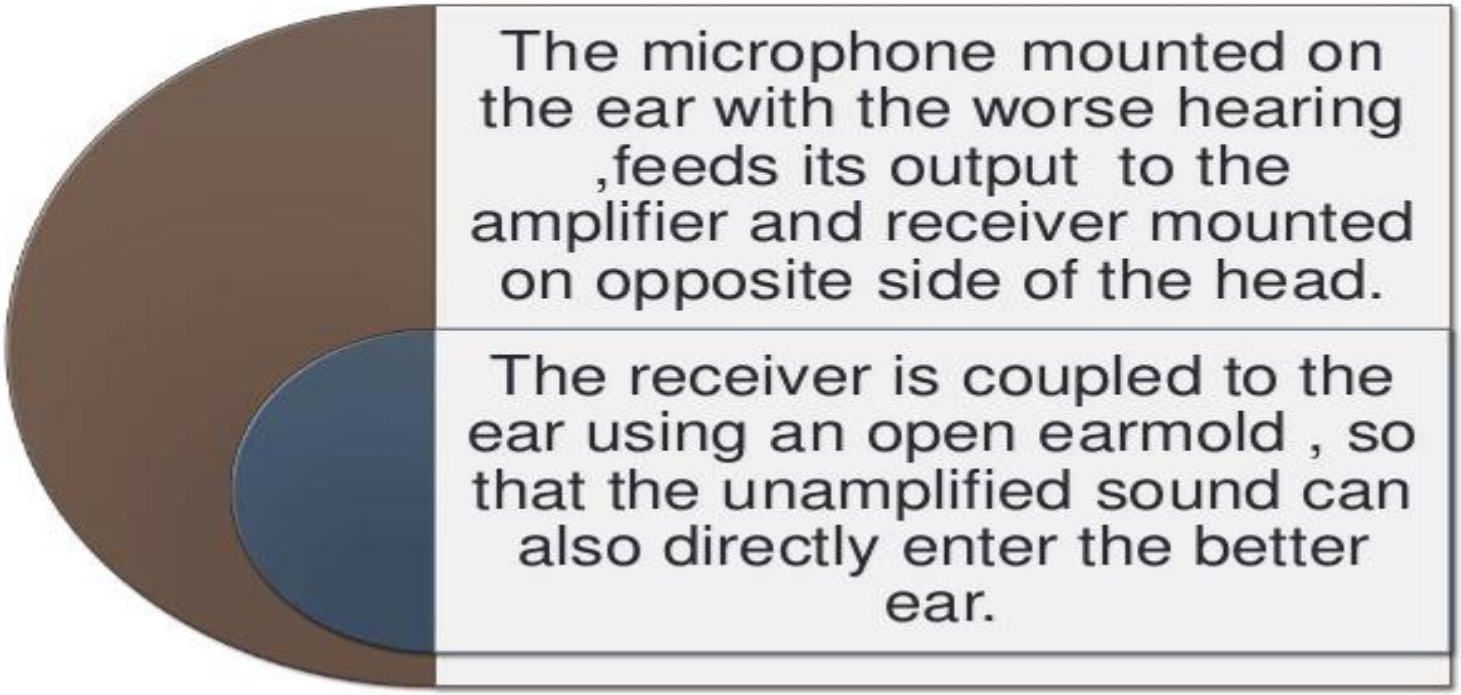


Figure 17.1 Block diagram of a CROS hearing aid system, viewed from above the head.

CROS HEARING AIDS

Simple CROS aids



STEREO CROS – CRIS CROS

Stereo CROS(CRIS-CROS)

- The left microphone feeds the receiver on the right side and the right microphone feeds the receiver on the left side.
- Invented with an aim of achieving high gain, combined with an open fitting , in both ears.
- The hope was that because each microphone is separated by head from receiver to which it is directly connected,the feedback path would be weak.

BICROS

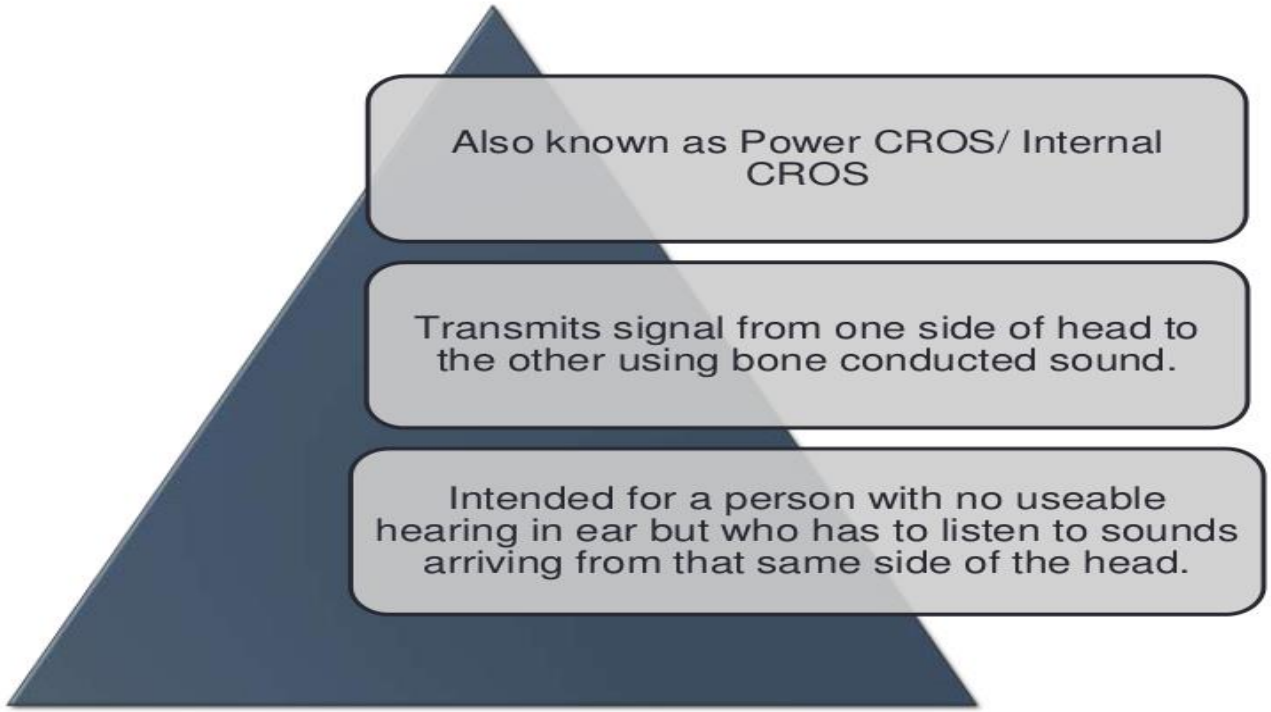
Bilateral CROS aids (BICROS)

The sound is picked up by both microphones and amplified signal is fed to one side

The BICROS fitting is useful where one ear has substantially greater degree of hearing loss or worse discrimination than the other ear or where chronic drainage percludes using an earmold or even tubing earpiece.

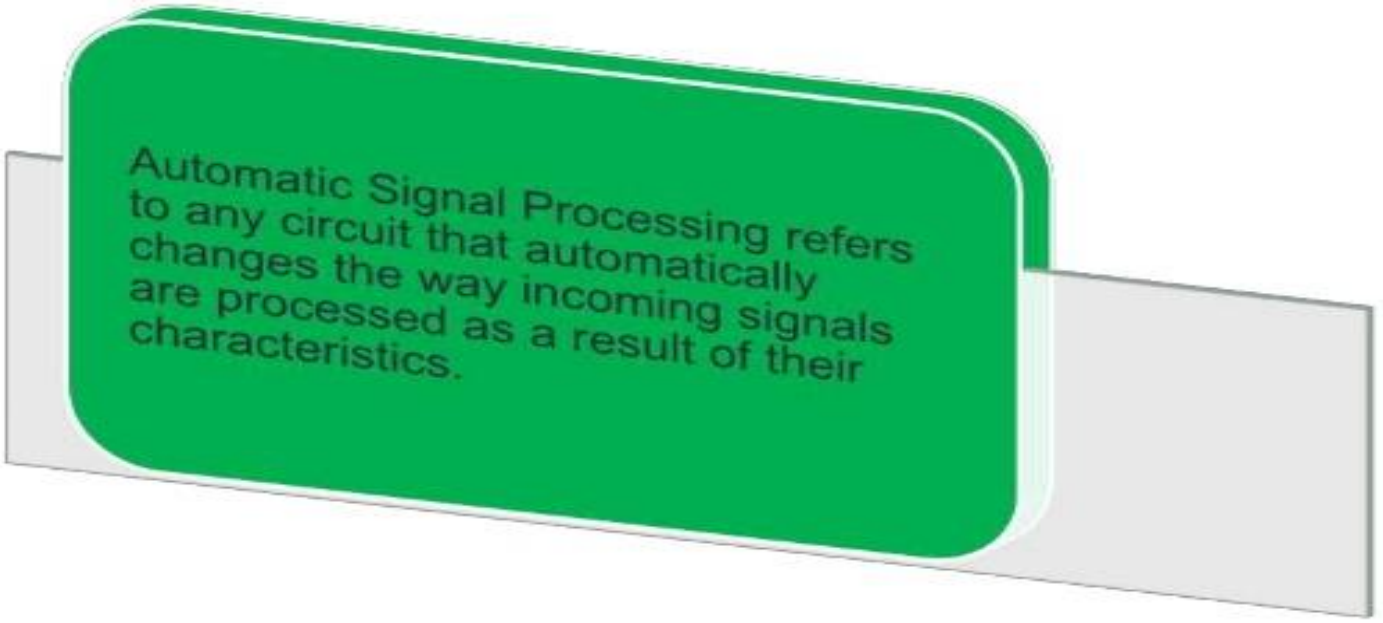
TRANSCRANIAL CROS AIDS

Transcranial CROS aids

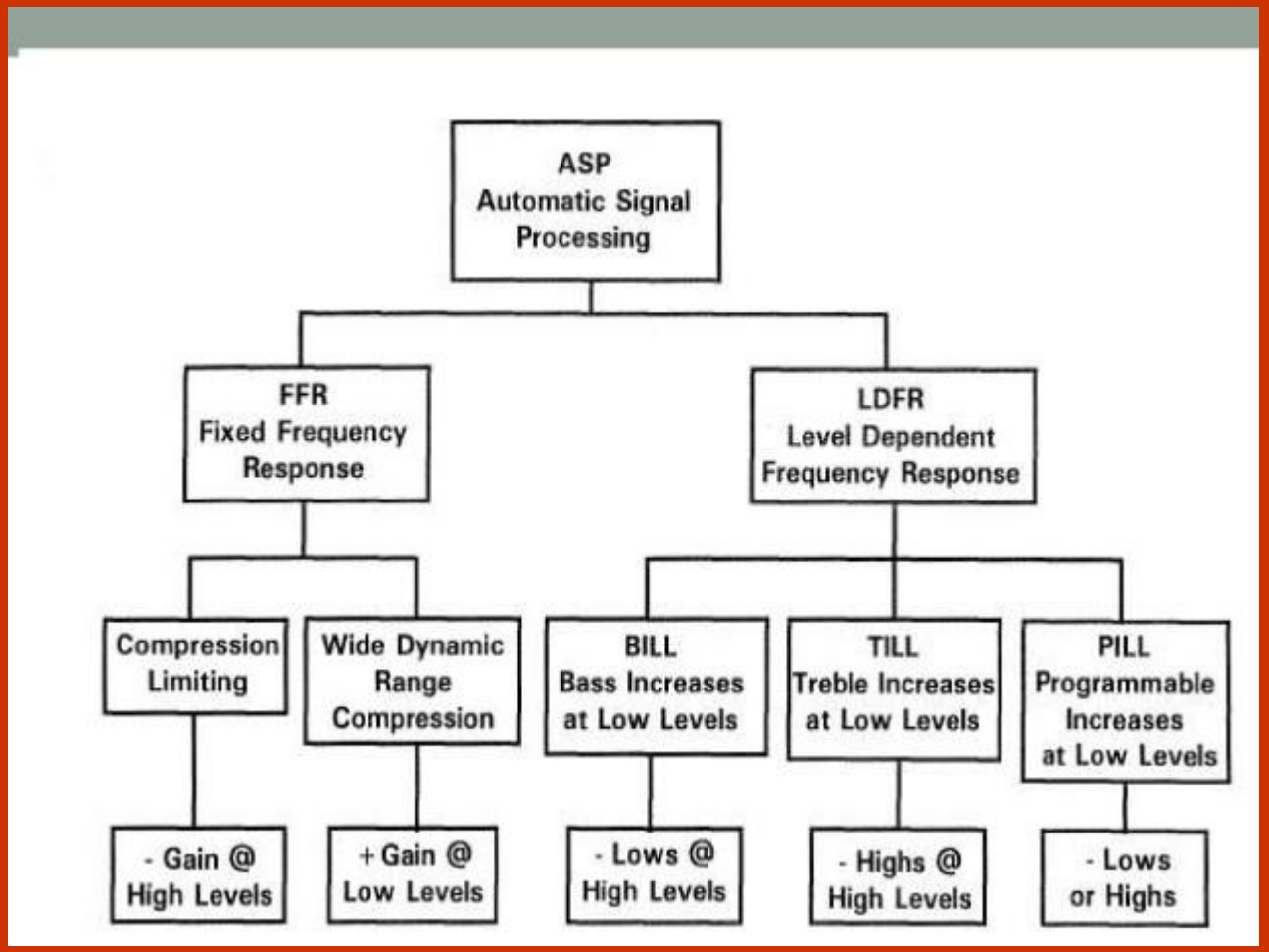


AUTOMATIC SIGNALPROCESSING

Automatic Signal Processing



AUTOMATIC SIGNALPROCESSING



BONE ANCHORED HEARING AID - BAHA

DENTAL PROSTHESIS

Intra-oral (i.e., dental) bone-conduction device with a microphone in the ear canal and a sealed thin, flat piezoelectric vibratory transducer (and battery) custom made to fit alongside the teeth.

IMPORTANT ISSUES

- ***Testing in quiet and in noise.***
- ***Testing in real life situations.***

BENEFIT?

- BETTER HEARING
- BILATERAL HEARING
- BINAURAL HEARING
- SOUND LOCALISATION
- SPEECH DISCRIMINATION
- HEARING IN BACKGROUND NOISE
- HEARING FROM THE DEAF SIDE

BINAURAL HEARING – THE BASICS

- In order to understand sound in very difficult listening situations (i.e., noise), the human brain must compare and contrast sound from the left and right sides.
- The variation in interaural timing differences (ITDs) and interaural loudness differences (ILDs) from both sides (as well as other factors in binaural summation and binaural speech) provides enormous information allowing the brain to know where to / what to focus on.
- When reliably and clearly transmitted and perceived, these same factors (ITDs, ILDs) allow the brain to assign meaning to sounds.

Understanding speech-in-noise is not specifically about loudness, per se, but involves many factors

- Signal-to-noise ratio (how loud the signal of interest is above the noise floor)
- Audibility (are all speech sounds present)
- Preservation of acoustic speech cues
- Most importantly, the brain's ability to compare and contrast information from the left and right side to first identify left and right differences (with respect to ILD and ITD) and to assign meaning to sound.

BENEFIT?

For the brain to maximally understand speech in noise, the brain requires input from the left and right side. Delivering sound to the better cochlea, although potentially beneficial, no rerouting aid or system provides true binaural hearing in cases of single sided deafness, as only one cochlea is stimulated.

BENEFIT?

Finbow and al reported that “it is well established that the CROS and BAHA do not improve sound localization abilities for people with SSD….”
“with our relatively low numbers, neither the benefit or decrement is significantly different from unaided….”
“our results confirmed, as expected, that performance is better in all device conditions with noise to the poorer ear, i.e., in the condition in which the noise is attenuated by the head shadow before it reaches the better ear to mask speech….”
The authors concluded that CROS hearing aids and BAHA “seem to perform roughly equivalently…”

BENEFIT - THE REALITY

- Hayes (2006) notes that CROS and BiCROS systems may be wired, wireless, or transcranial.
- "It is not very realistic to expect substantial benefit with a CROS aid in most types of background noise.
- The resources required for perceiving speech in a diffuse noise background (localization and figure/ground separation) cannot be provided by a device that only aids one ear.
- Those skills require binaural input….

BENEFIT - THE REALITY

Oeding and Valente (2013) examined differences in the reception threshold for sentences across four conditions
unaided, no Noise Reduction (NR), mild NR, and maximum NR.

"no significant differences were found across the four conditions.

"none of the three aided listening conditions were significantly different from unaided performance…"

Howeve, subjectively, significant benefits were found via the APHAB (Abbreviated Profile of Hearing Aid Benefit).

CONCLUSION – BENEFIT OF REROUTING THE SIGNAL

Finally, it is the truth if you think so.

L. Pirantelo