

Only quality controlled induction loops are fit for the future.

The new international standard
IEC 60118-4 for Audio-Frequency
Induction Loop Systems

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Increasing Signal-to-Noise Ratio

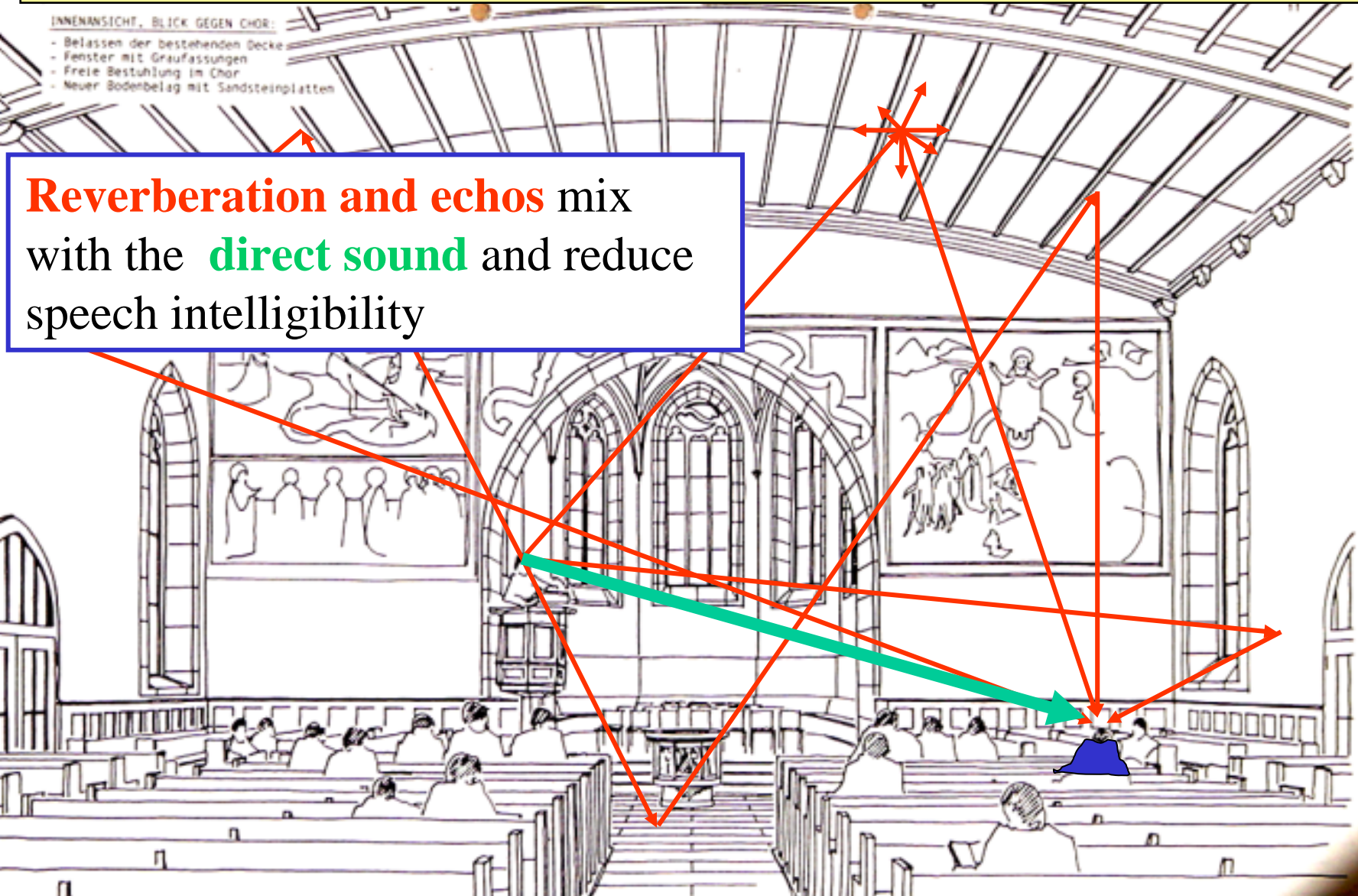
The Need for Assistive Listening Devices

- Reverberation
- Distance to the sound source
- Ambient noise

No noise through echos (reverberation)

INNENSICHT, BLICK GEGEN CHOR:
- Belassen der bestehenden Decke
- Fenster mit Graufassungen
- Freie Bestuhlung im Chor
- Neuer Bodenbelag mit Sandsteinplatten

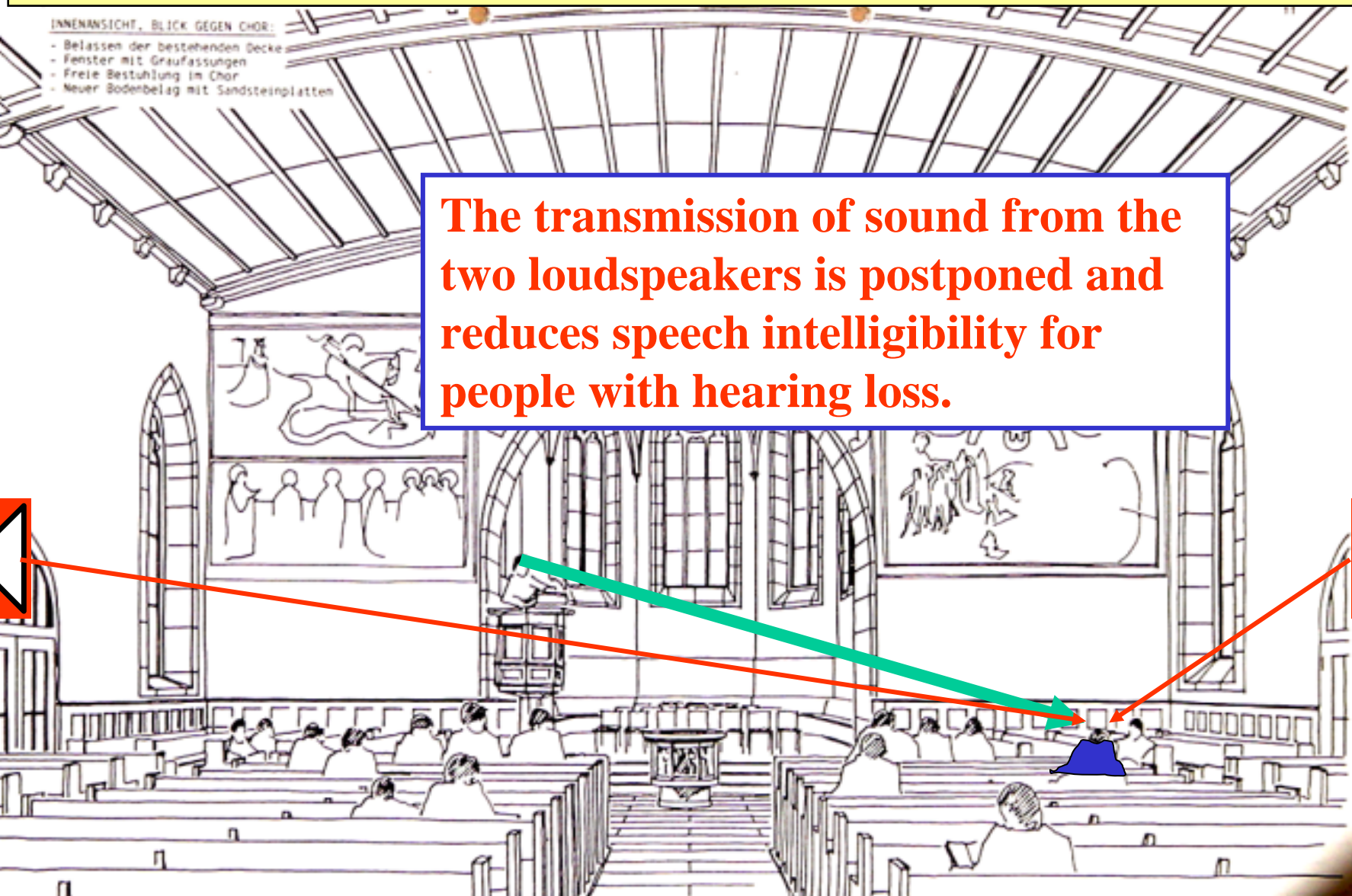
Reverberation and echos mix with the **direct sound** and reduce speech intelligibility



No transmission time postponement

- INNENSICHT, BLICK GEGEN CHOR:
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The transmission of sound from the two loudspeakers is postponed and reduces speech intelligibility for people with hearing loss.



No ambient noise

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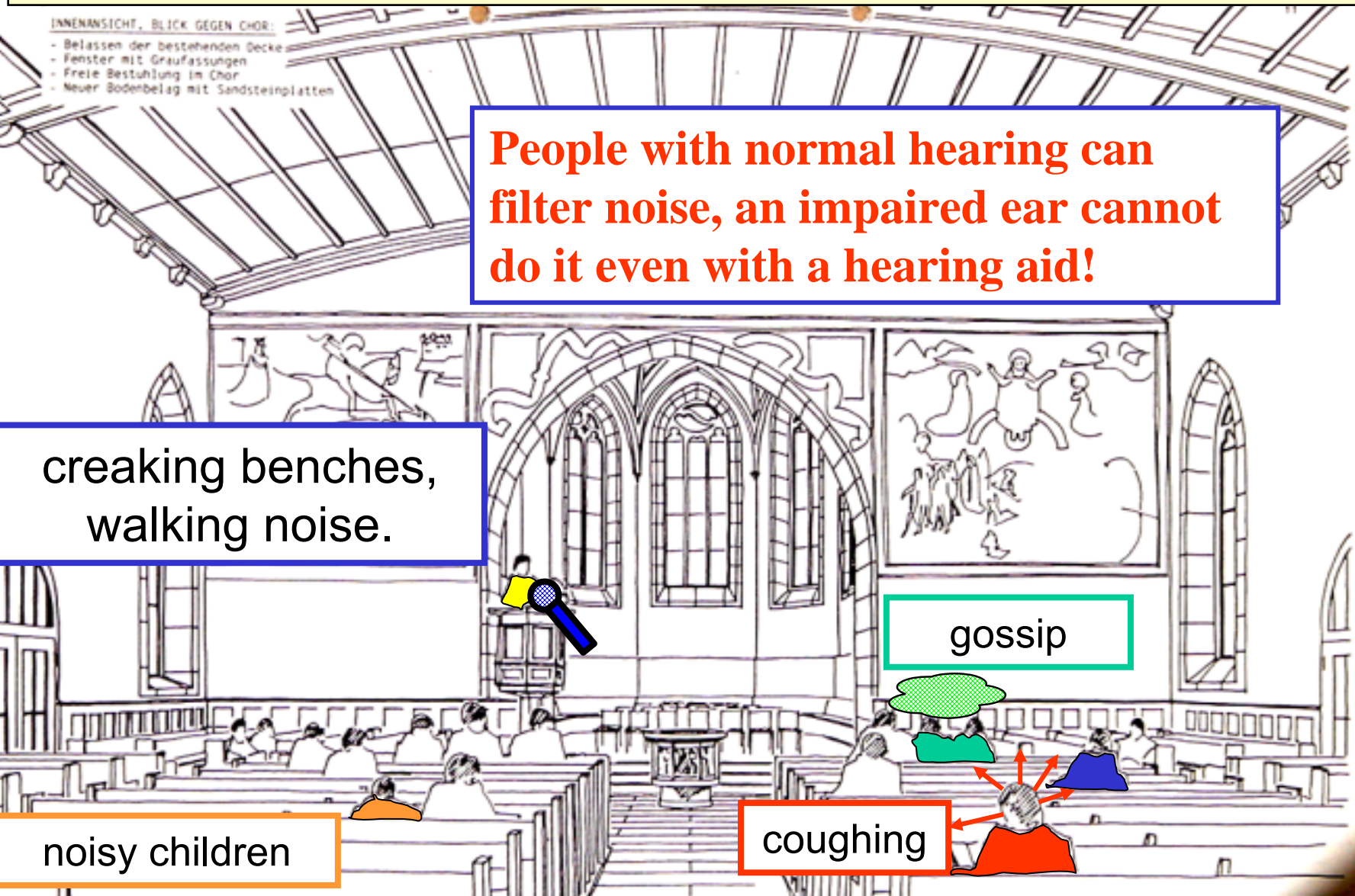
People with normal hearing can filter noise, an impaired ear cannot do it even with a hearing aid!

creaking benches,
walking noise.

gossip

noisy children

coughing



Assistive Listening Systems:

Induction loop

- + Most hearing aids have integrated induction coils (telecoil, T-coil)
- + Cochlear implants have integrated or accessory T-coils, - only 1 channel

Infrared

- + Discretion, more than 1 channel
- Direct visual contact needed, extra device for reception needed

Frequency Modulation (FM)

- + Mobility, more than 1 channel
- No discretion, extra device for reception needed

IEC standard 60118-4: (1981)1998

Average field strength

(-20 +/- 3) dB re. 1 A/m,
which is 100 mA/m +/- 3dB at 1
kHz

Maximum field strength

(-8) dB re. 1 A/m,
which is 400 mA/m at 1 kHz

Frequency response

100 Hz to 5,000 Hz
+/- 3 dB re. 1 kHz

Background noise level

Better than -40 dB
re. 1 A/m valued "A" and with
integration time "SLOW".

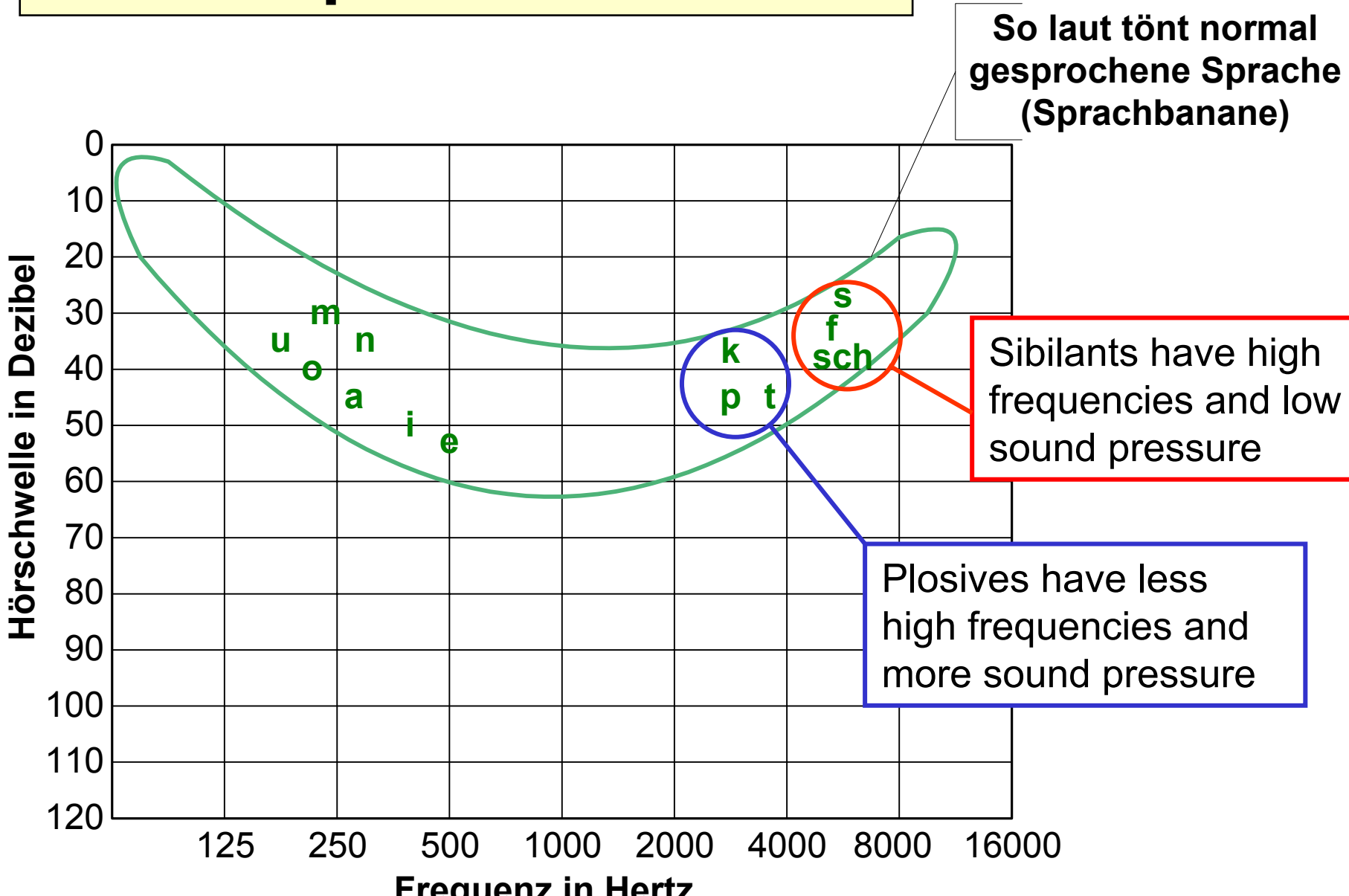
The IEC standard is in revision, draft version (Nov. 2004)



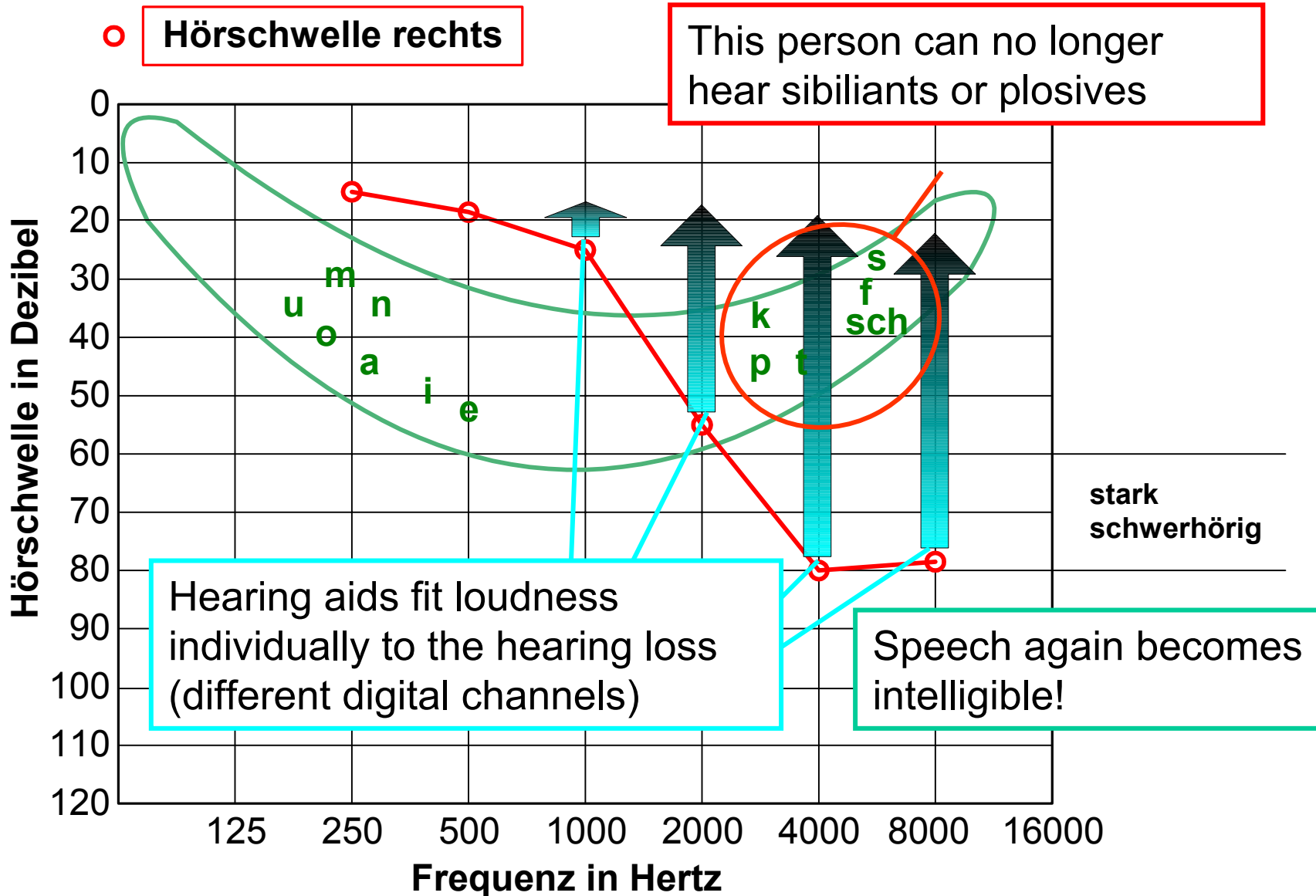
The Audio Frequency
Induction Loop System at
the renovated
Casinotheater Winterthur /
Switzerland exactly meets
the IEC standard 60118-
4:1998.

Measured by David
Norman, 20 February
2003

The speech banana



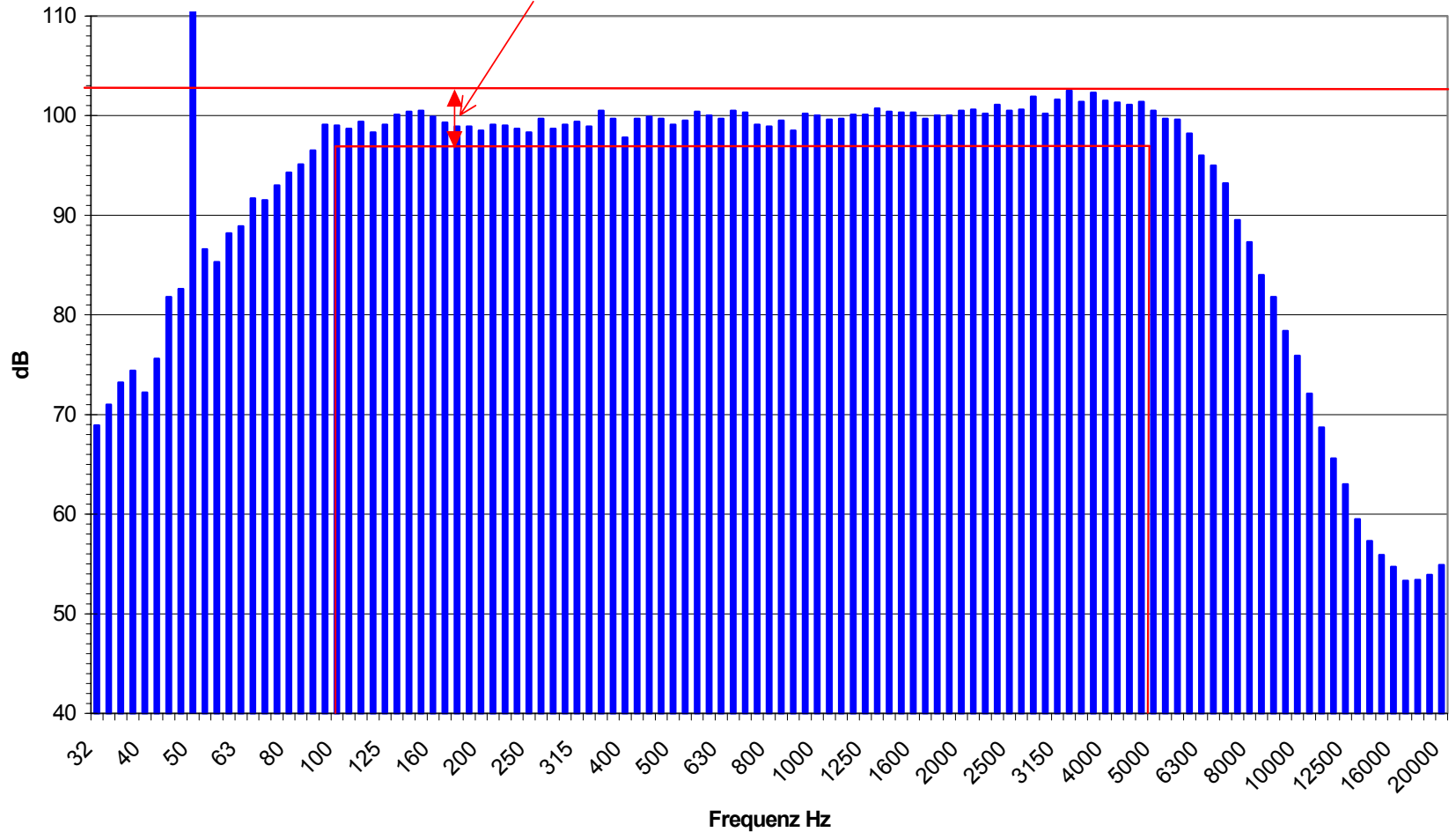
Korrektur mit Hörgerät (schematisch)



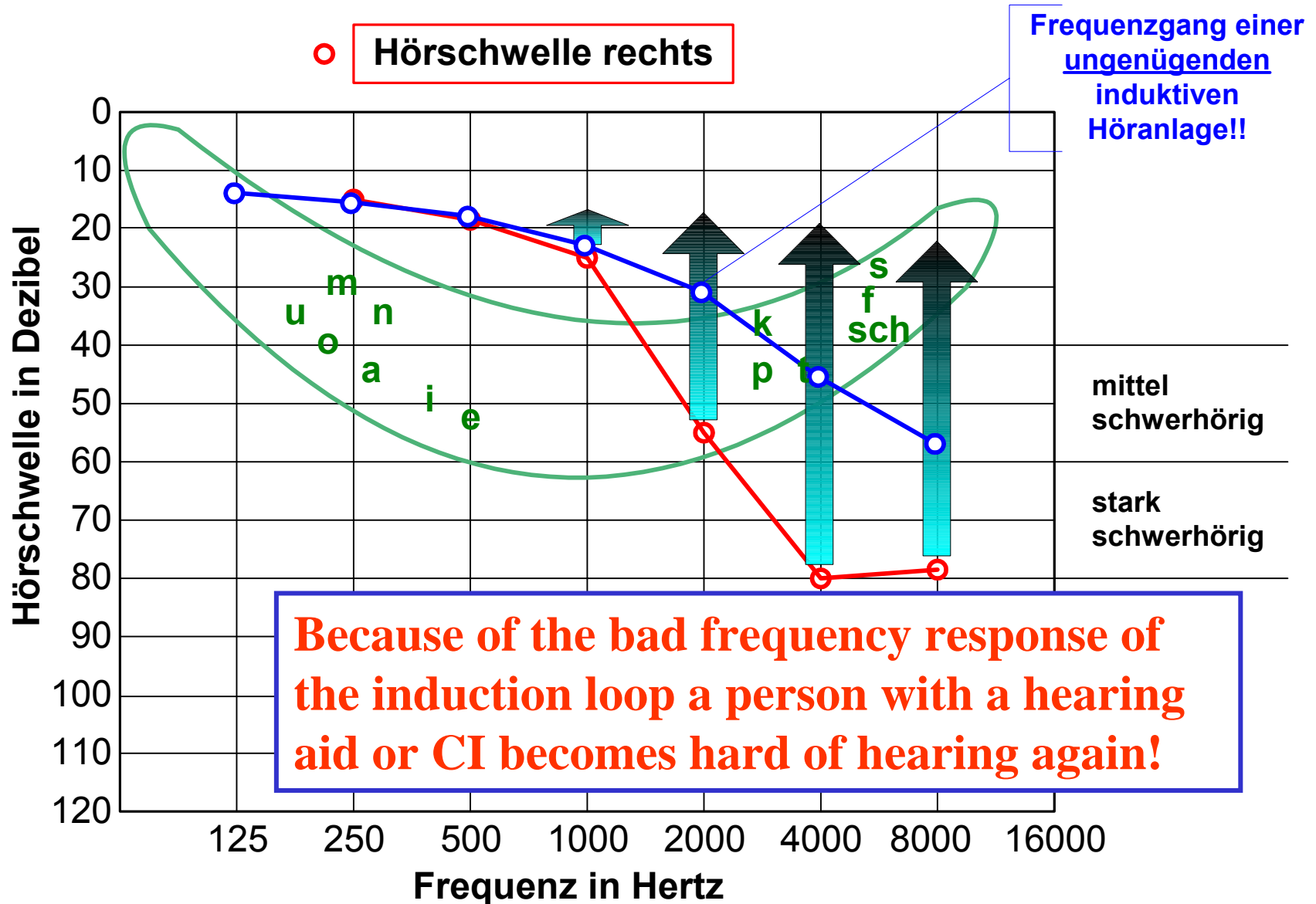
Correct frequency response (IEC standard 60118-4)

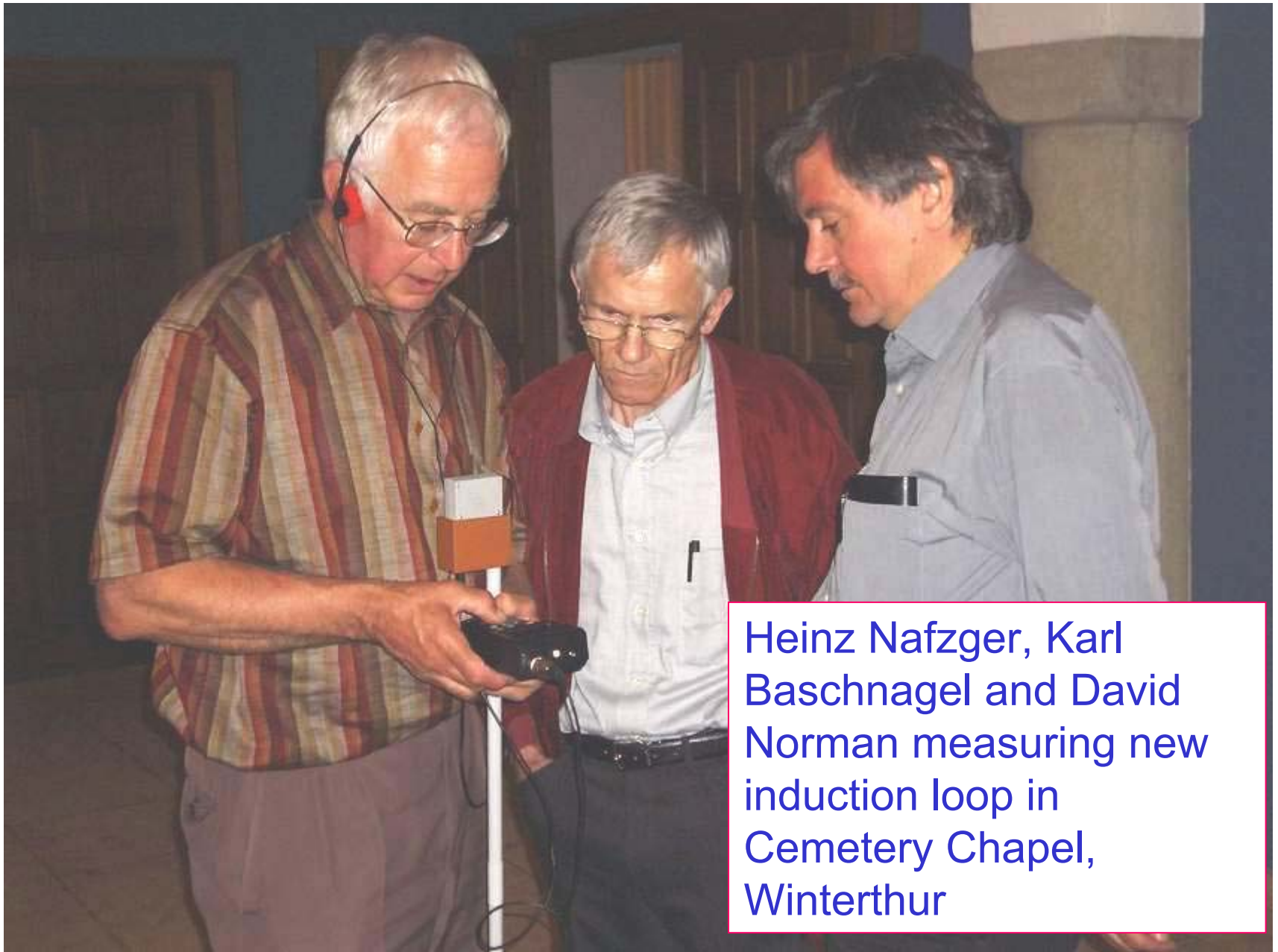
Induktive Höranlage Casino Theater Winterthur
Messungen 20.2.03 Normalisiert auf 100 dB

Toleranz gemäss IEC +/- 3 dB 100 Hz bis 5,000 Hz



Bedeutung des Frequenzgangs bei Höranlagen





Heinz Nafzger, Karl Baschnagel and David Norman measuring new induction loop in Cemetery Chapel, Winterthur

Measuring equipment for induction loops IEC 60118-4:1998



An instruction manual written by David Norman on how to measure an audio frequency induction loop system according to the standards of the International Electrotechnical Commission

(IEC 60118-4) can be found at

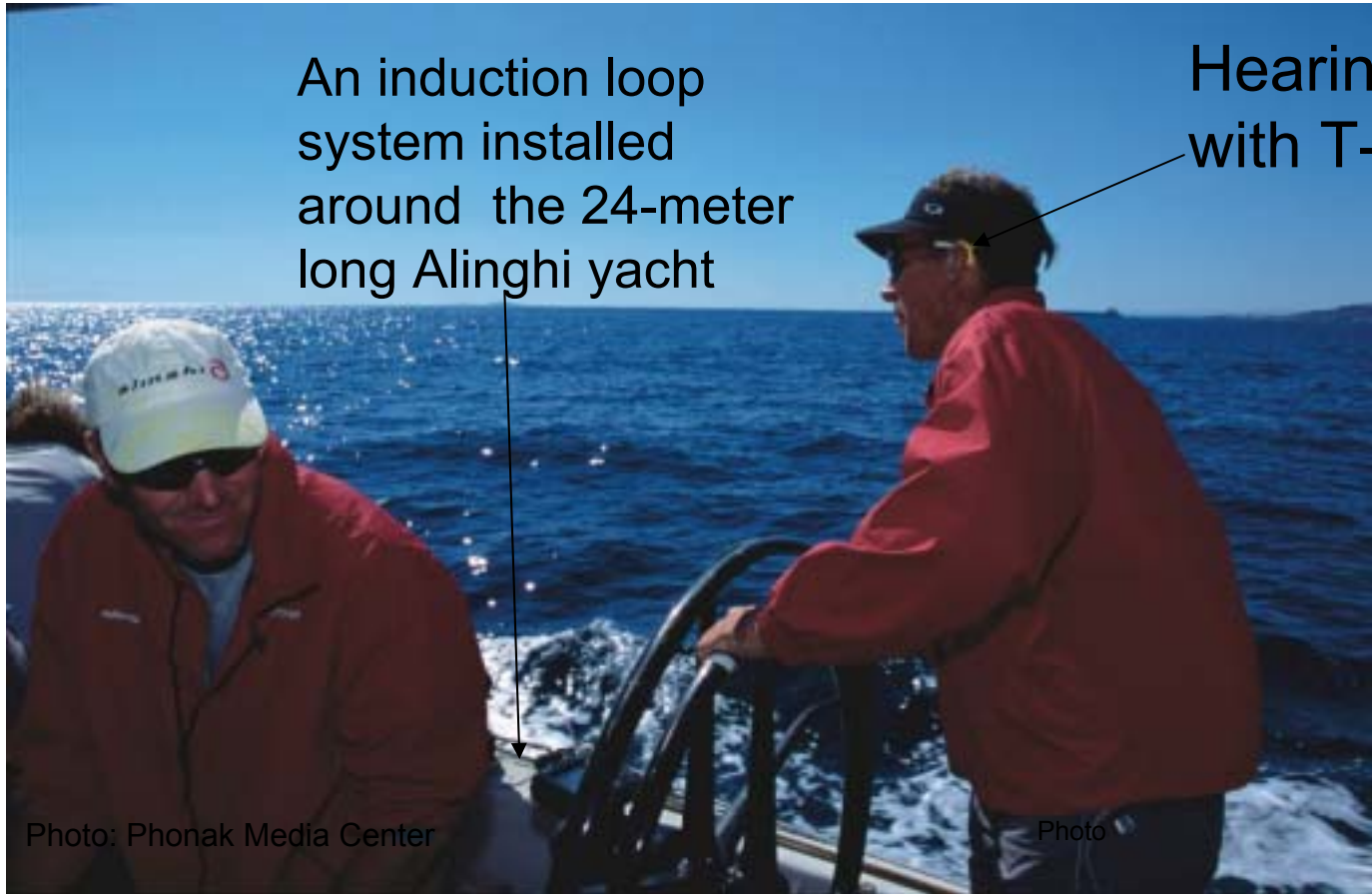
www.nt-instruments.com

Products / Minstruments / Minilyzer

or

www.david-norman.ch

The Swiss Team Alinghi wins the America's cup 2003 Phonak inductive technology wins too



An induction loop system installed around the 24-meter long Alinghi yacht

Hearing aid with T-coil

Photo: Phonak Media Center

Photo

Cochlear implants are ready for induction loops

Cochlear ESPrit 3G with integrated T-coil

Freedom, flexibility & performance. For life.

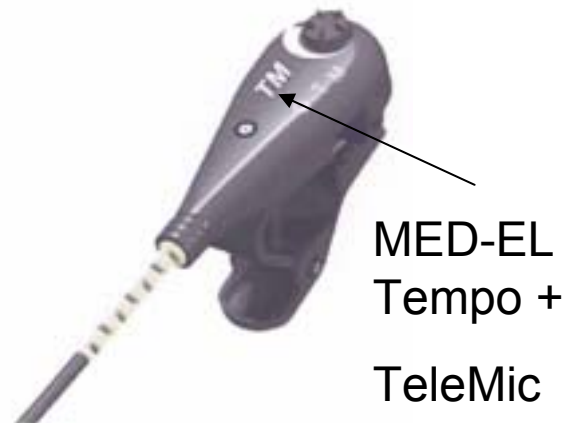
ESPrit™ 3G speech processor



Switch for built-in telecoil and Whisper Setting

T-coil accessories

Advanced Bionics
Auria
T-coil



MED-EL
Tempo +
TeleMic

Induction loops or FM in schools ?

The answer is both!

Example:

The Swiss center and school for hard of hearing students „Landenhof“ in Unterentfelden uses:

☺ **Induction loops in all common rooms**
(auditorium, recreation rooms, TV room)

☺ **FM in the classrooms.** Each class sets the FM receiver to a specific frequency (to exclude crosstalk)

Thank you for your attention



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