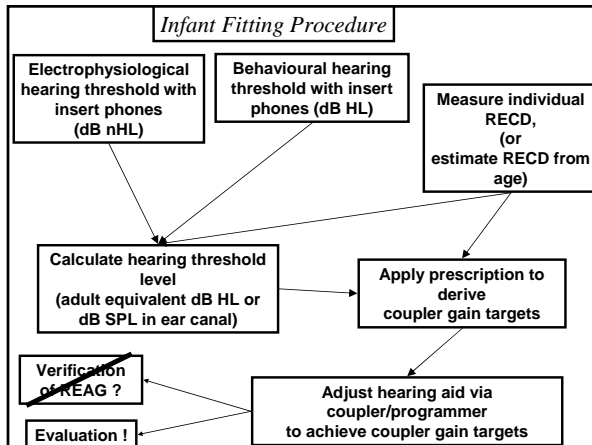
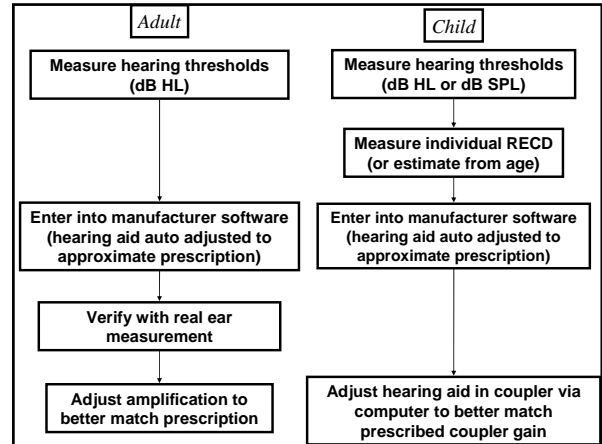


Prescribing hearing aids for adults and children

Harvey Dillon, Gitte Keidser, Teresa Ching,
 Matt Flax, Scott Brewer

HEARING CRC
 National Acoustic Laboratories

Audiology NOW!
 San Diego
 2010



Prescribe hearing aids to:

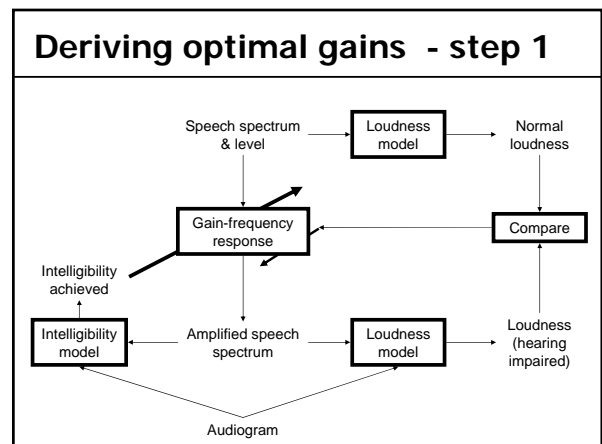
- Make speech intelligible
- Make loudness comfortable
- Prescription affected by other things
 - localization,
 - tonal quality,
 - detection of environmental sounds,
 - naturalness.

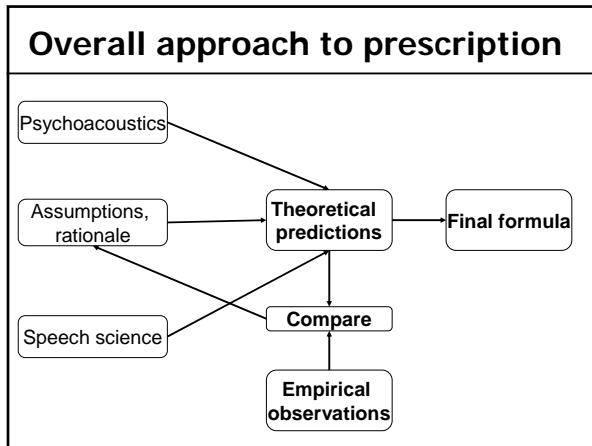
The rationale for NAL procedres

Maximize calculated speech intelligibility ,
 but
 Keep total loudness less than or equal to normal

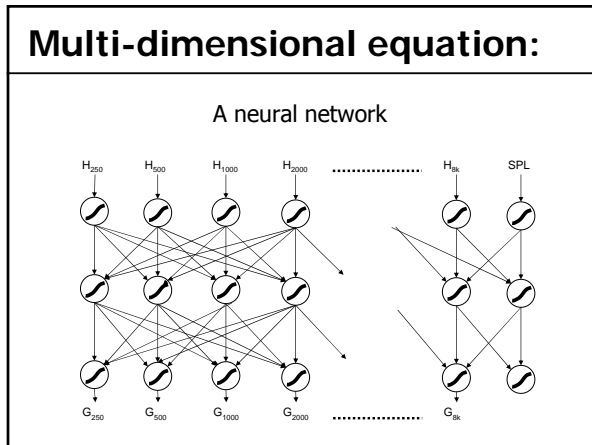
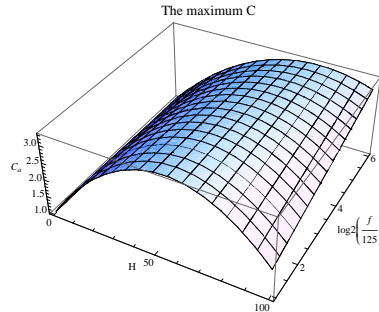
NAL-NL1 (1999) → empirical studies
 → psychoacoustic studies
 → speech intelligibility models

} NAL-NL2

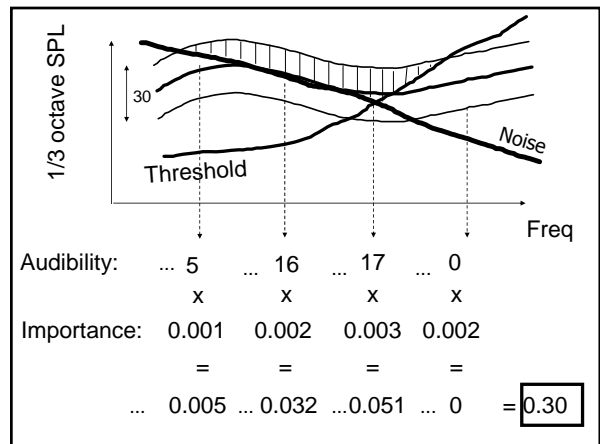
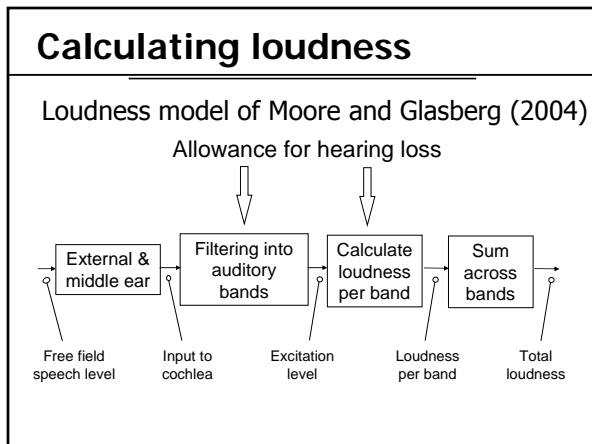


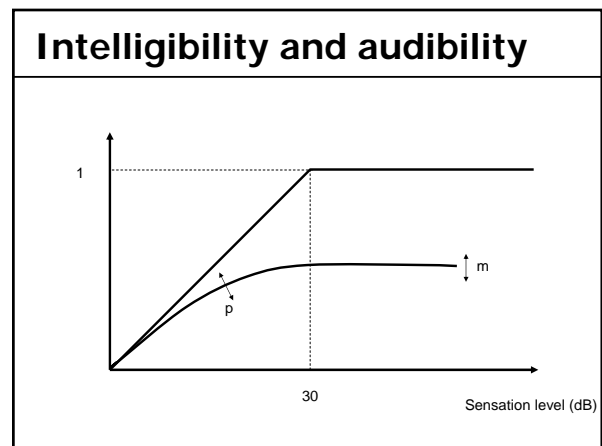
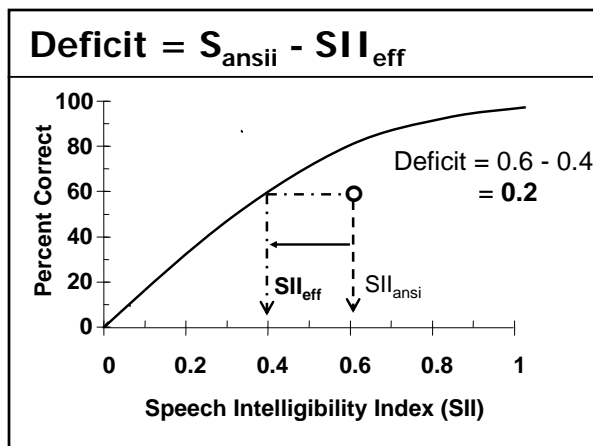
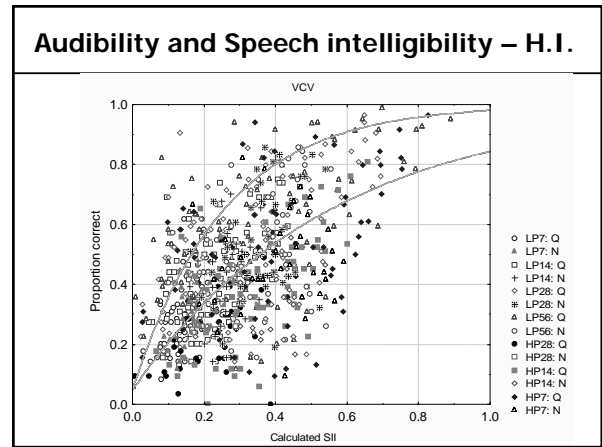
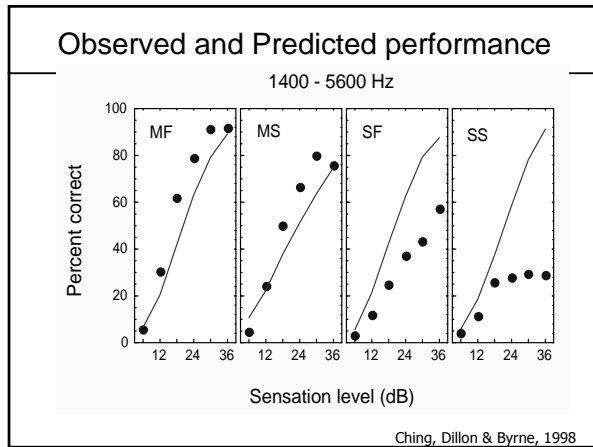
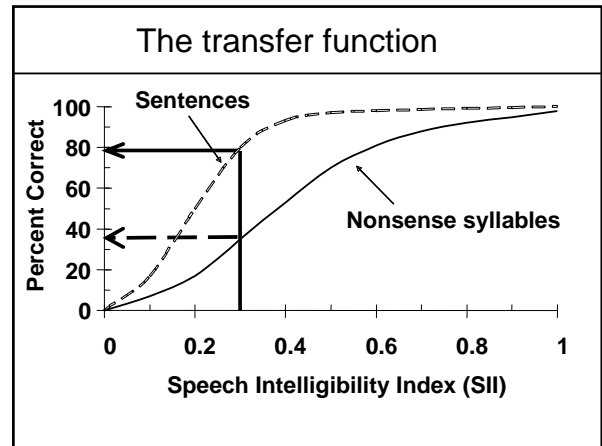
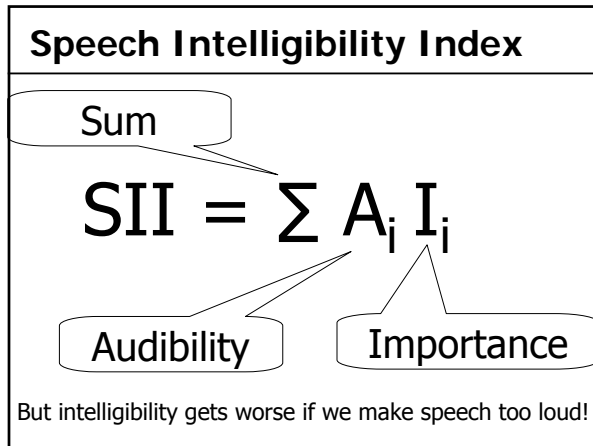


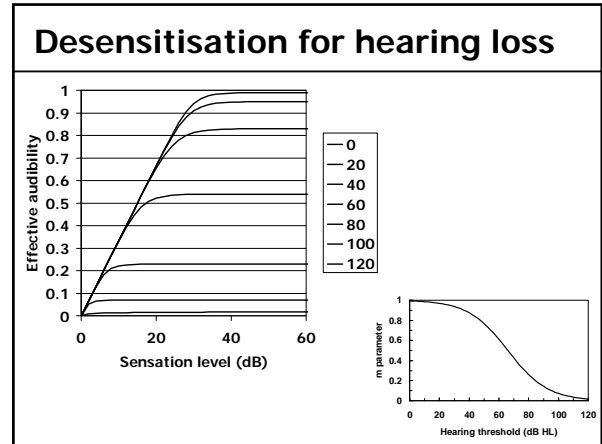
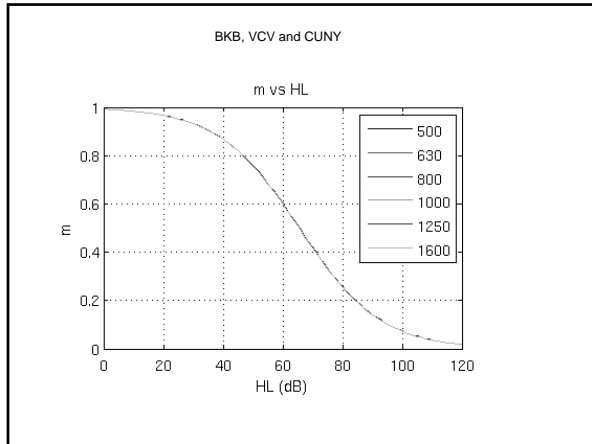
Limiting compression ratio



- ### Effect of language
- Gain at each frequency depends on importance of each frequency
 - Low frequencies more important in tonal languages
 - Two versions of NAL-NL2
 - Tonal languages
 - Non-tonal languages

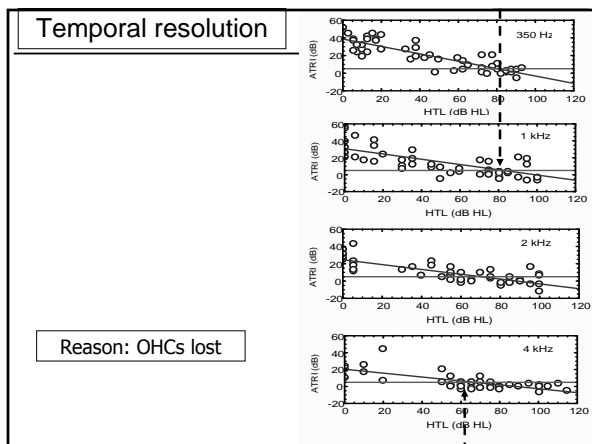
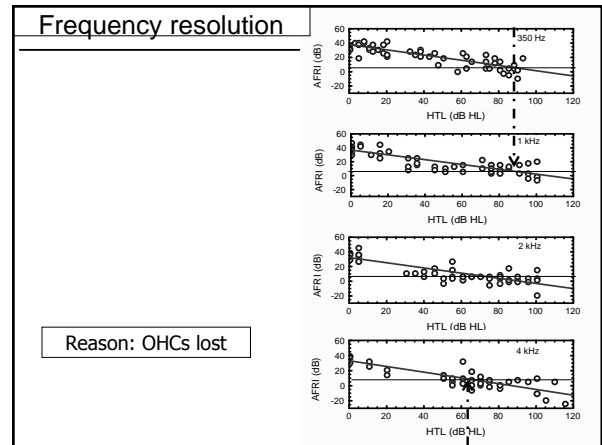







Psychoacoustics

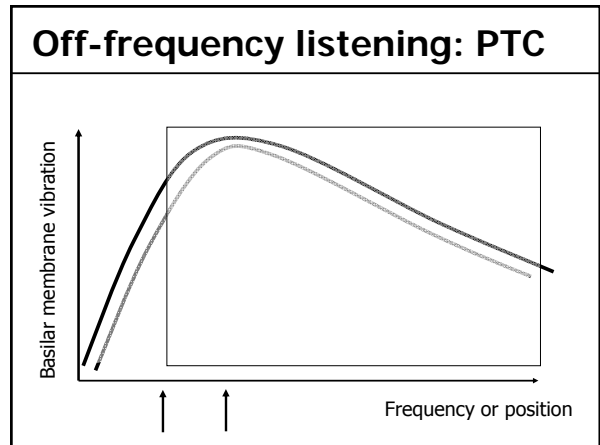
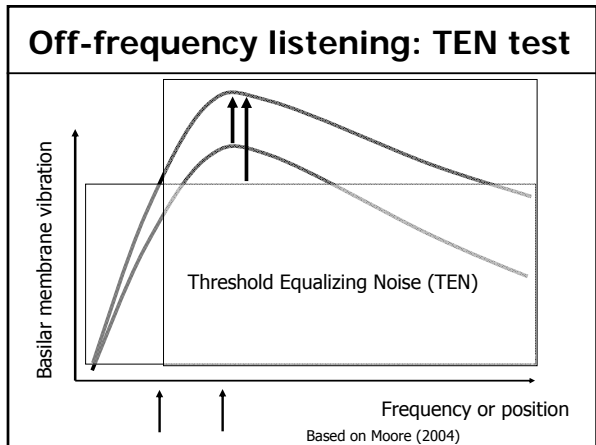
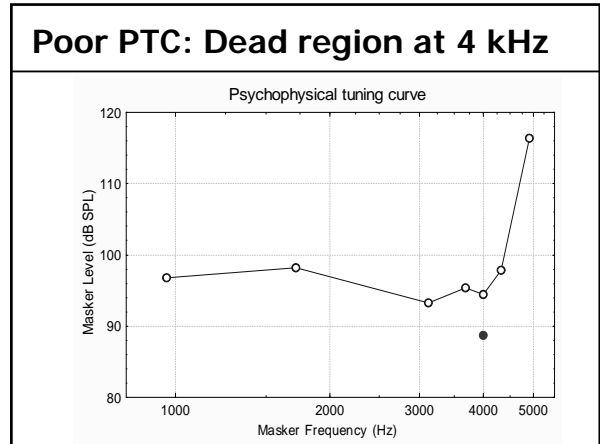
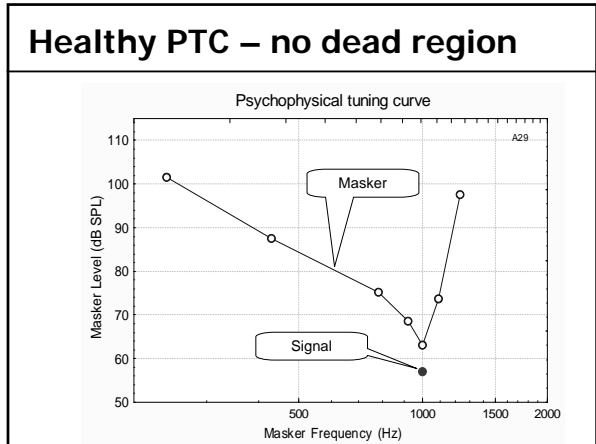
Why measure only pure tone thresholds?



Other measurements

- Hearing threshold levels
- Outer hair cell function
 - click-evoked otoacoustic emissions
- Frequency resolution
 - psychophysical tuning curves
 - cochlear dead regions – TEN test
- Cognitive ability
- Age





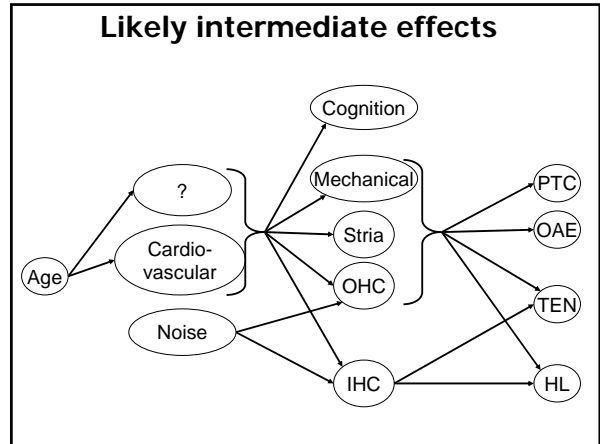
TEN and PTC (non) agreement

2 kHz	TEN: Alive	TEN: Dead	TEN uncertain
PTC: Tip in place	60	1	1
PTC: Tip shifted	4	3	2
PTC uncertain	1	2	1

Can we better predict intelligibility if we use psychoacoustic results?

Yes, a little – speech deficit increases as frequency selectivity gets broader

But not once we fully build HL into the SII prediction



Implications for prescription

Pure tone thresholds critical

Knowledge of temporal resolution, frequency resolution, dead regions adds relatively little to prediction of intelligibility

Age and cognitive ability affect all frequency bands similarly → no effect on gain needed

