
Interactive fitting strategies

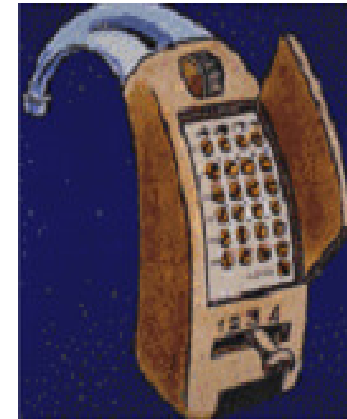
Monique Boymans
Wouter Dreschler

Academisch Medisch Centrum Amsterdam

Classical steps in HA fitting

- “First fit”
 - Usually guided by the fitting rules in the software of the manufacturer
 - Generic rules for group averages
 - Proprietary fitting rules, not evidence-based

- Individual “fine-tuning”
 - Based on subjective reactions / impressions
 - Complaint driven after a trial period

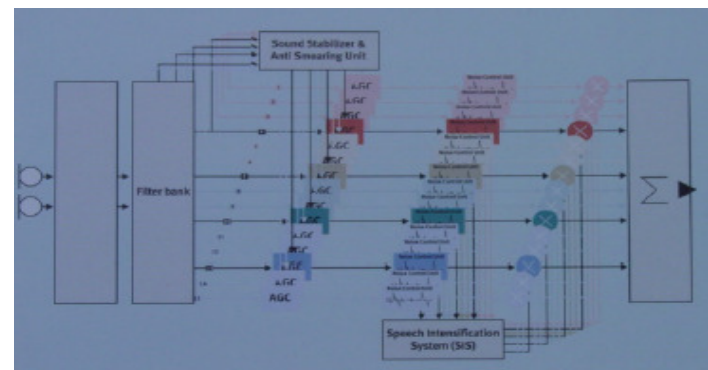


In short: strongly based on ‘trial and error’

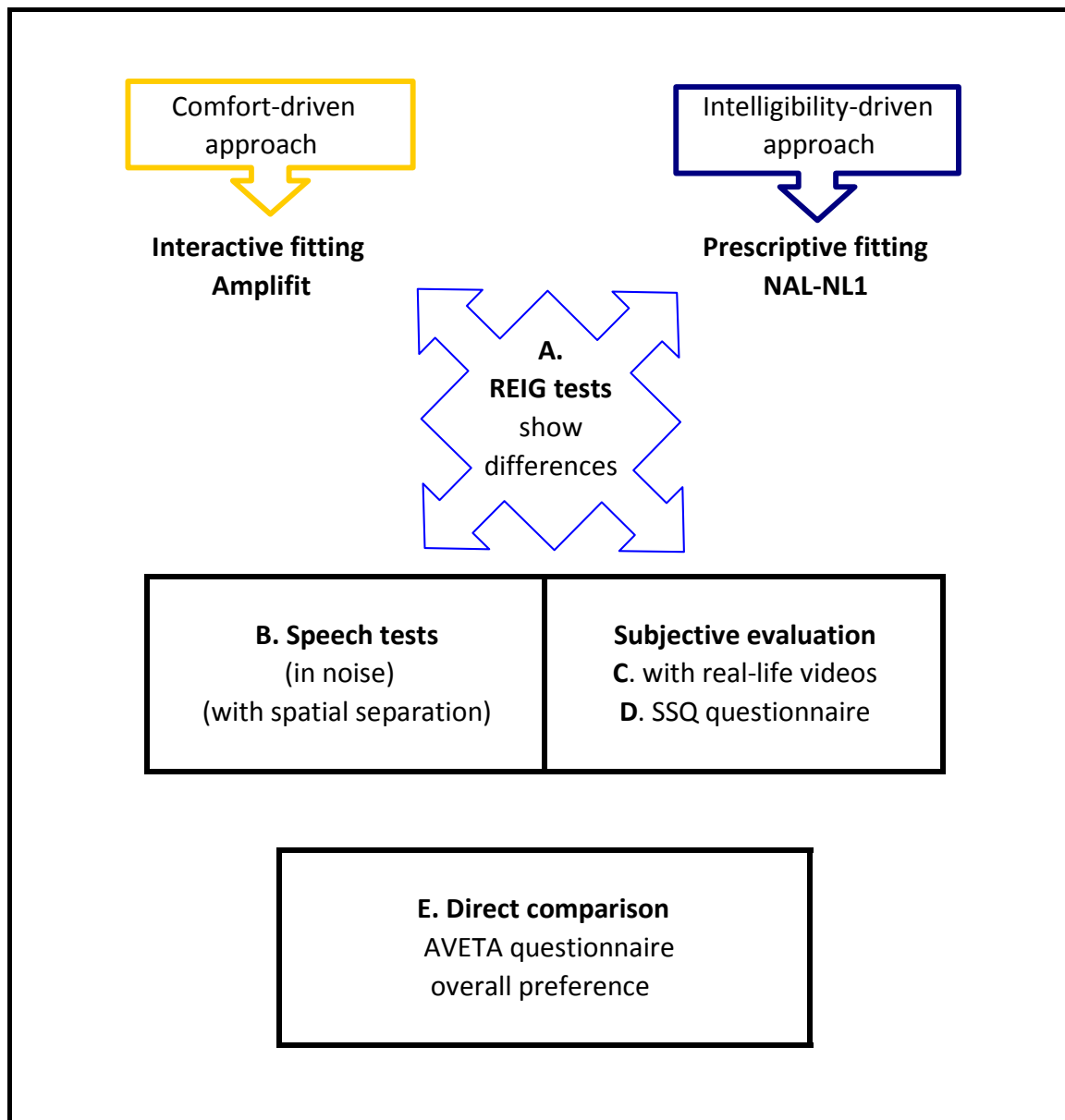


Technical possibilities go beyond our knowledge about fitting

- Fitting rules do have strong limitations
 - Large inter-individual variations
 - No rules apply to signal processing like Noise Reduction and Directionality
 - Number of parameters are unmanageable large
- In addition, more programs ask for fittings for each situation separately

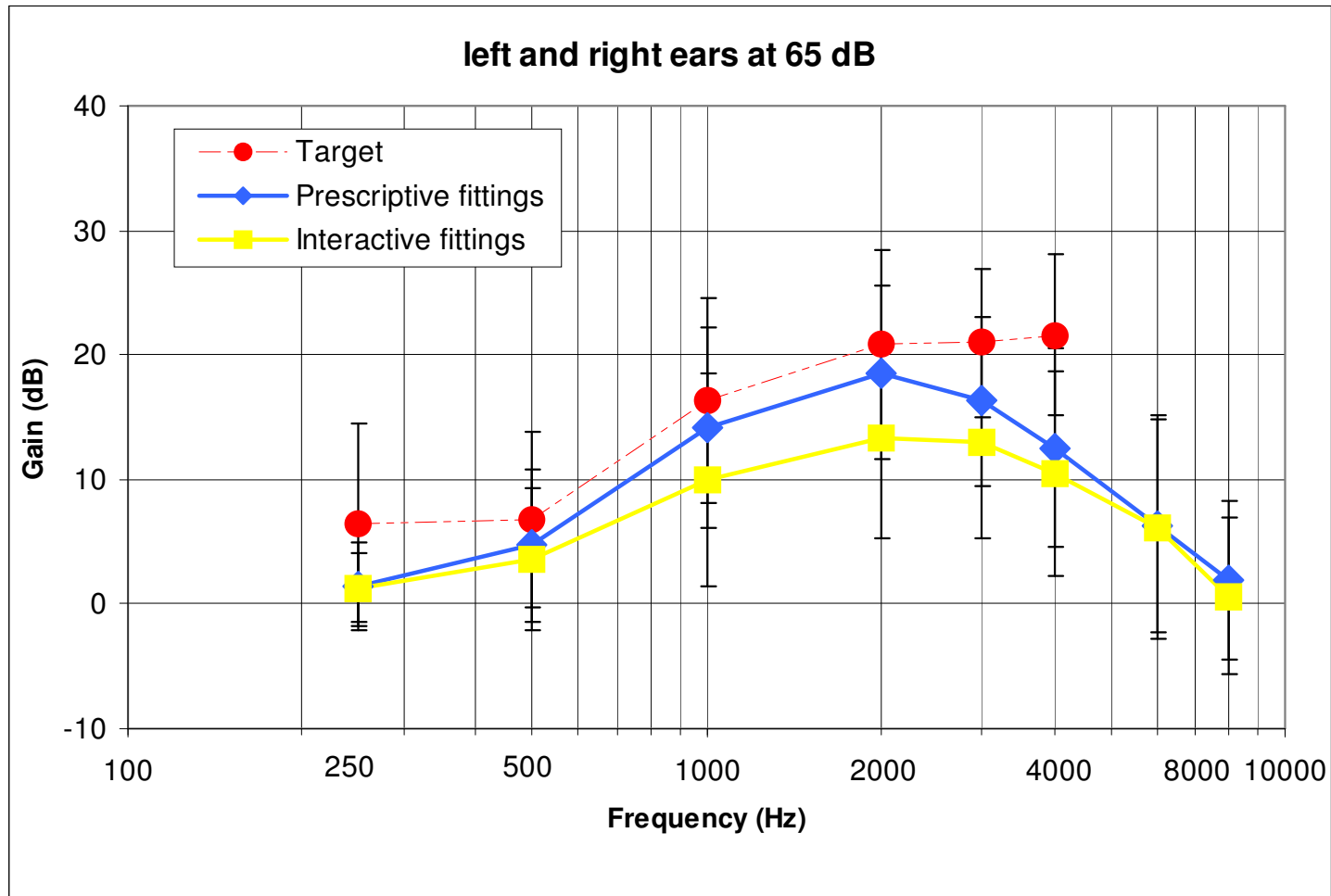


→ Therefore interactive fitting



Cross-over comparison
in 74 HA users
(PACT study in 4 AC's)

Differences in gain selected



Overall preference in 74 subjects

- 67 % prescriptive fit
- 18 % interactive fit
- 15% no preference

		Interactive fit	Prescriptive fit
SRT	in quiet	-	+
	in continuous noise	0	0
	in time-reversed speech	-	+
	spatial separation	-	+
Amplifit	speech in quiet	-	+
	speech in noise	-	+
	speech in reverberation	0	0
	soft sounds	0	0
	loud sounds	+	-
	quality	-	+
SSQ	speech	0	0
	spatial	0	0
	quality	0	0
Aveta	detection	-	+
	discrimination	0	0
	speech quiet	0	0
	speech noise	-	+
	localization	-	+
	comfort loud sounds	0	0

Potential advantages of Amplifit to increase the interaction with the user

- Higher involvement of HA user was positive
- Amplifit is applicable in addition to objective IG measurements:
 - To indicate the individual starting position in a standardised way
 - For fine tuning noise reduction and directionality
 - For evaluation of the results of daily practice

[the power of standardisation is also the possibility to collect data of different hearing aid users]

Weakness in the approach: how to utilize the feedback of the hearing aid user?

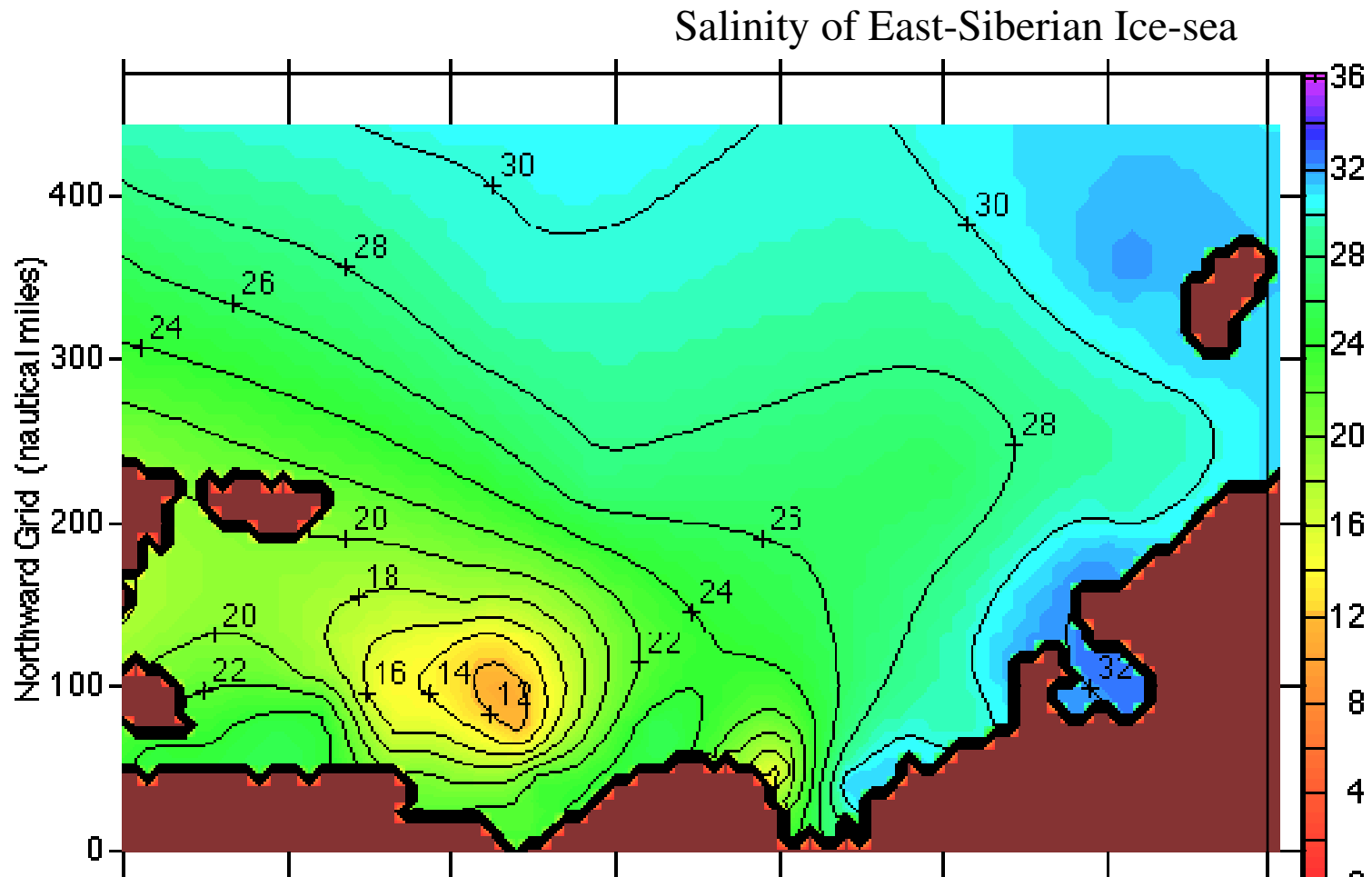
- Feedback information is available:
 - Trial and error during the trial period
 - Datalogging
 - Use of the responses to real-life simulations (like in Amplifit)

But how to apply and structure this information?

- Use of paired comparisons (Franck)
- Paired Comparisons with statistics (HearClip)
- The user in the driver's seat, based on situations in his own environment (Trainable hearing aids)

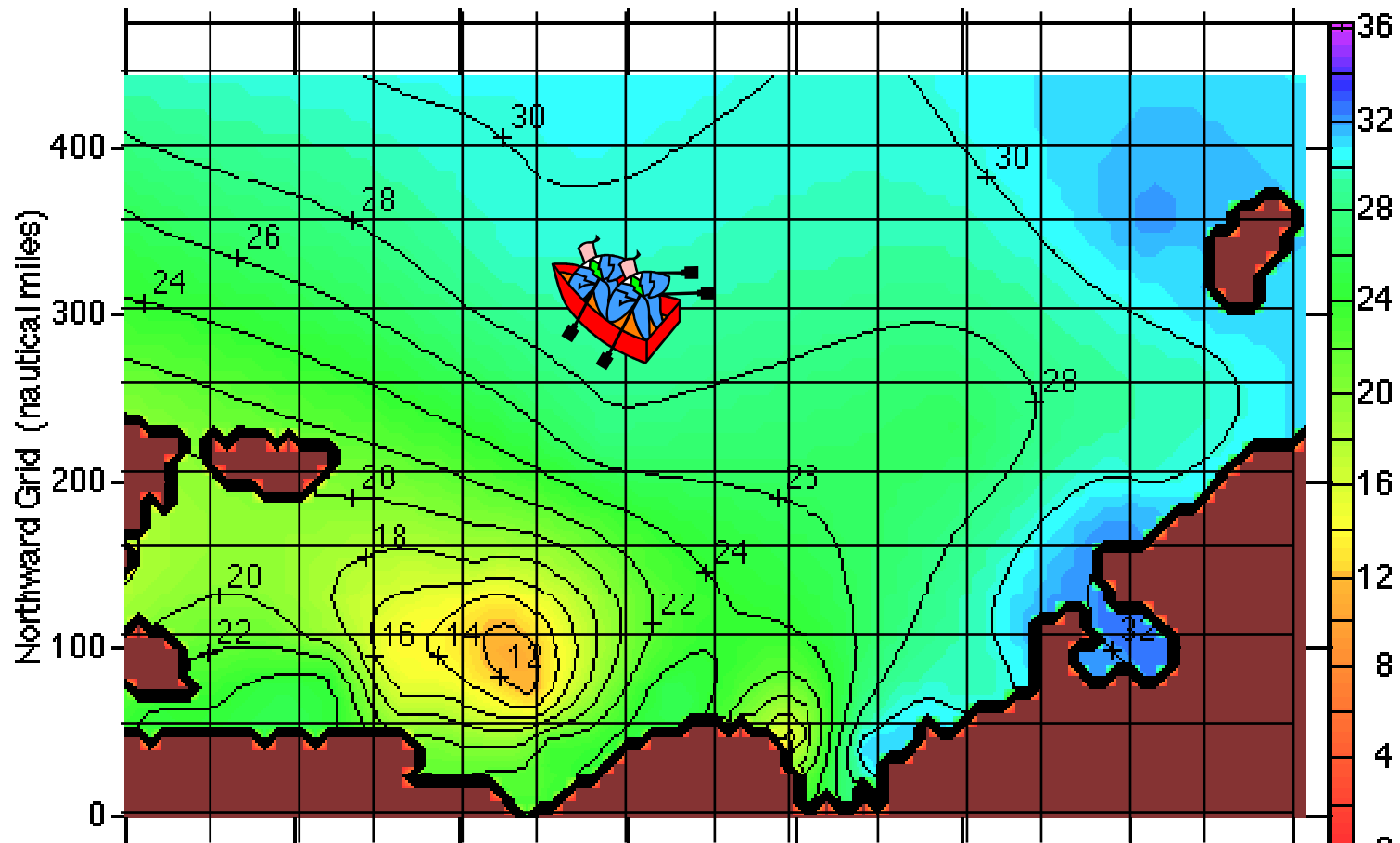
Use of paired comparisons

Where are we?

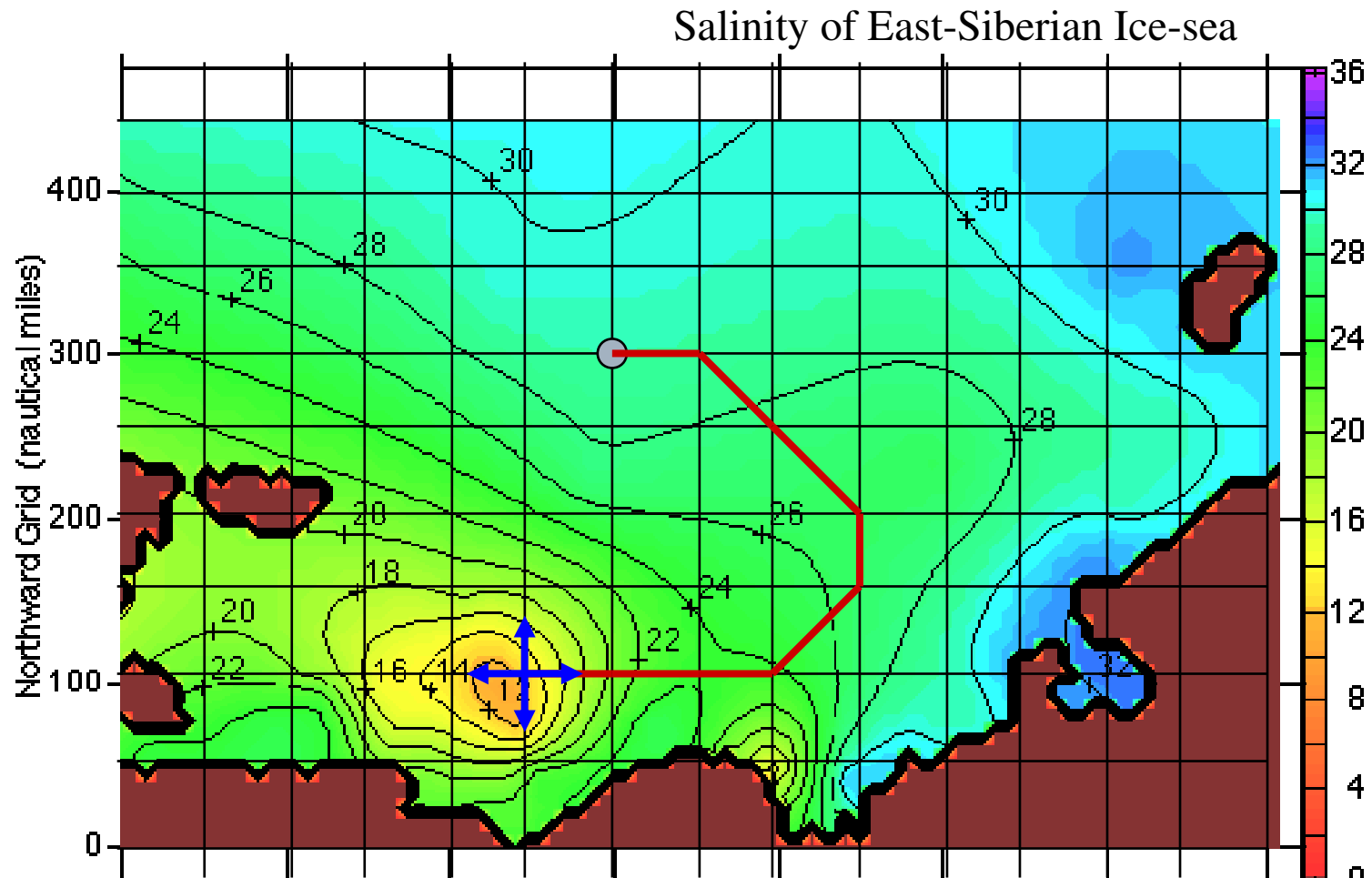


What are we looking for?

Salinity of East-Siberian Ice-sea

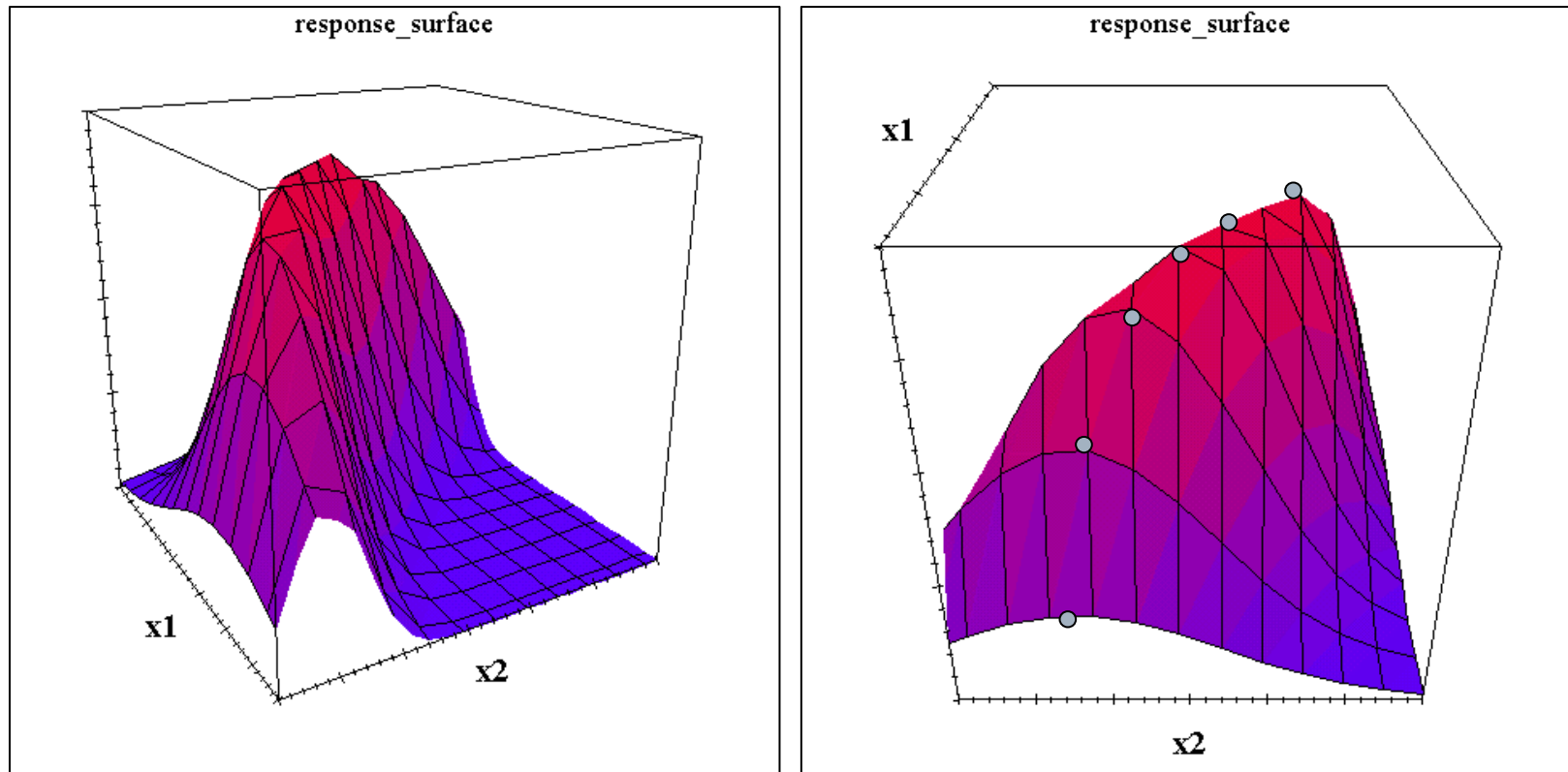


Did we find the optimum?



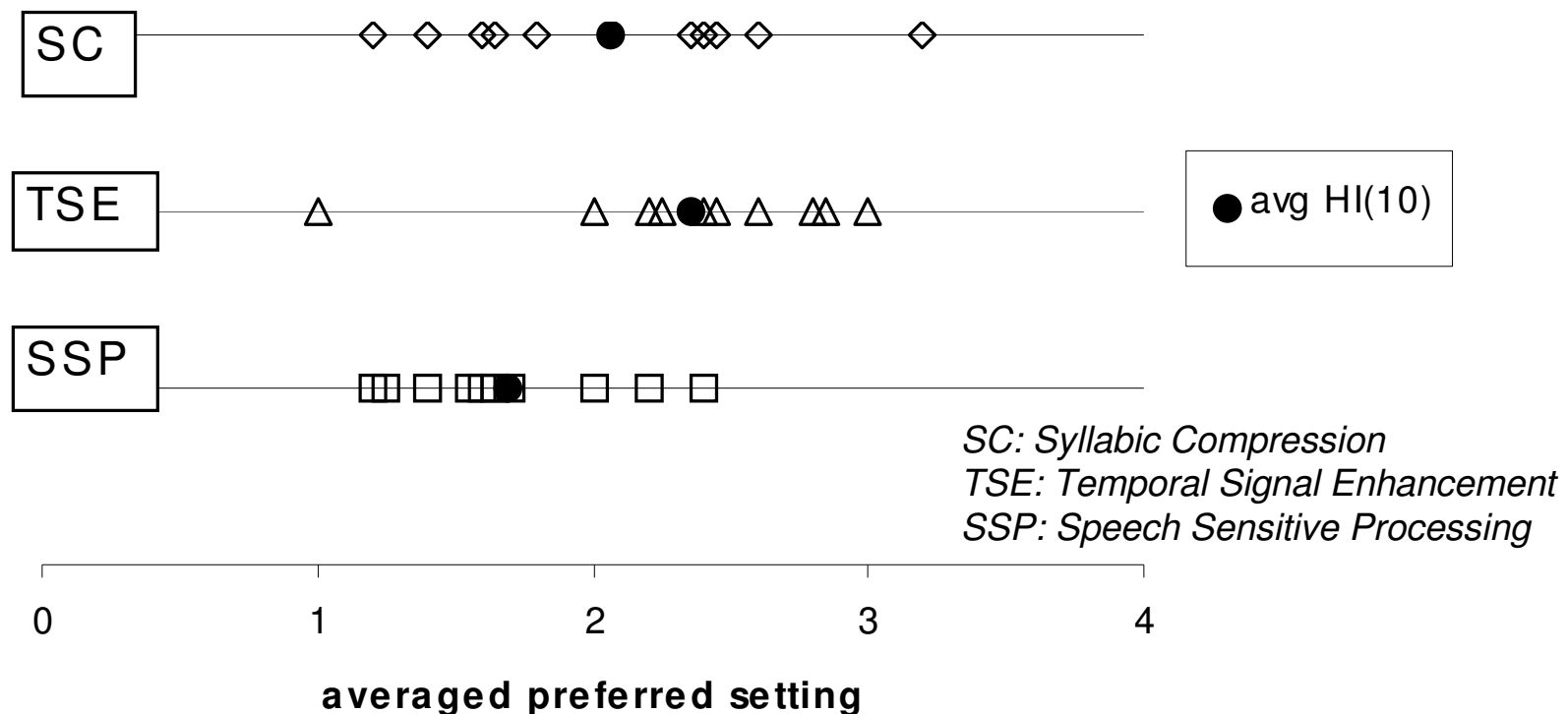
More-dimensional interactive search strategies ("multi-directional pattern search", Franck)

The only way to take into account existing (!) interactions



Study II: Audiological results

Averaged Simplex optimum for each subject



SC: Syllabic Compression
TSE: Temporal Signal Enhancement
SSP: Speech Sensitive Processing



Project HearClip:

A user-centered approach for hearing-aid fitting



Radboud University Nijmegen, Intelligent Systems:

Tom Heskes

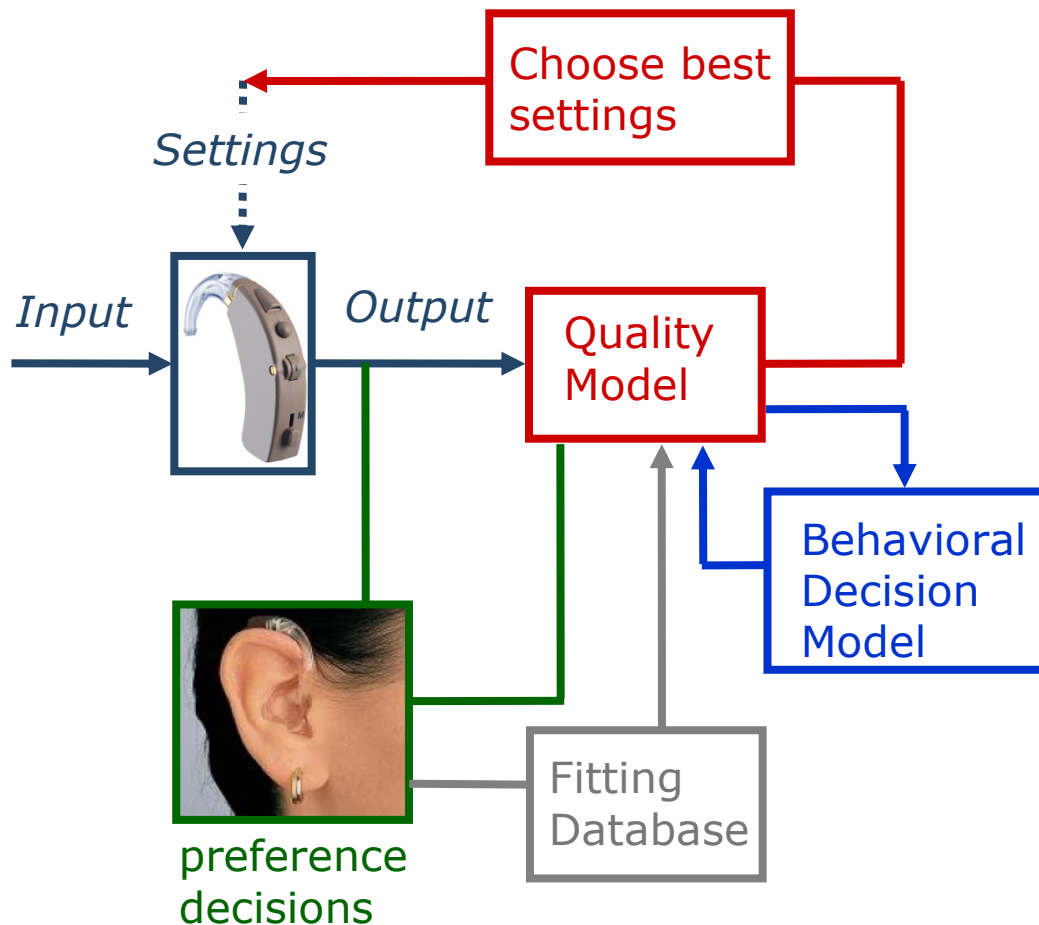
TU Eindhoven, Dept Electrical Engineering

Tjeerd Dijkstra and Bert de Vries

AMC, Clinical & Experimental Audiology

Rolph Houben and Wouter Dreschler

The new approach HearClip



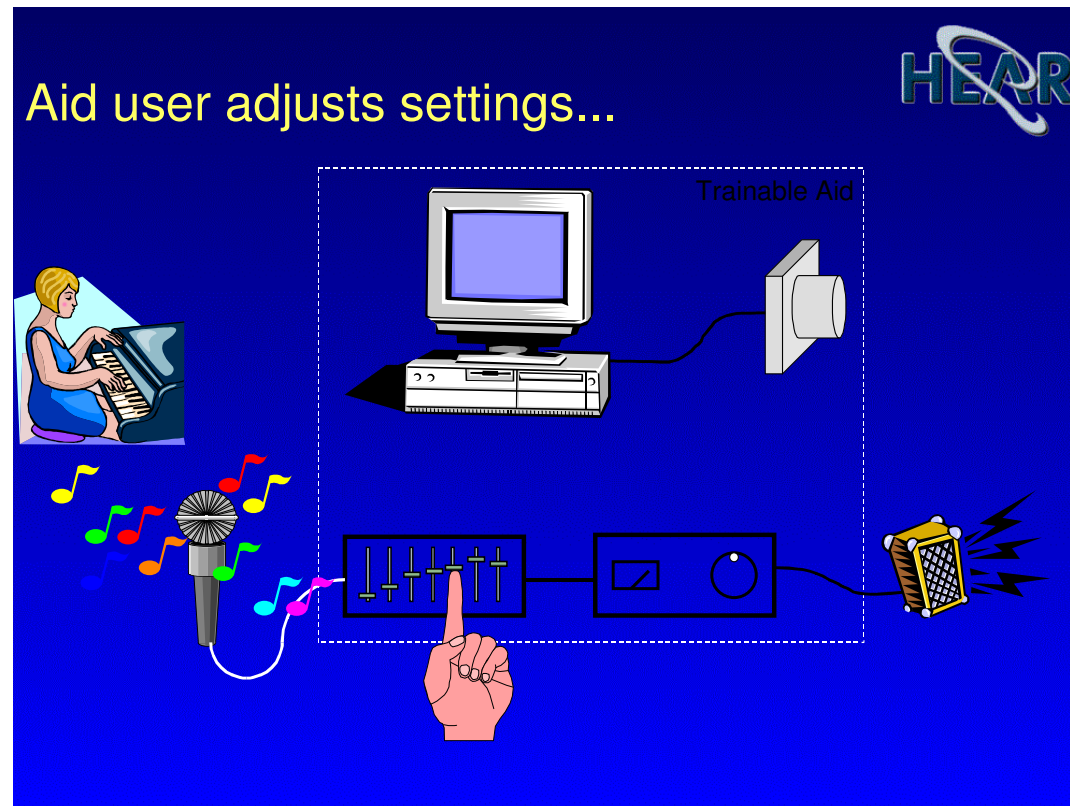
- standard hearing-aid
- settings change based on user preference
- use a model that describes user preference (utility model)
- Use database of previous results (community fitting)
- Use Bayesian statistics to improve fitting

Applications

- In the clinic
 - Using speech samples in different background noises
 - Using sound samples available in NOAH programs
 - Using videos like Amplifit
- However, still a first-order approximation of real-life conditions

Trainable hearing aids

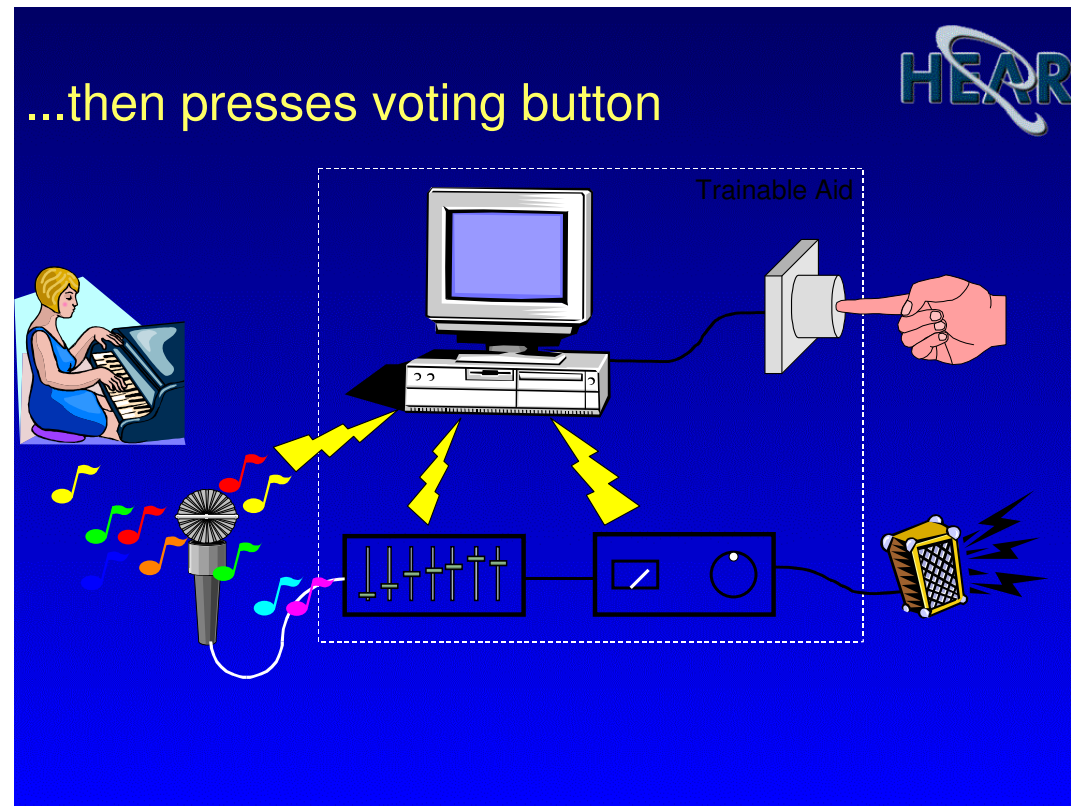
- The user in the driver's seat
- The hearing aid will be trained by the hearing aid user



*Dillon, Keidser
& Dreschler, NAL*

Trainable hearing aids

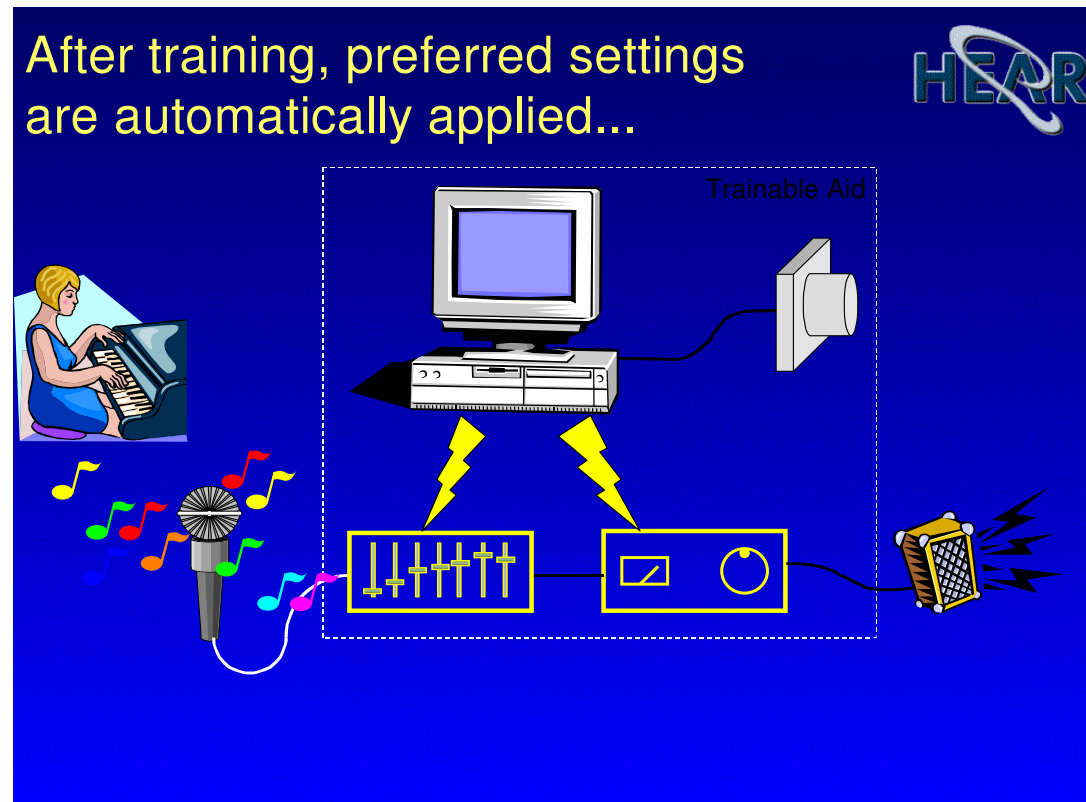
- Advantages:
- Sounds of the own environment
 - Not complaint driven



*Dillon, Keidser
& Dreschler, NAL*

Trainable hearing aids

After a change of hearing or a change in the sound environment there is a possibility to retrain the HA



*Dillon, Keidser
& Dreschler, NAL*

Our wishlist for fitting

★ Available,
but not commonly used
★ Under development

- ★ Selection of gain settings using an objective control during the first fit (IG or VSM)
- ★ Well-structured procedures to fine tune other signal processing parameters
- ★ Validated instruments to retrieve subjective information after fitting
 - ★ Retrieval of user judgements (PC)
 - ★ Intelligent choice of conditions (Database / statistics)
 - ★ Simulation of real life or real life itself (*Trainable HA*)
- ★ Intelligent use of this information to optimize the settings in terms of speech intelligibility and listening comfort (Quality models)
- ★ Robust objective evaluation tools