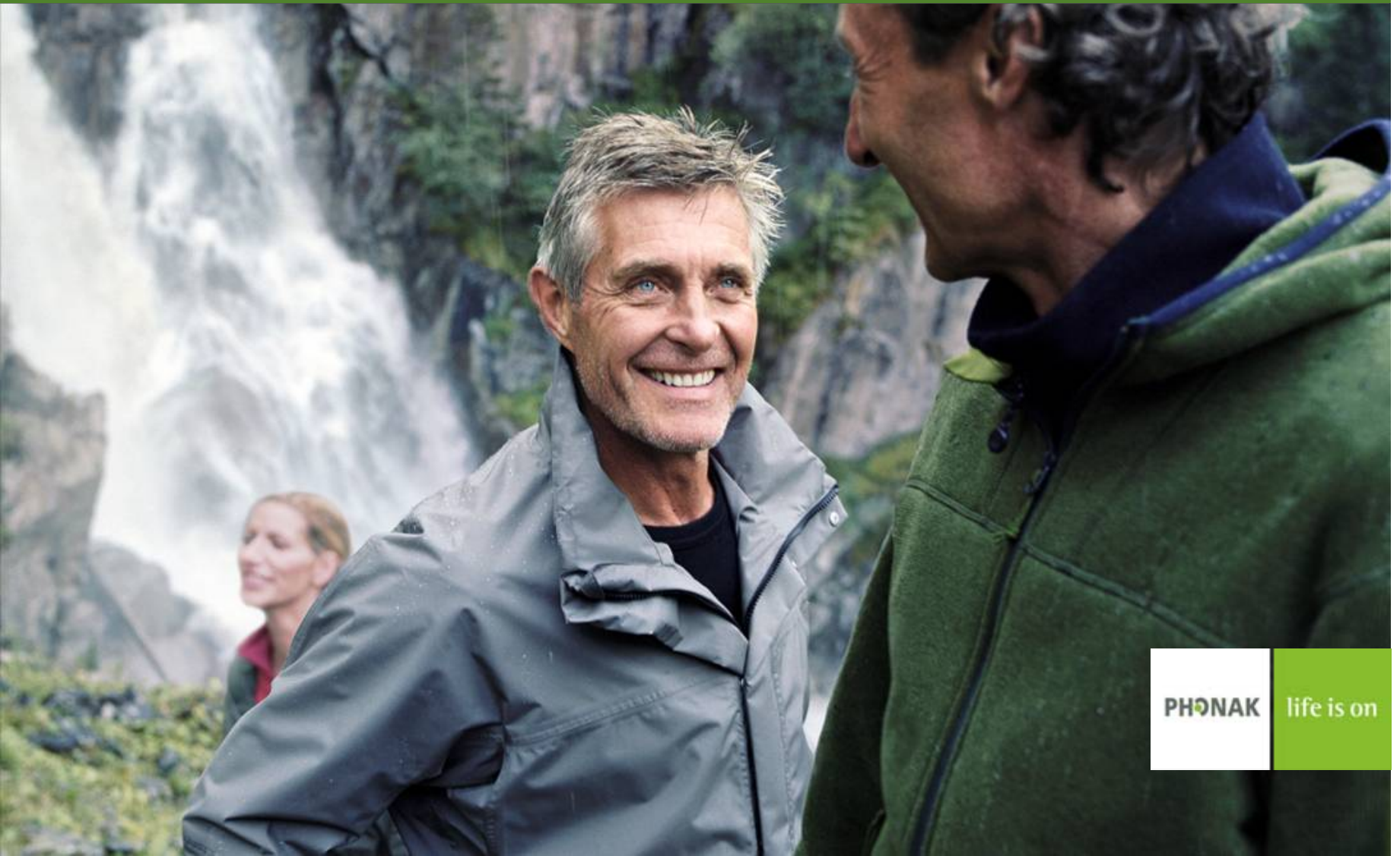


24/11/2009

# Hearing solutions for Seniors

## Andi Vonlanthen



**PHONAK**

life is on



# Who are the seniors?





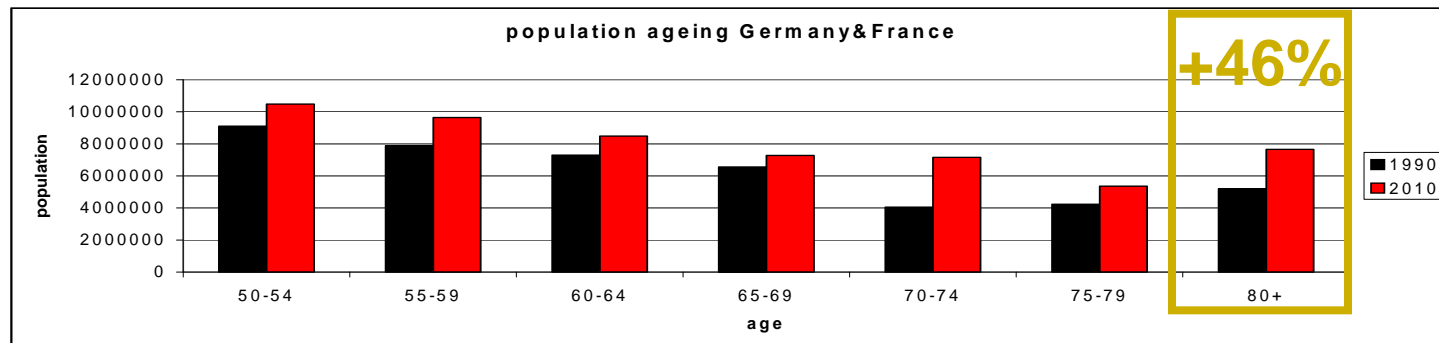
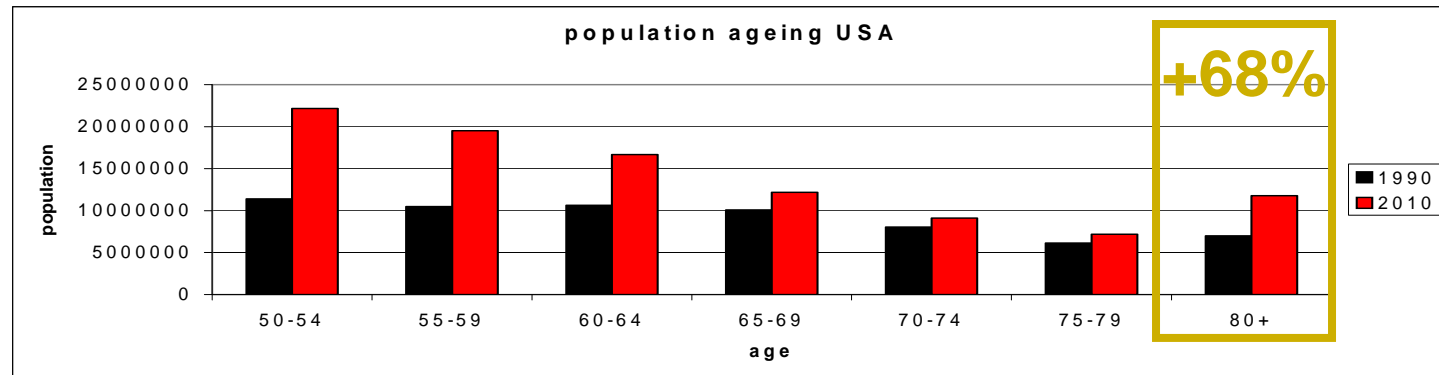
# Products for Seniors has to be big



# Demographics

## Population ageing from 1990 to 2010

→ Population of people age 80+ is the fastest growing segment in developed countries



(\* <http://www.census.gov/ipc/www/idb/worldpopinfo.html> Average through all major Phonak Markets, 2007: USA, France, Canada, UK, Germany, Italy)

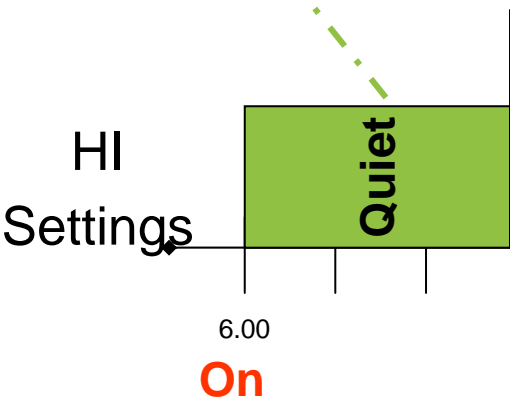
A day in the life .....

A little story

# A day in the life .....

## A little story

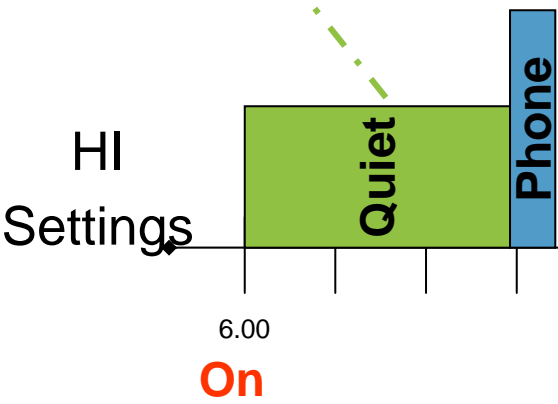
- Get up
- Get on the HI
  - Battery test
  - Switch On the product
  - Insert the earmold/HI



# A day in the life .....

- Get up
- Get on the HI
  - Battery test
  - Switch On the product
  - Insert the earmold/HI

- Phone Call with daughter
  - Appointment for Lunch
  - Phone Call for a Taxi



# A day in the life .....

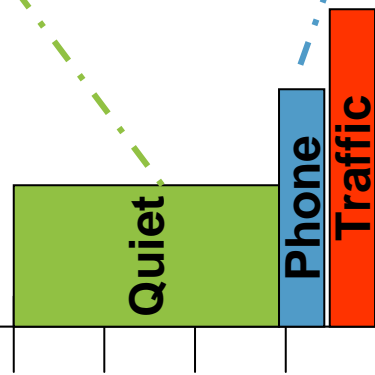
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- Phone Call with daughter
  - Appointment for Lunch
  - Phone Call for a Taxi

-Taxi to the doctor

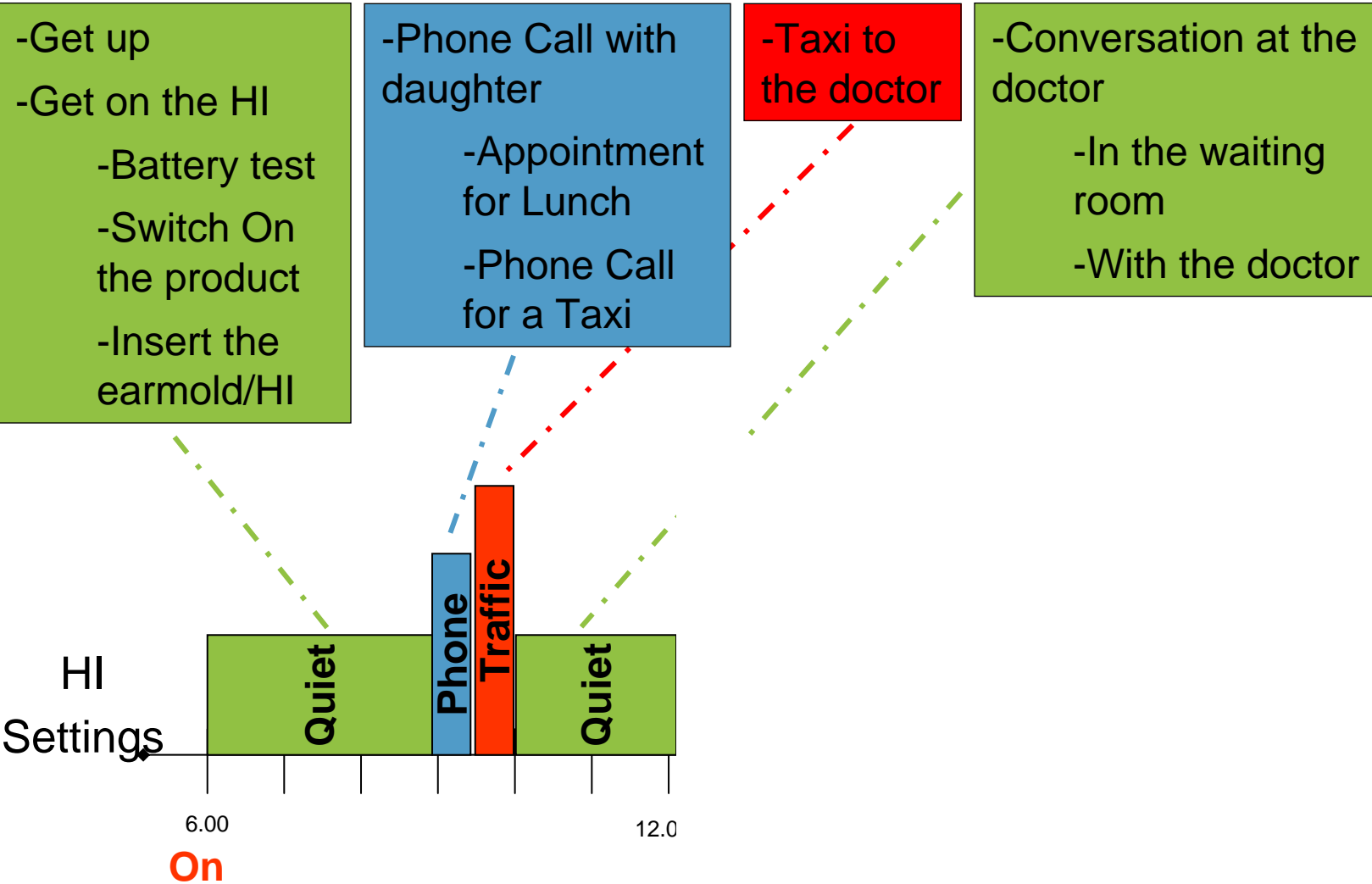
HI  
Settings

6.00  
On

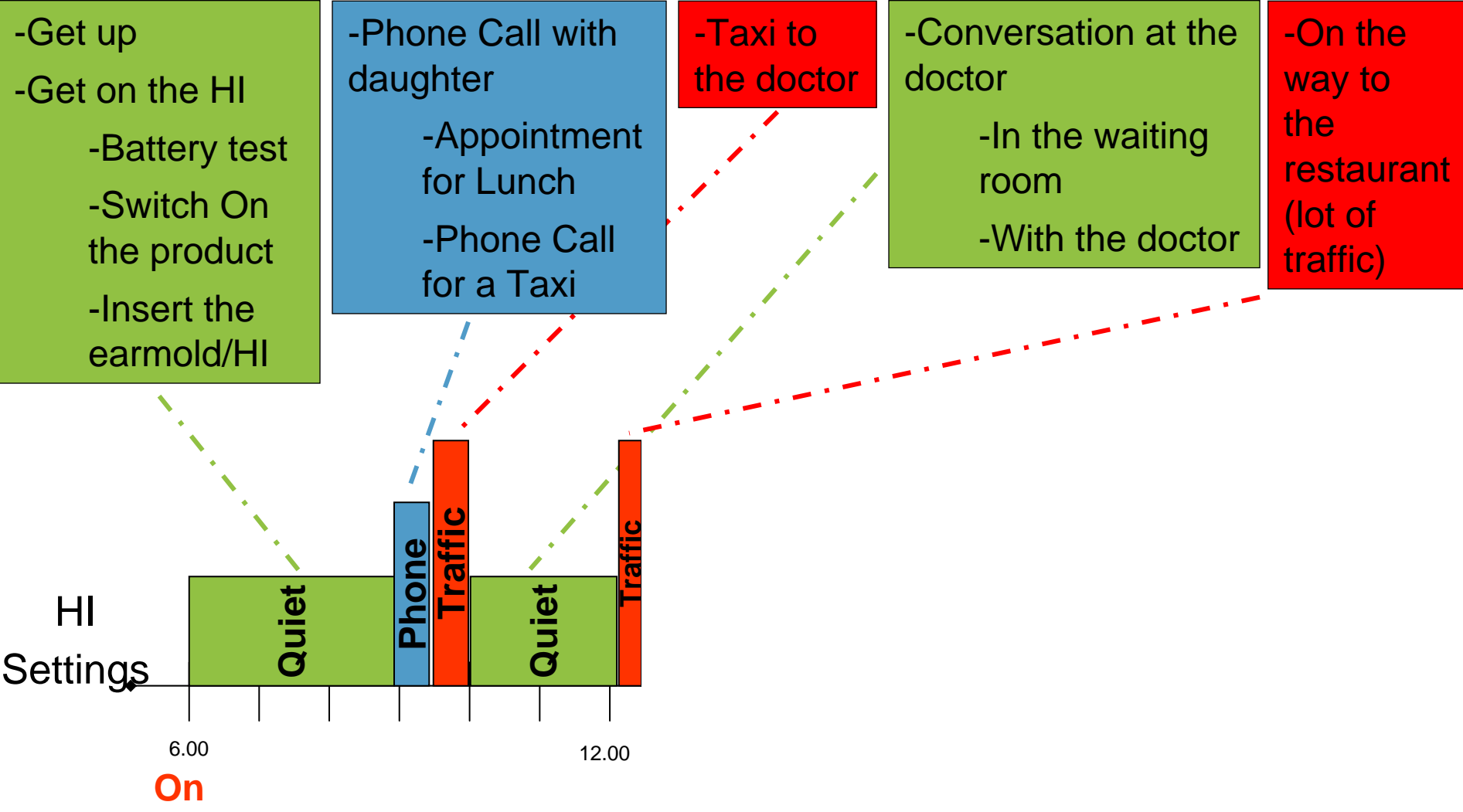




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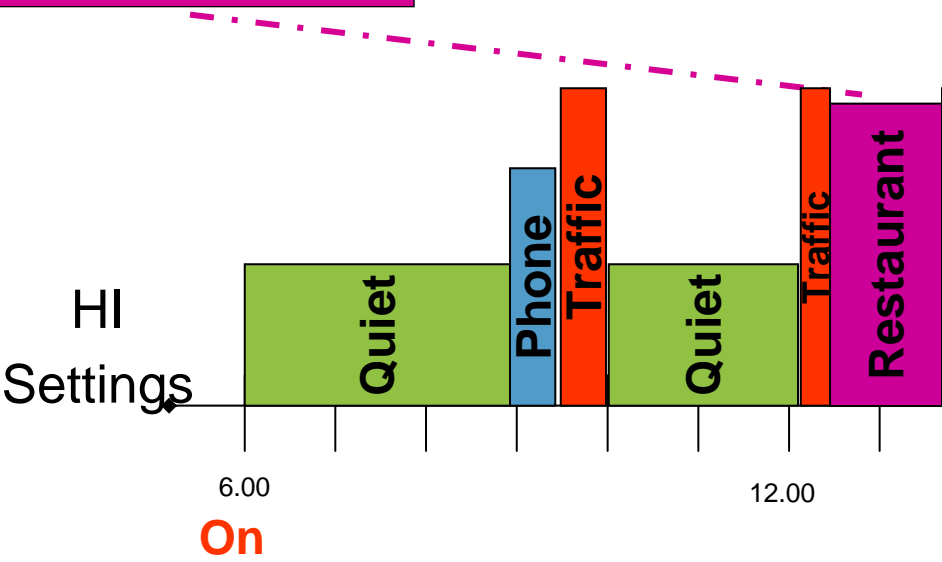


# A day in the life .....



# A day in the life .....

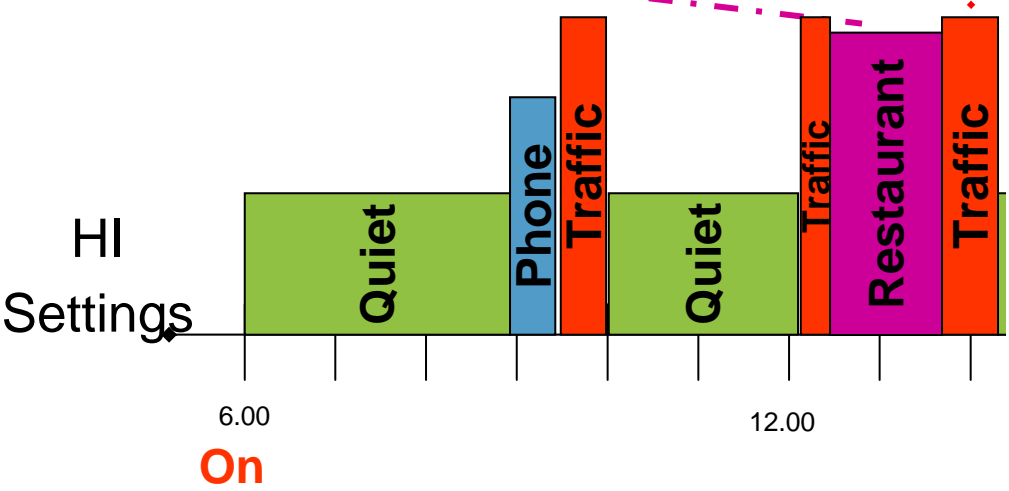
- Lunch with daughter
- Conversation with waiter
- Conversation with daughter
- Difficult situation



# A day in the life .....

- Lunch with daughter
- Conversation with waiter
- Conversation with daughter
- Difficult situation

-In car with daughter



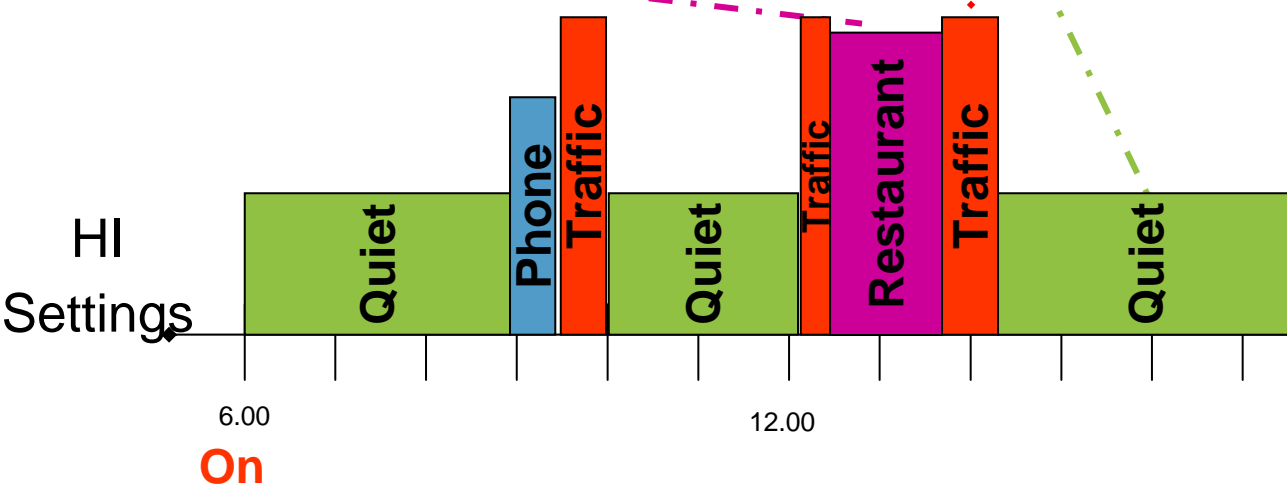


# A day in the life .....

-Lunch with daughter  
 -Conversation with waiter  
 -Conversation with daughter  
 -Difficult situation

-In car with daughter

-Relaxing  
 -Reading a book  
 -Doing some housework



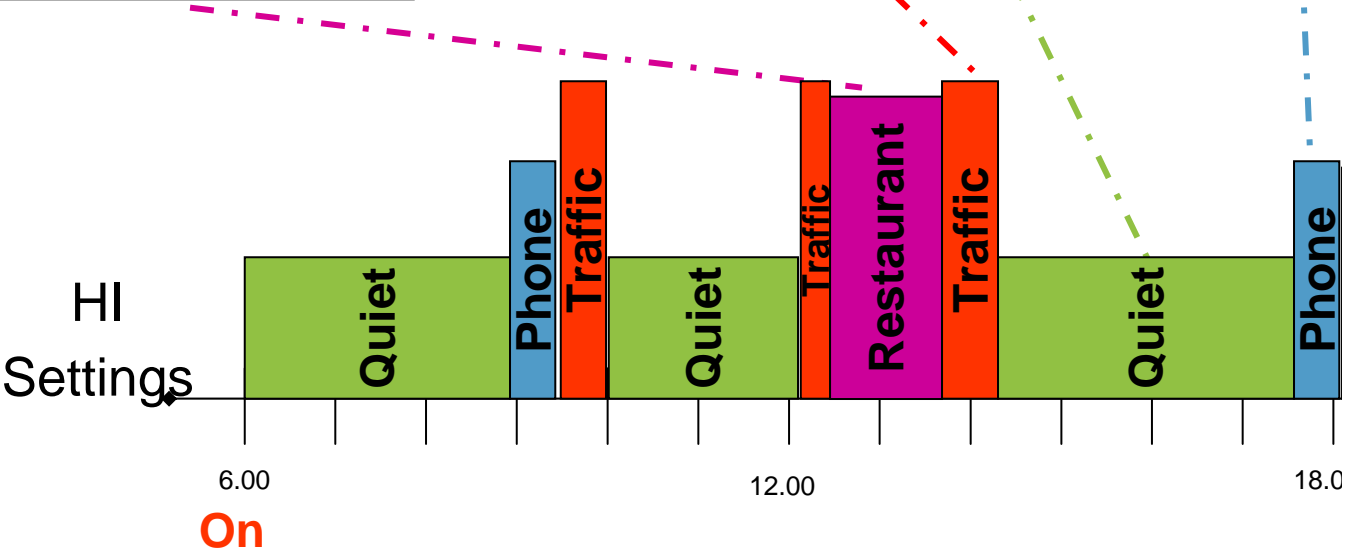
# A day in the life .....

-Lunch with daughter  
 -Conversation with waiter  
 -Conversation with daughter  
 -Difficult situation

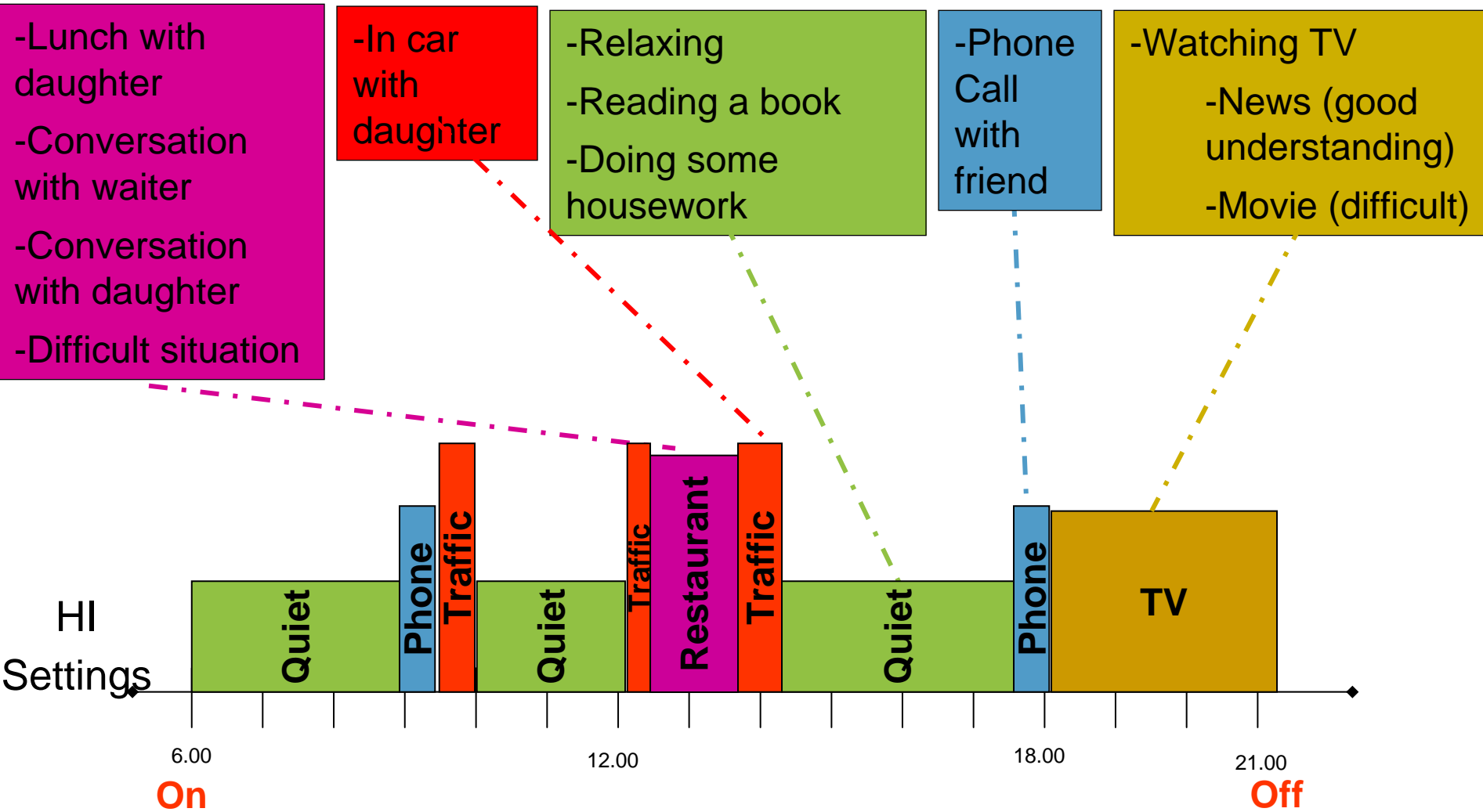
-In car with daughter

-Relaxing  
 -Reading a book  
 -Doing some housework

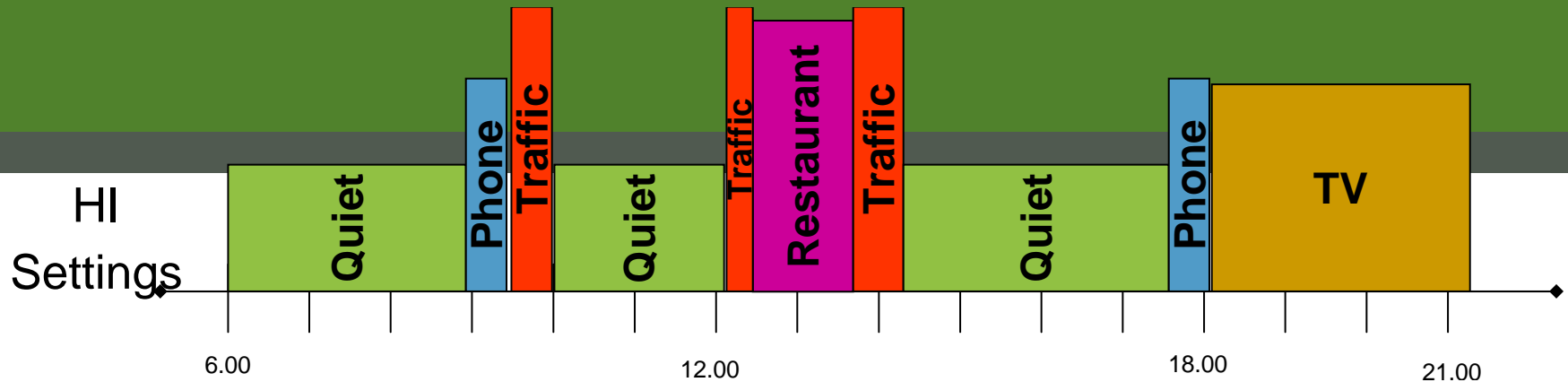
-Phone Call with friend



# A day in the life .....



# Better solution in the different situation... but how?



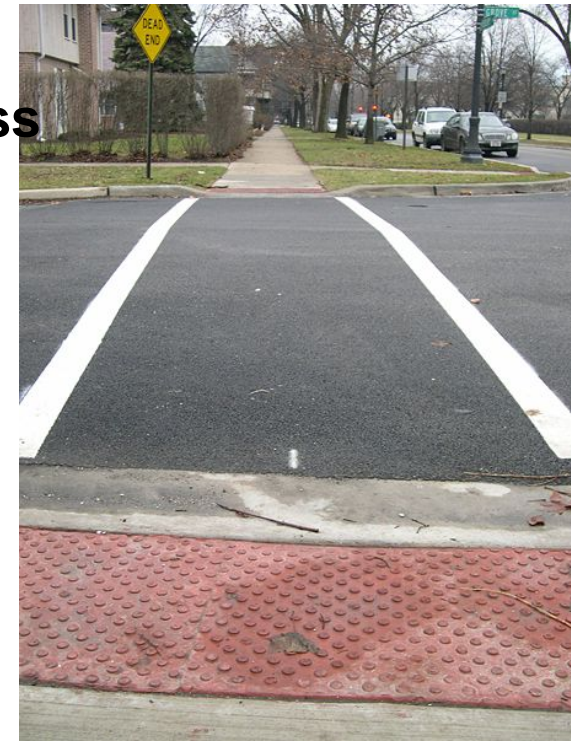
**There are a lot of different hearing situations during the day !**  
**also for Seniors, not only for people doing business**

**What are the adequate solution ?**

**.... But not only for Seniors**

- A paradigm that emerged from “barrier-free” or “accessible design” and “assistive technology”.
- *“A barrier-free design is accessible for impaired but also attractive for non-impaired”*

Example: “curb cuts”





# Dexterity

- Get up
- Get on the HI
  - Battery test
  - Switch On the product
  - Insert the earmold/HI

**Majority of seniors 80+ (90%) has problems with manual dexterity**

## **Problems:**

Inserting ear mold

Handling hearing instruments

Cleaning

Change of battery

Manipulating buttons, remote controls



# Battery

- Get up
- Get on the HI
  - Battery test
  - Switch On the product
  - Insert the earmold/HI

## Battery or Rechargeable ?

- To maintain independent senior with physical and mental limitations profit from reduced handling and maintenance. A accumulator hearing aid could help.
  - *Reasons*
- No fiddling around with batteries
- No purchasing of batteries
- No On/Off handing (HI could run as soon as it is taken out of the charging station)
- Better reliability (sealed?)
- *Consequences*
- → Operation time reduced to 30% (max 2 days) !!!!!!!!!!!!!!!
- Regular charging required
- Bigger products due to bigger rechargeable batteries and Senior requirements (easy handling)

**So far not yet a good solution for Seniors available**

# Earmold

- Get up
- Get on the HI
  - Battery test
  - Switch On the product
  - Insert the earmold/HI

No intuitive differentiation between right and left by elderly first-time users

**Clear visual cue for right/ left is needed !!!**

Possible solution with colored tips of the earmolds



## Insert an earmold

-> Poster Schimmelpfennig et al.

### Main problems:

- Confusion of right and left
- Insecurities about the required placement of the hearing instrument
- Insecurities how to proceed
- Wrong grabbing and orientation of the HI instrument
- Dexterity problems in handling the small instrument



# Insert an earmold

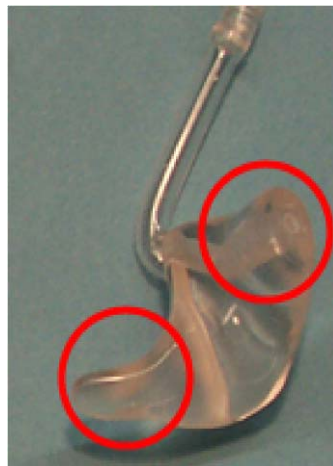
-> Poster Schimmelpfennig et al.

## Main problems:

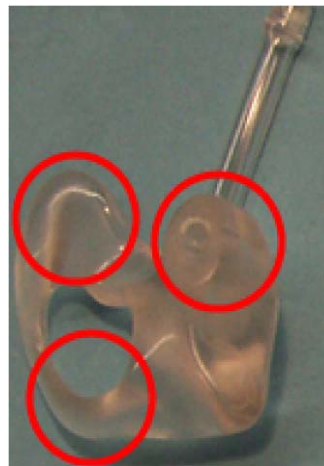
- Confusion of right and left
- Insecurities about the required placement of the hearing instrument
- Insecurities how to proceed
- Wrong grabbing and orientation of the HI instrument
- Dexterity problems in handling the small instrument
- Insecurities about the required fit of the earmold



Standard dome



Individual half skeleton



Individual full skeleton

First impression: The smaller and less complex - the easier. But dissatisfaction regarding comfort of fit in the ear.

After tryout: Resentments related to size and form of individual earmolds diminish. Comfort of fit in the ear more important.

**Focus on criteria that determine fit in the ear!**

# Phone I



- Phone Call with daughter
- Appointment for Lunch
- Phone Call for a Taxi

- Phone is a big challenge for HI users (not only for Seniors)

Specific Phone Program  
Changing Listening Program?

Yes  
Manually

No

Yes  
Automatic

- Remember the program
- Knowing how to change
- Remember to change back

**Not suited for Seniors**

- Bad quality (hearing performance) via HI microphone except for CIC. Reduced speech intelligibility

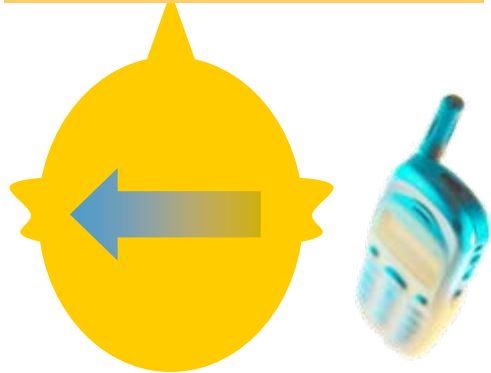
**Not suited for Seniors**

- Recognition of the Phone (magn. Switch)... choosing Phone program
- Wireless direct or via Bluetooth

**Wireless delivers the best sound quality for speech intel.**

# Phone II .... Enter the wireless world a challenge.... and an opportunity for Seniors

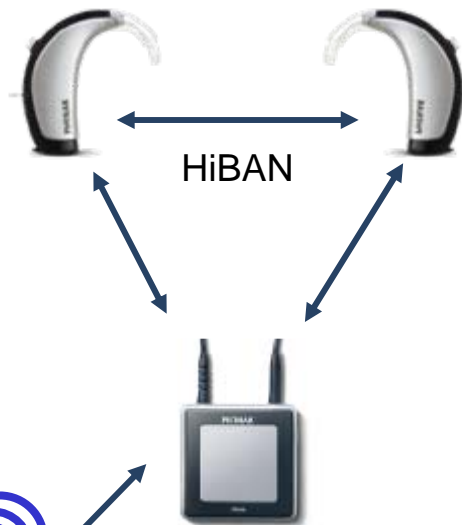
Wireless Phone with binaural Link (Binaural Phone)



Better intelligibility due to binaural signal



Wireless Phone via Bluetooth



Only One click to  
-Connection  
-Sound quality  
-Speech intelligibility

Wireless Phone via FM



# Traffic



-Taxi to  
the doctor

- High noise level, Safety, Security
  - Important issues for seniors in traffic
- Still needs to understand
- Product should support Seniors in choosing the right program in this situation
  - No manipulating of the buttons
  - Fully automatic system
    - Automatic directional systems
    - Automatic gain adjustment for diff. listening situations, Program manager

**Automatic adaptation to listening environment will improve quality of audio signal and speech intelligibility**

**New and special features such as steering the beam of a directional microphone can improve even very difficult situation**



## Restaurant ... Speech in Noise

- Lunch with daughter
- Conversation with waiter
- Conversation with daughter
- Difficult situation

### **Automatic adaptation to listening environment**

Best possible solution to improve speech intelligibility for Seniors

- Automatic directional systems
- Automatic gain adjustment for diff. listening situations, Program manager

### **Manual adaptation to listening environment**

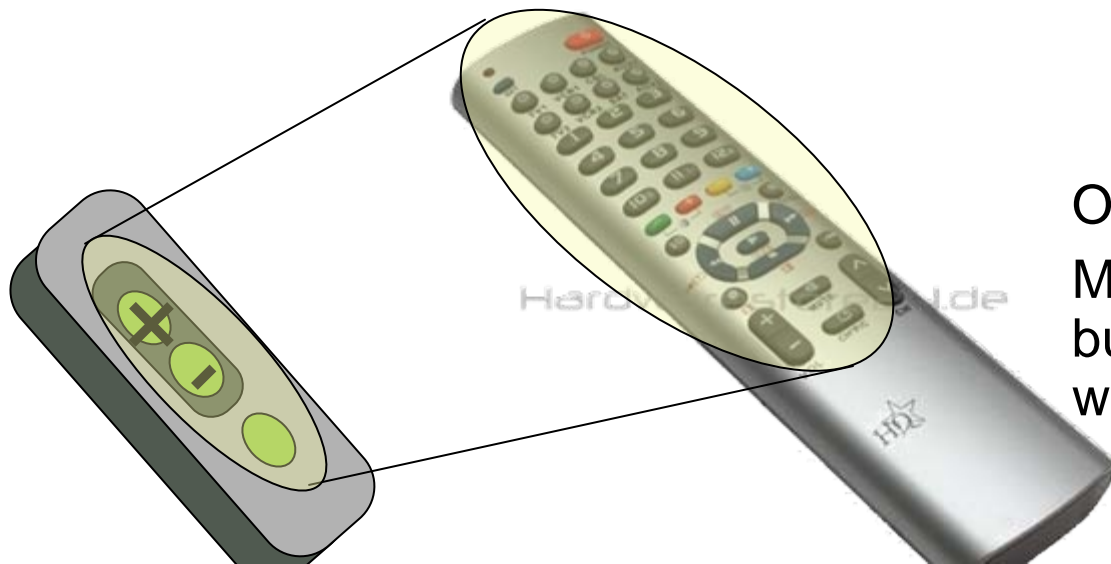
In some situation a manual interaction could be needed

- Easy access to the button on Remote or Product
- Intuitive
-

# Improved manual access



- Using wireless functionality to ease handling
- Synchronization (only one side has to change)
  - Vol up on right side
  - Vol down on Left side
- } **Less but bigger controls**



Only a few button  
More functionality behind the buttons (Changing Vol/DirMic/NC with one click)

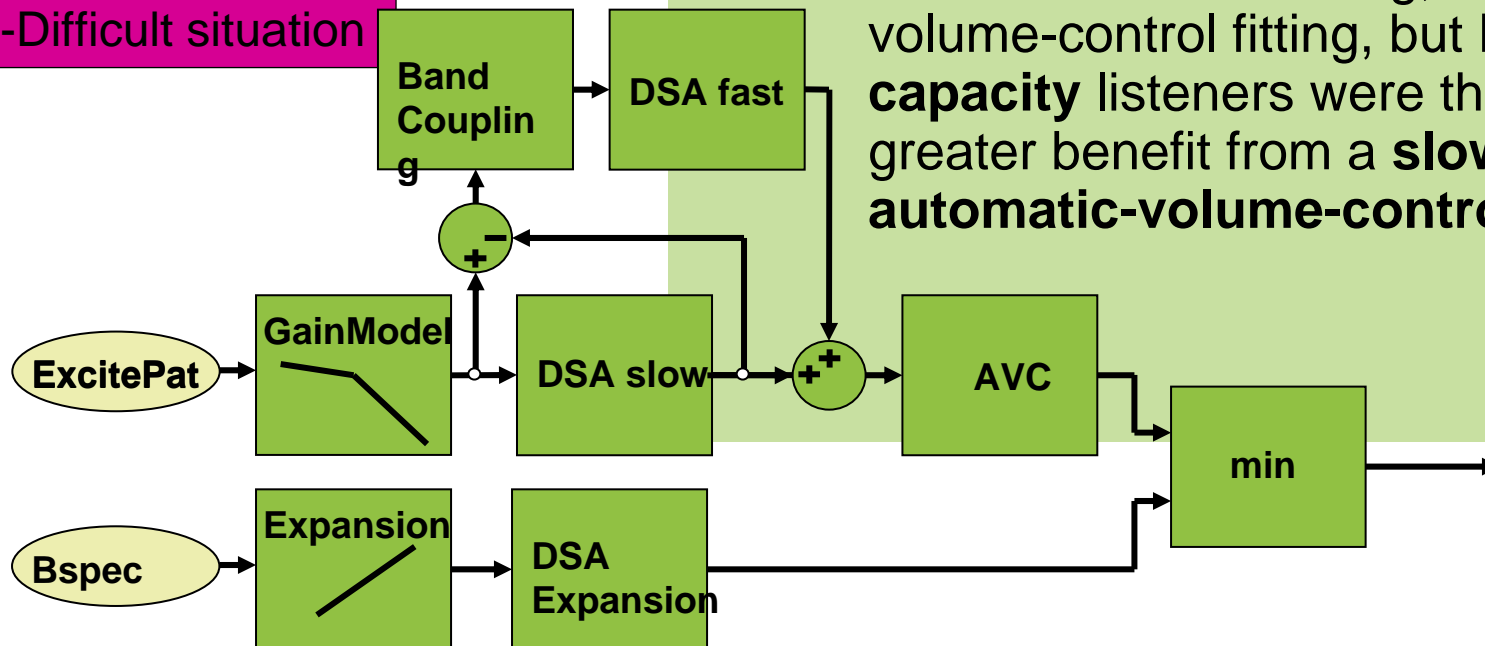
# Improve speech intelligibility with slower time constants

- Lunch with daughter
- Conversation with waiter
- Conversation with daughter
- Difficult situation

## Gatehouse 2006:

- ‘With benefit of one kind of fitting over another:

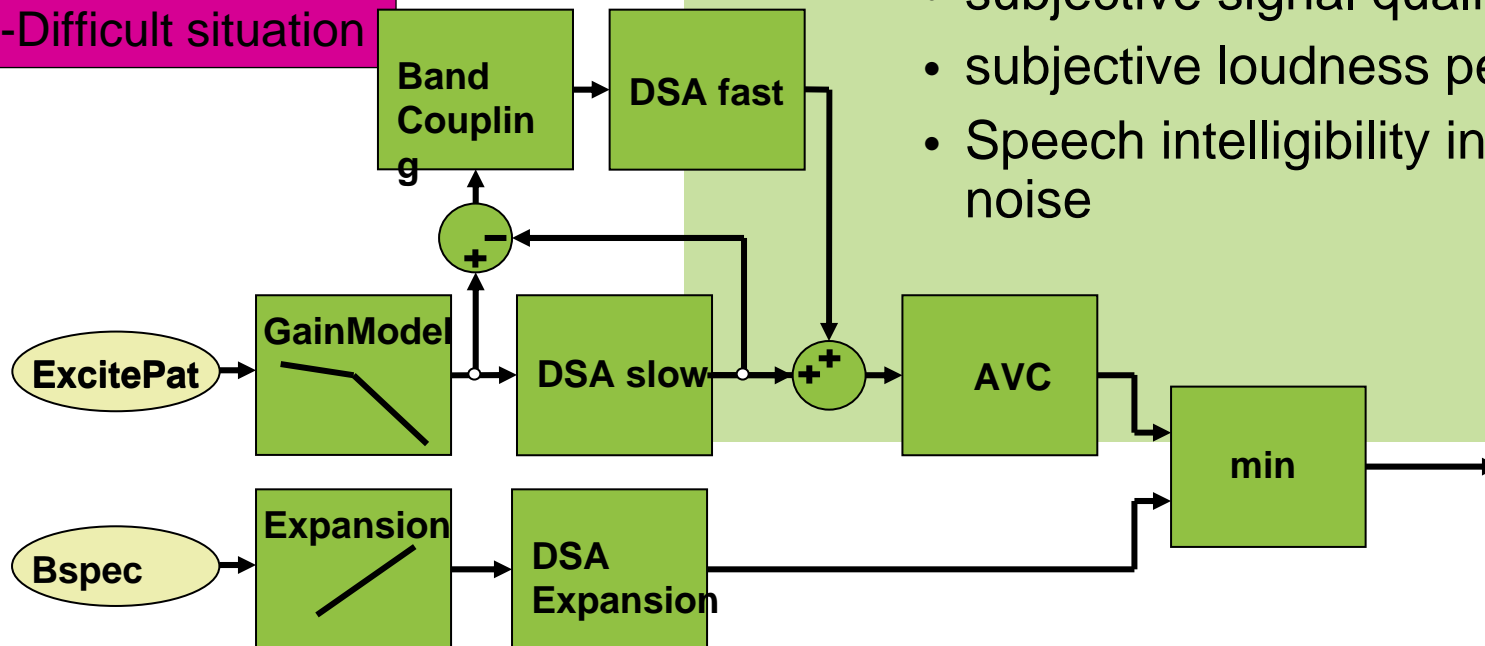
**High-cognitive ability** listeners derived greater benefit from a **fast-acting, wide-dynamic-range compression fitting** than from a slow-acting, automatic-volume-control fitting, but **Low-cognitive capacity** listeners were the opposite with greater benefit from a **slow-acting, automatic-volume-control fitting**



# Improve speech intelligibility with slower time constants

- Lunch with daughter
- Conversation with waiter
- Conversation with daughter
- Difficult situation

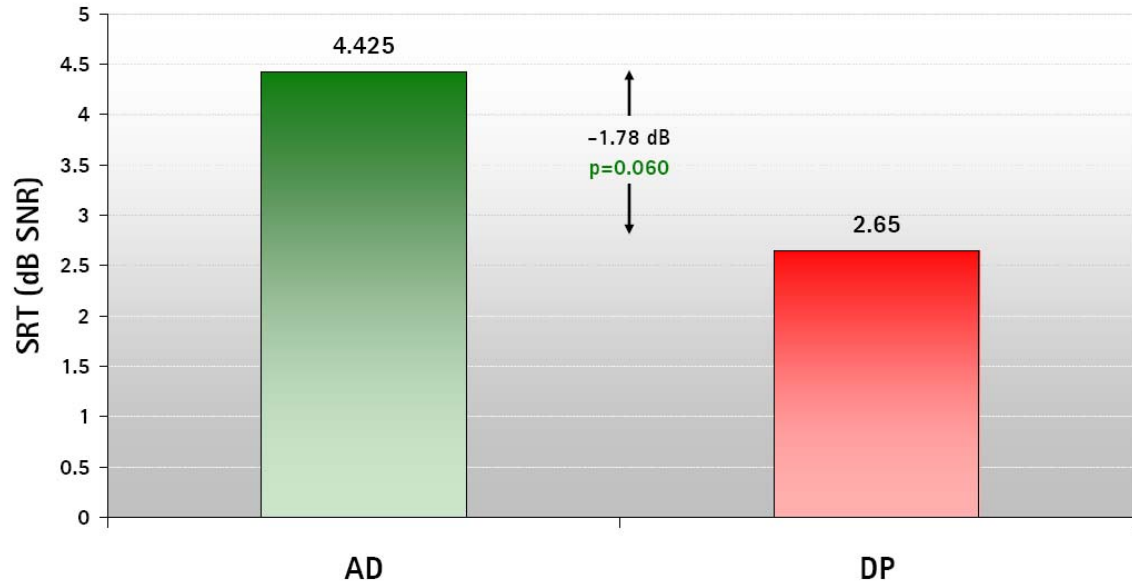
- Study in Mainz:
  - Test acceptance and satisfaction of a new dual-path signal processing strategy (AD / DP)
  - Compare acceptance and satisfaction level generated by two different settings (AD / DP)
    - subjective signal quality
    - subjective loudness perception
    - Speech intelligibility in quiet and in noise





# Results

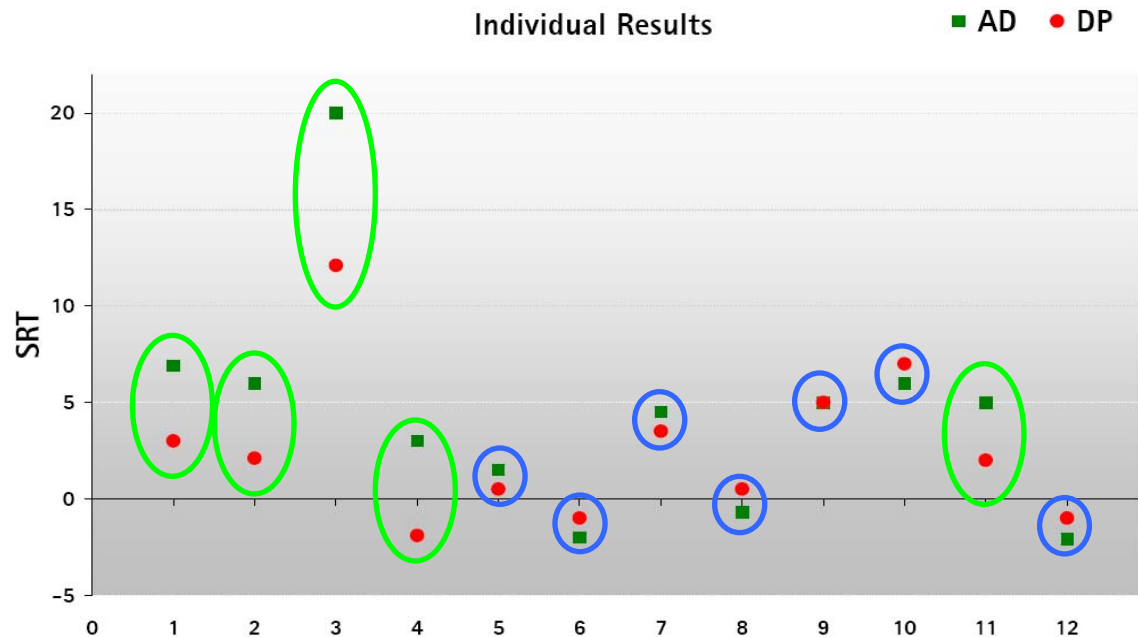
OLSA Group Results (N=12)



We could see a better performance for half of the group. 😊

But there was no evidence to the age but rather to the hearing loss. 😞

Individual Results



## TV

**-Watching TV**

- News (good understanding)
- Movie (difficult)

- TV is not an easy sound situation
  - All signal coming out of a small box
  - Speech intelligibility depends strongly on the TV program
    - News, speaker is fine
    - Movies can have a very bad signal to noise
  - TV creates a very fast changing of the acoustic signals (environment). speech in Noise.. and Music...

Difficult situation for an Automatic
- **Special TV listening program in the HI is recommended, but should engage automatically**

# Wireless application for TV.. Automatic; easy to use , great quality.

- Application for Seniors need to be easy
- Wireless technology offers best quality and no hassle for the user.
  - Modified (low delay) Bluetooth Technology
  - Proprietary solution to the HI
- Don't forget FM !!!



# Summary

- New technologies such as the wireless technology improves the situation for seniors
  - Handling
  - Hearing performance
- Solution for seniors should also work for other user groups (and vice versa)
- Seniors does not show a clear preference to a specific signal processing strategy..... Hearing loss is a better parameter to differentiate than age.

Thank you

