Hearing solutions for Seniors
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Who are the seniors?
Products for Seniors has to be big
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

HI
Settings
Quiet
6.00
On
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

HI Settings

Quiet

Phone

6.00

On
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
- Taxi to the doctor

HI Settings

Quiet

Traffic

6.00

On
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
- Taxi to the doctor
- Conversation at the doctor
  - In the waiting room
  - With the doctor
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

- Taxi to the doctor

- Conversation at the doctor
  - In the waiting room
  - With the doctor

- On the way to the restaurant (lot of traffic)
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

<table>
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<th>Time</th>
<th>Quiet</th>
<th>Traffic</th>
<th>Phone</th>
<th>Traffic</th>
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<td></td>
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<tr>
<td>12.00</td>
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HI Settings

On
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

HI Settings

On

Traffic

Quiet

Phone

Traffic

Restaurant

Traffic

Quiet

6:00 12:00 18:00

Traffic

Quiet

21:00

Phone

HI

Settings
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 ……

- 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

- Watching TV
  - News (good understanding)
  - Movie (difficult)

On 6.00 12.00 18.00 21.00
Off

HI Settings

- Quiet
- Traffic
- Quiet
- Restaurant
- Traffic
- Quiet
- Phone
- TV
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”
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

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

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

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

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

Specific Phone Program
Changing Listening Program?

Yes
Manually

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

Not suited for Seniors

Yes
Automatic

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

HiBAN

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
### 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

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

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

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

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. 😞
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