

Effects of Age on Feasible Sound Level of AVAS*

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* This research is performed in collaboration with **Pioneer**

Feasible sound level of AVAS*?

*Acoustic Vehicle Alerting System

ECE/TRANS/WP.29/78/Rev.2

Annex 2

4. Sound type and volume

- (c) ...should not to exceed the approximate sound level of a similar vehicle of the same category equipped with an internal combustion engine and operating under the same condition.

*Is it enough to work as a warning
in urban sound environment?*

Cross-cultural study on feasible sound level*

- the adequate levels are comparable to noise level of the environment (in L_{Aeq})
- affected by sound quality of warning sound
- no significant difference between German and Japanese subjects
- age of subjects: mainly 20s and 30s

* Yamauchi et al., Proc. of Inter-noise 2011, CD-ROM (2011).
Informal Doc., 6th QRTV (San Diego, 17-19 May 2011)

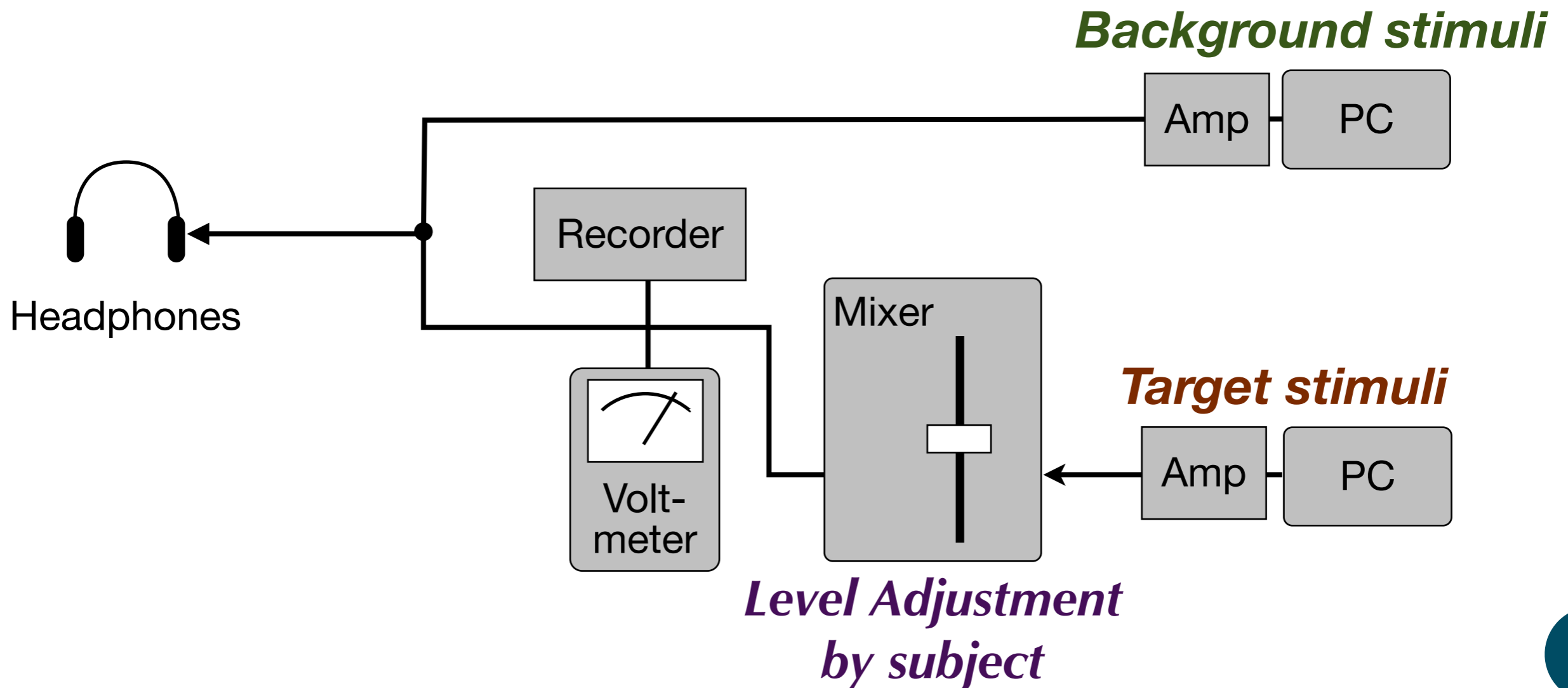
Effect of age on feasible sound level

- ✓ Subject: wide range of age (from 20s to 70s)
- ✓ Stimuli: meet to the guideline
- Procedure: similar to the previous work

Experimental set-up & Procedure

Adjust the level of warning sounds in the background noise

1. **Adequate Level:** *clearly audible and can be reliably detected*
2. **Minimum Level:** *just audible*

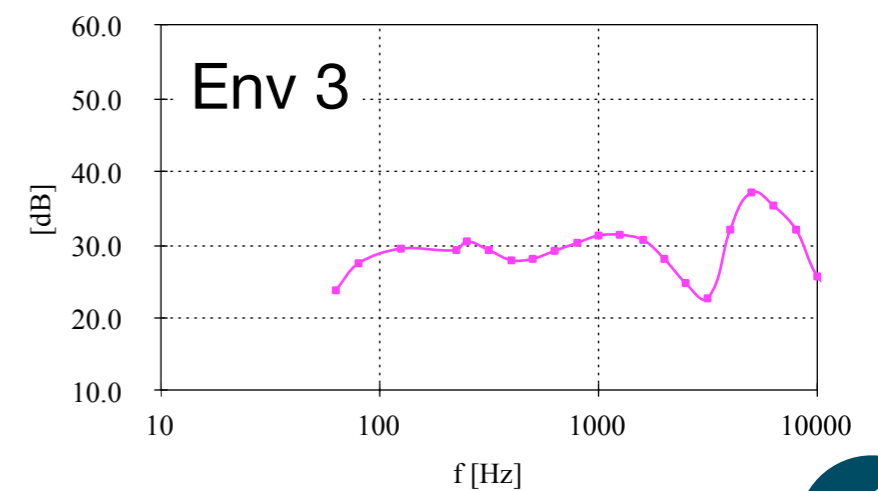
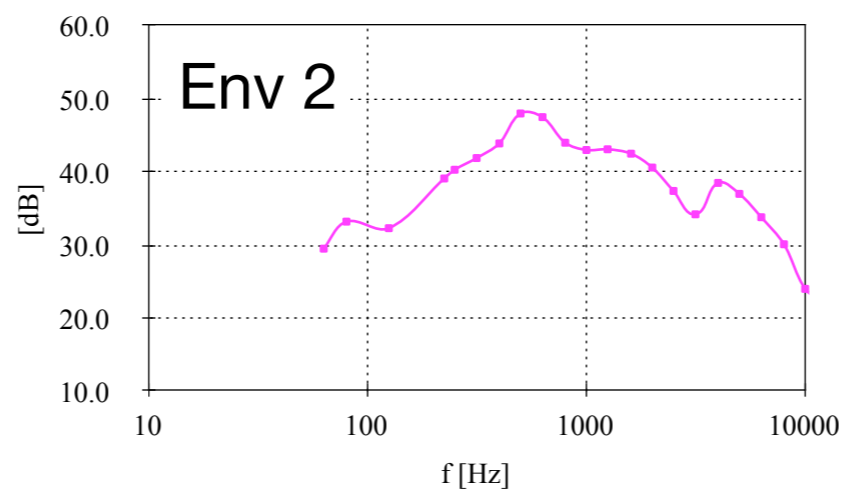
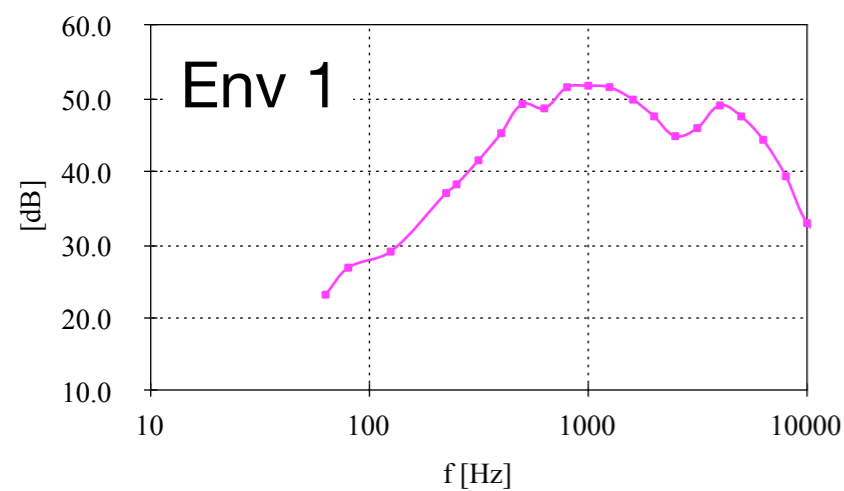


Background Stimuli

Binaural Recording (with Head and Torso Simulator/HATS)

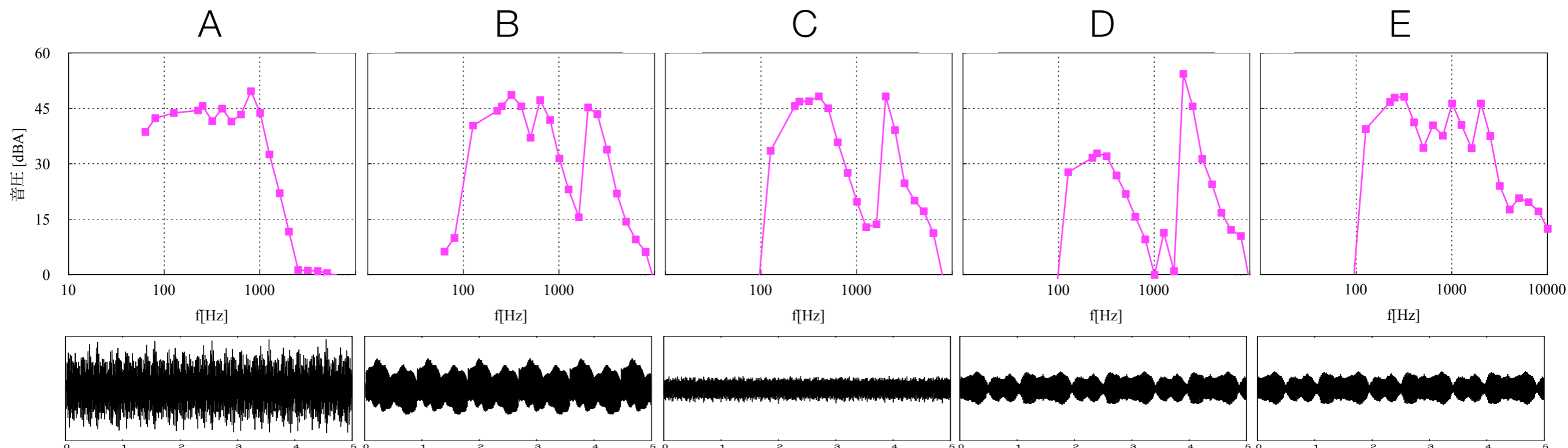


ID	L_{Aeq} [dB]	outline
Env 1	60.3	Shopping Street (sounds of crowds, sounds from shops)
Env 2	54.8	Back street in Down town (traffic noise from distant street)
Env 3	44.0	Suburban Parking (sounds of birds and insects)



Target Stimuli

- Designed to exceed the level of target loudness curve at least one 1/3 octave band when the stimuli played at 55 dB(A)
- Target loudness curve was set from the ISO532B loudness curve of the background stimuli
- All target stimuli were re-recorded via HATS in an anechoic room to simulate a position 2m diagonally behind the subject

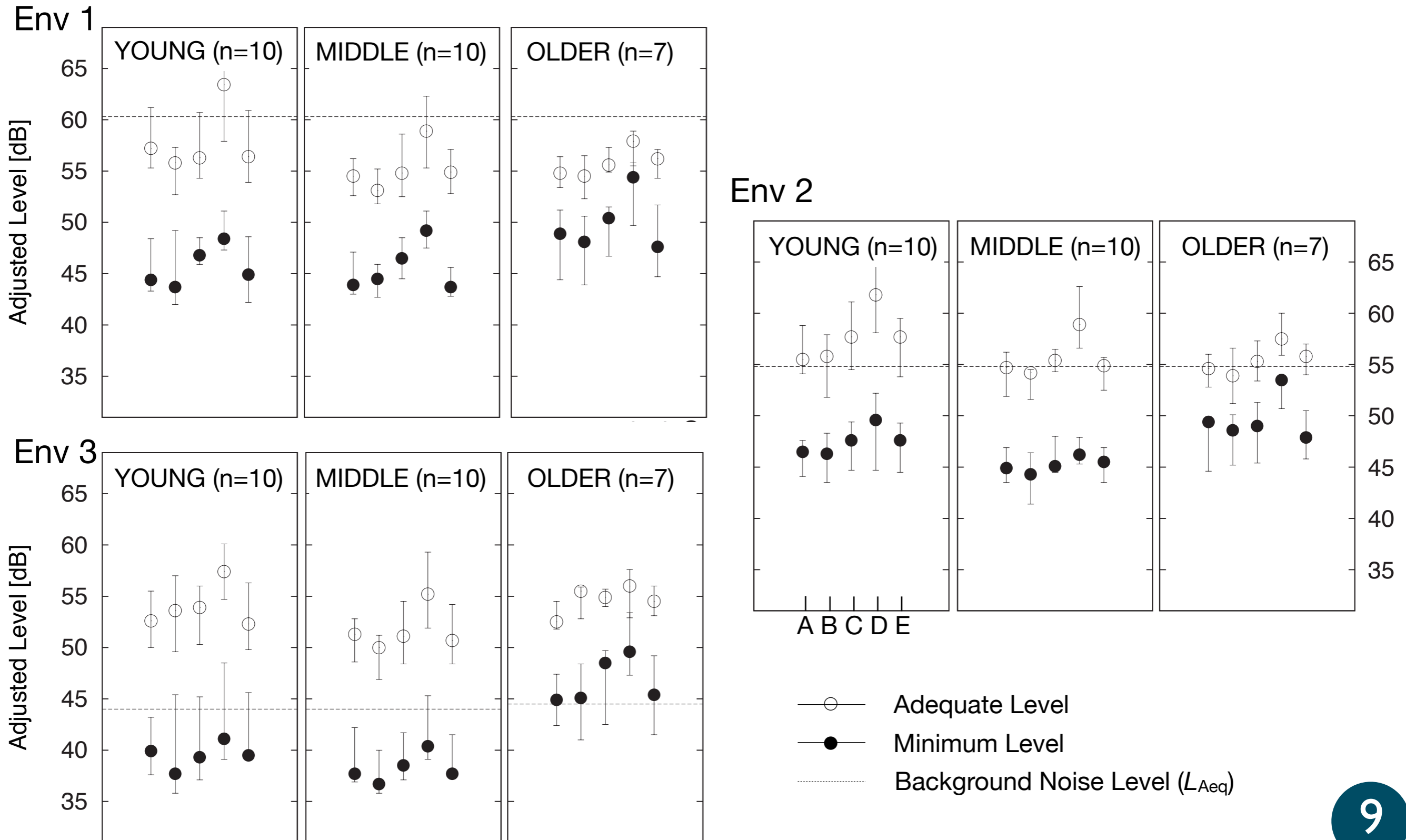


Subjects

	Number of subjects (male / female)	Age mean (min. / max.)
YOUNG	10 (5/5)	20.5 (19/24)
MIDDLE	10 (6/4)	38.0 (30/48)
OLDER	10 (5/5)	69.0 (60/74)

Note: two subjects who could not catch the background stimulus and one subject who could not understand the experimental task were excluded from the analysis

Results — *Adjusted Levels*



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- The adequate level of older subjects was not different from other age groups
 - The minimum level of older subjects was higher than other
 - The adequate level of young subjects was slightly higher —use of headphone audio?
 - In quieter environment (less than 50 dB?) possibly requires higher level than the environmental noise level