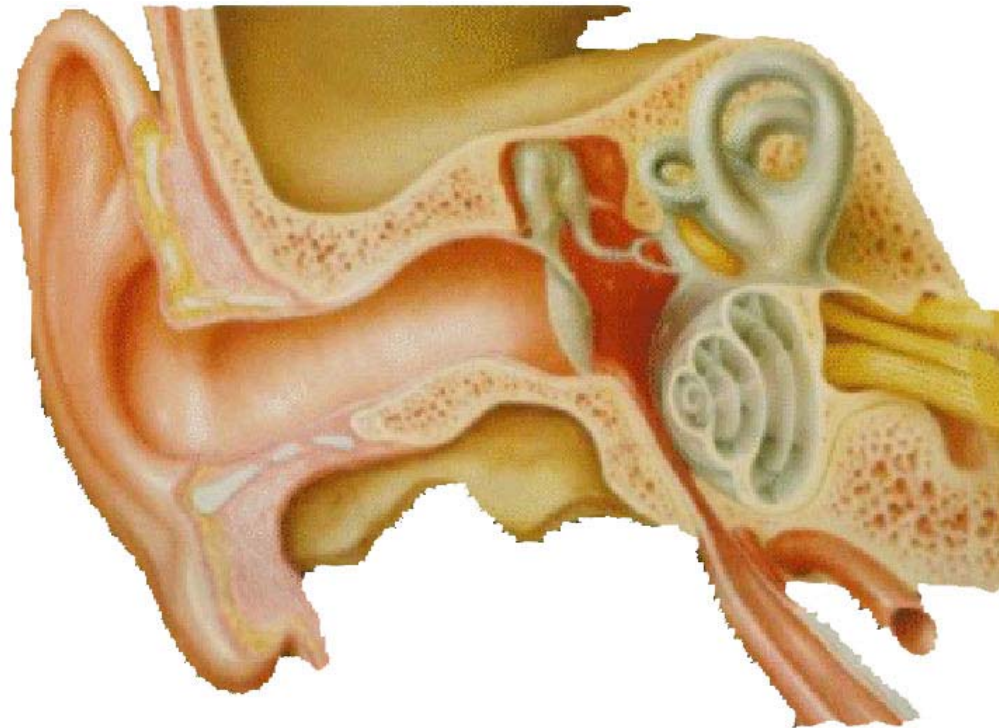


Interior noise – A topic with many interfaces

Prof. Dr.-Ing. Markus Hecht
TU - Berlin / FG Schienenfahrzeuge
Salzufer 17-19 / Sekr. SG 14, D-10587 Berlin

www.tu-berlin.de/~schienenfahrzeuge
markus.hecht@tu-berlin.de

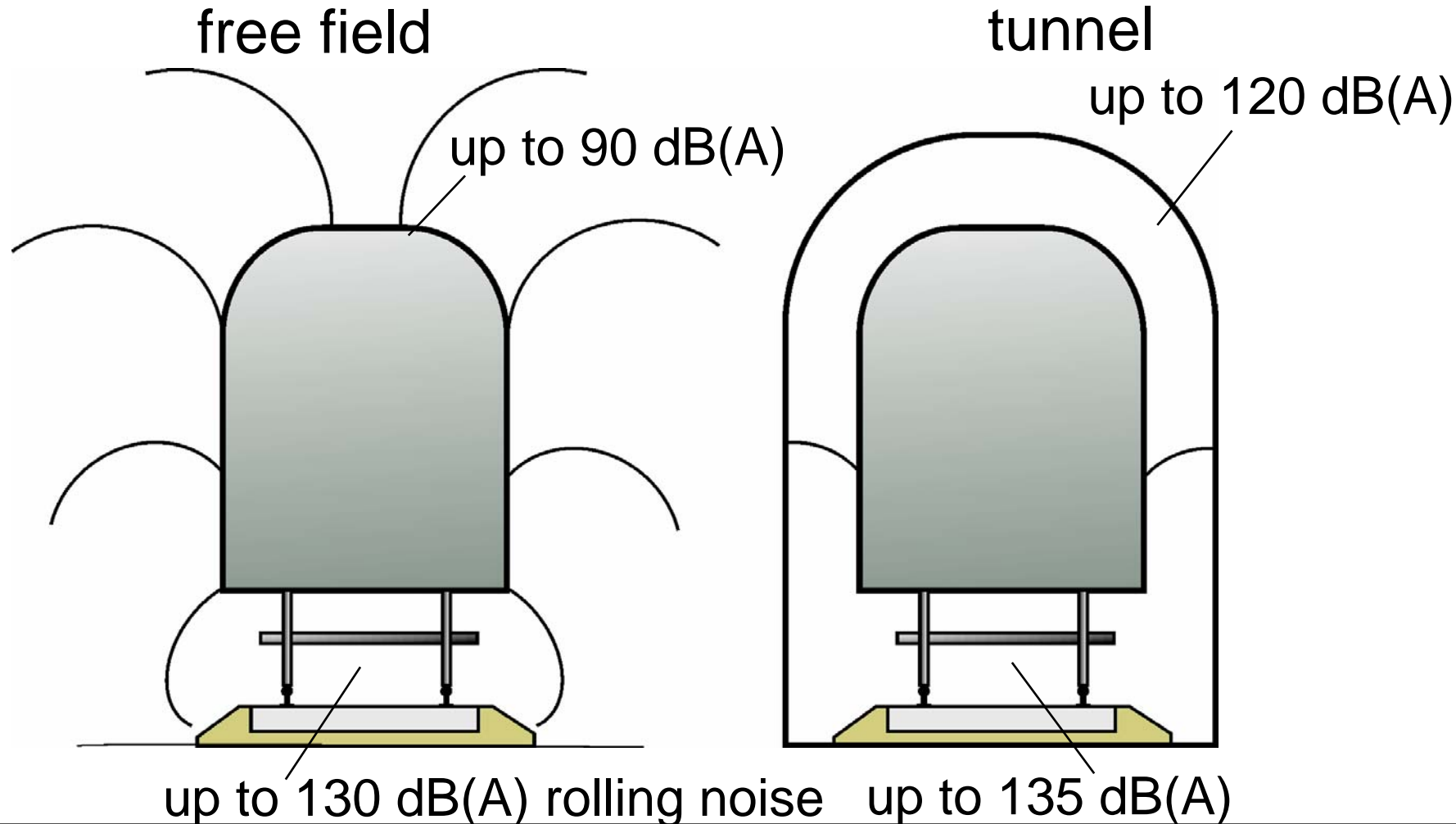
EAR is very sensitive
few milliwatt may be
extremely annoying



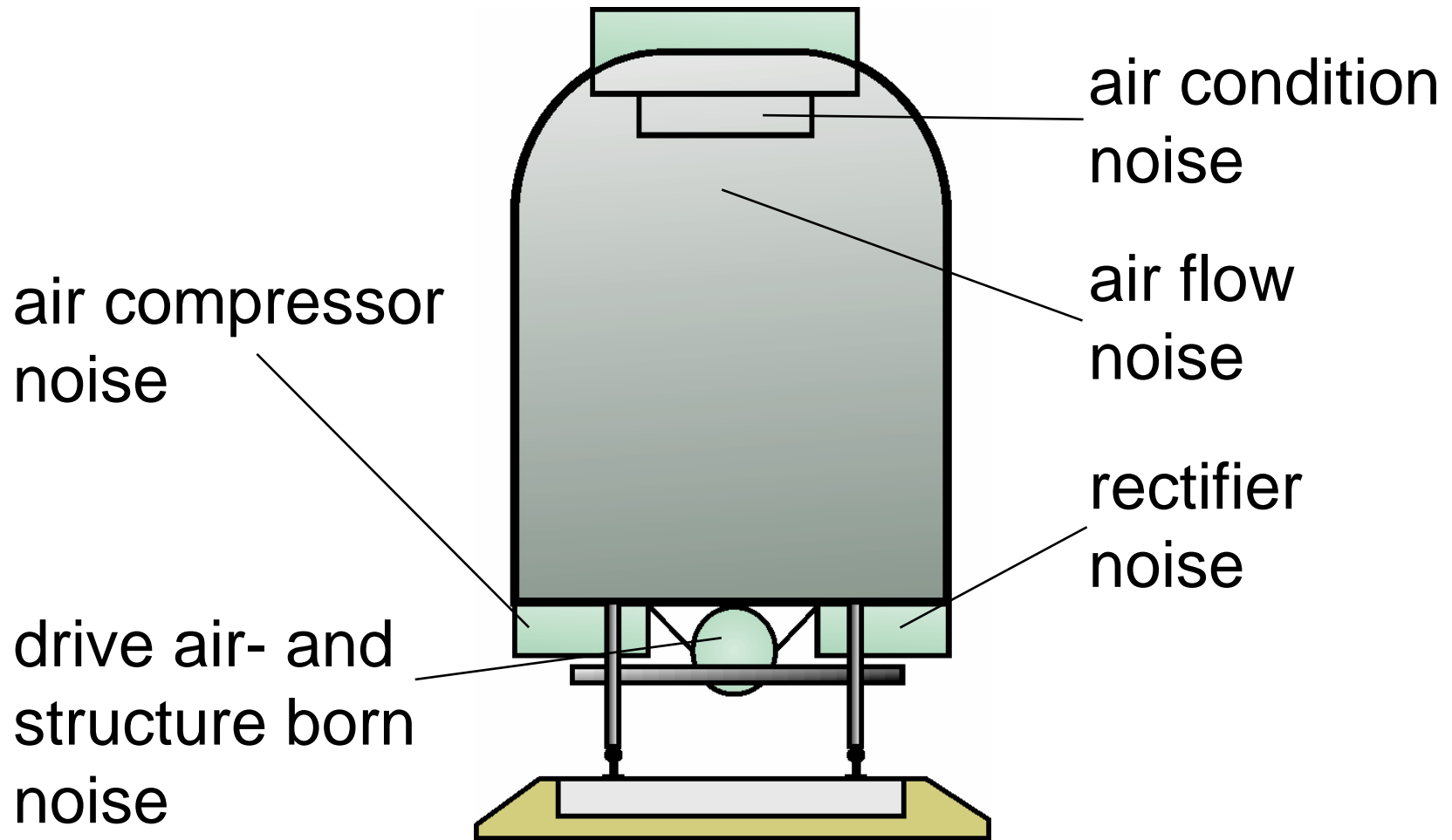
Noise Sources

- exterior
- belonging to the wagon cell
- interior

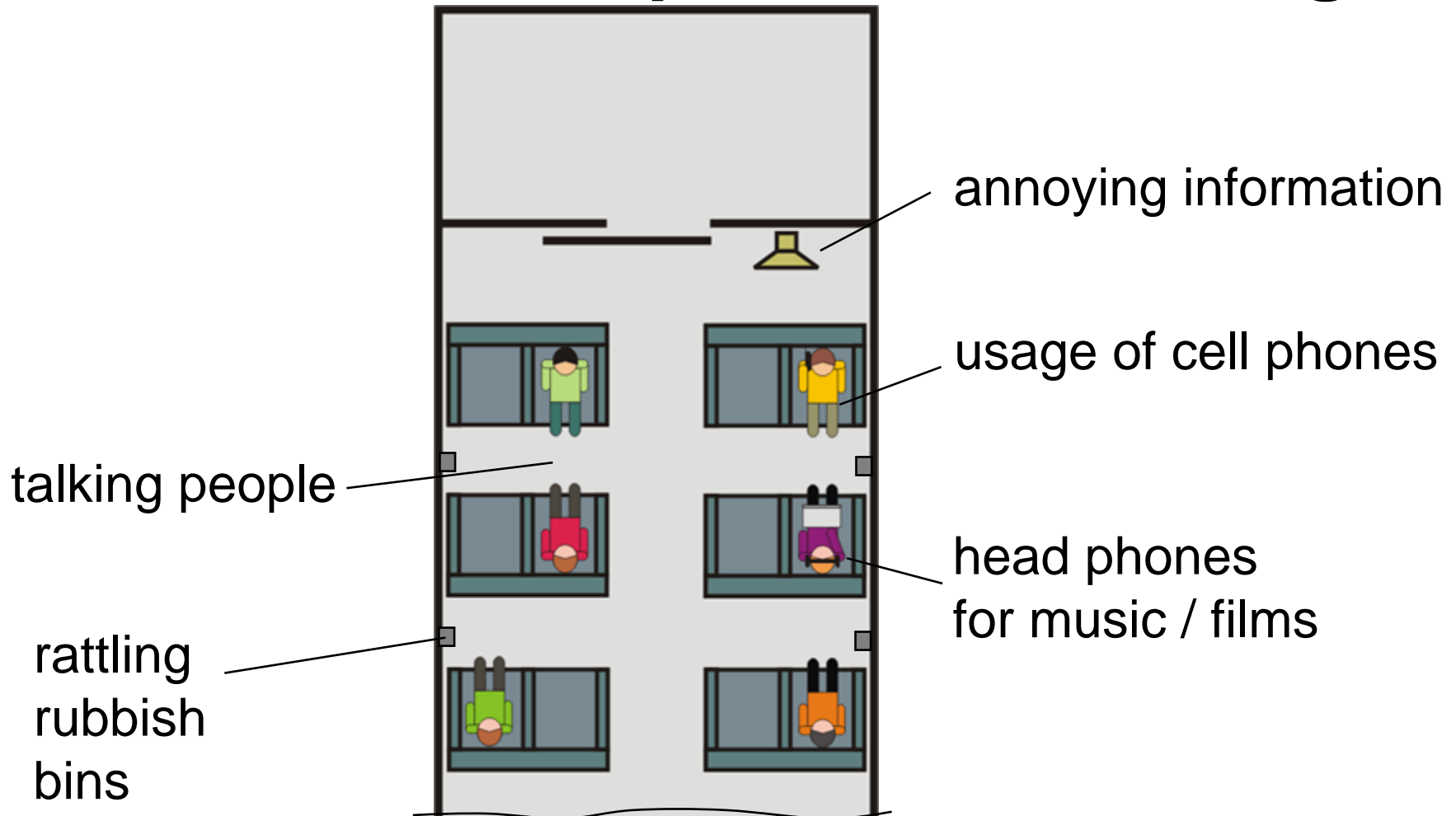
Exterior Noise Source



Wagon cell - Noise Sources

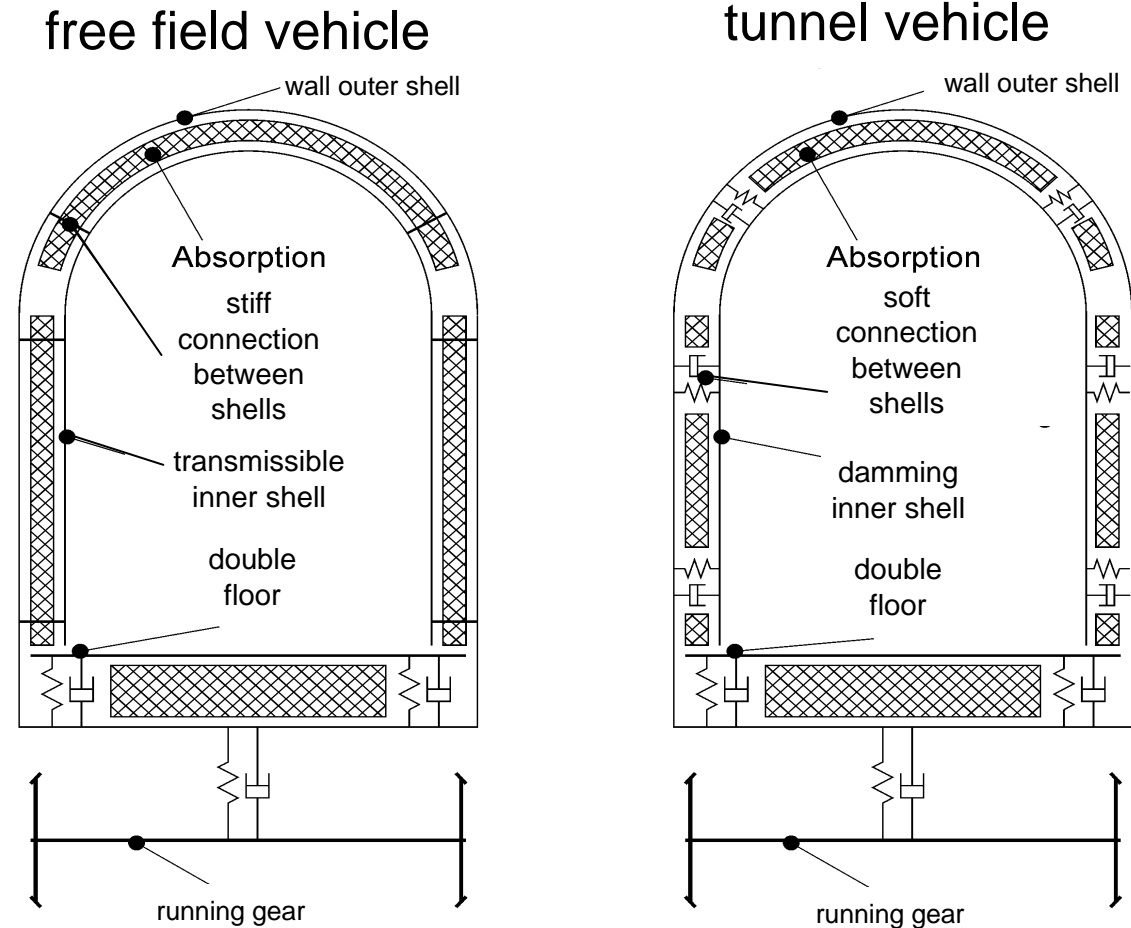


Interior noise at open saloon carriages



Countermeasures - exterior noise

Damming reduction values 20 ÷ 45 dB
Problem: better damming means weight and more space consumption



Countermeasures – wagon cell noise

- proper position and isolation of primary and auxiliary power sources
- avoiding tonal components
- damming and cooling via silencers

reduction values 10 ÷ 35 dB

problem: careful specification and implementation
needs lots of know how.

Countermeasures – interior noise

- increase absorption to create privacy

noise reduction values

between 2 dB in the direct vicinity

5 dB in the next seat row

to 15 dB between wagon ends

problem: much space needed or additional
demand for seats:
seats as sound absorbers / baffles

Countermeasures – interior noise

Recommended values [dB_A] Interior Noise Levels

	Stand still (air condition max.)	Maximum speed	
		2nd	1st class
Long distance	48	66	63
regional	50	68	65
Metro/tram	53	70	

If tonal components occur according EN ISO 3381 then a pure tone supplement of 5 dB is to be respected additionally

Conclusion A

- Interior noise optimization needs competence and influence in many fields
- Interior noise optimization must be followed up during the entire design and production process as at maintenance afterwards

Conclusion B

for fully
satisfying
Railway Interiors

**Noise is a
key issue**