

Gradientin  
kaiutinsuunnittelufilosofiasta  
ja vähän muustakin

EISS, Botta  
15.03.2023 / Atte Salmi

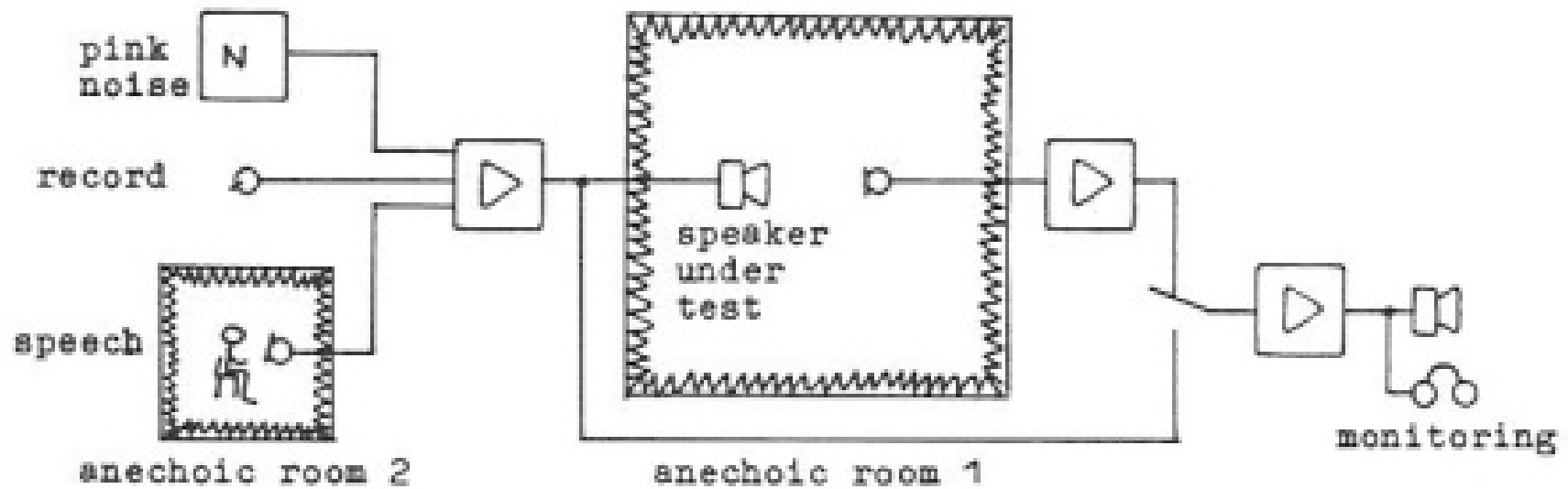
# ' Listening room influence on loudspeaker sound quality and ways of minimizing it '

Jorma Salmi, Anders Weckström  
Lohja Corporation Electronics, Finland

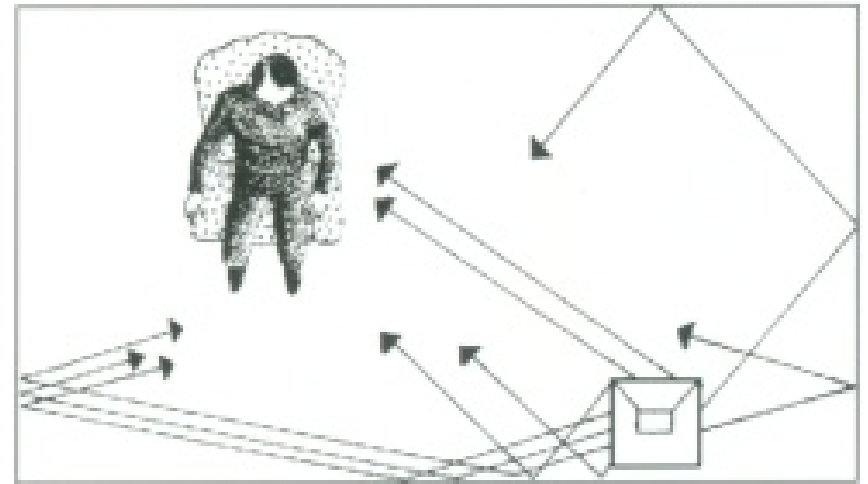
**Presented at  
the 71st Convention  
1982 March 2-5  
Montreux**

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**Gradient**

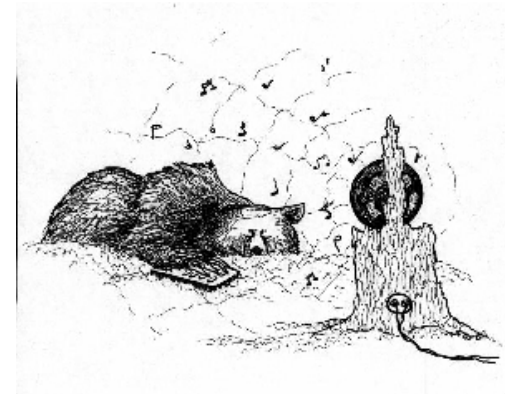


Room reflections colour the sound.



design starting points:

- the lowest possible level of early reflections compared to direct sound.
- the greatest possible time difference between the direct sound and the first reflections.
- smooth free field and power responses.
- wide listening area.



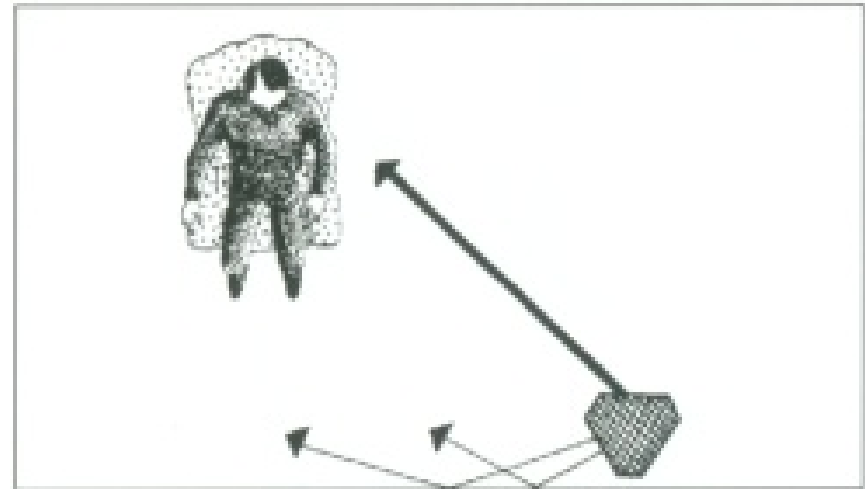
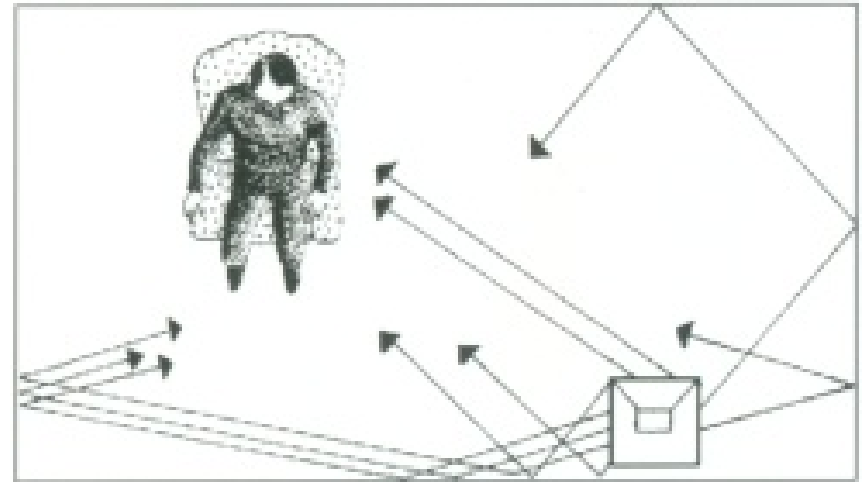
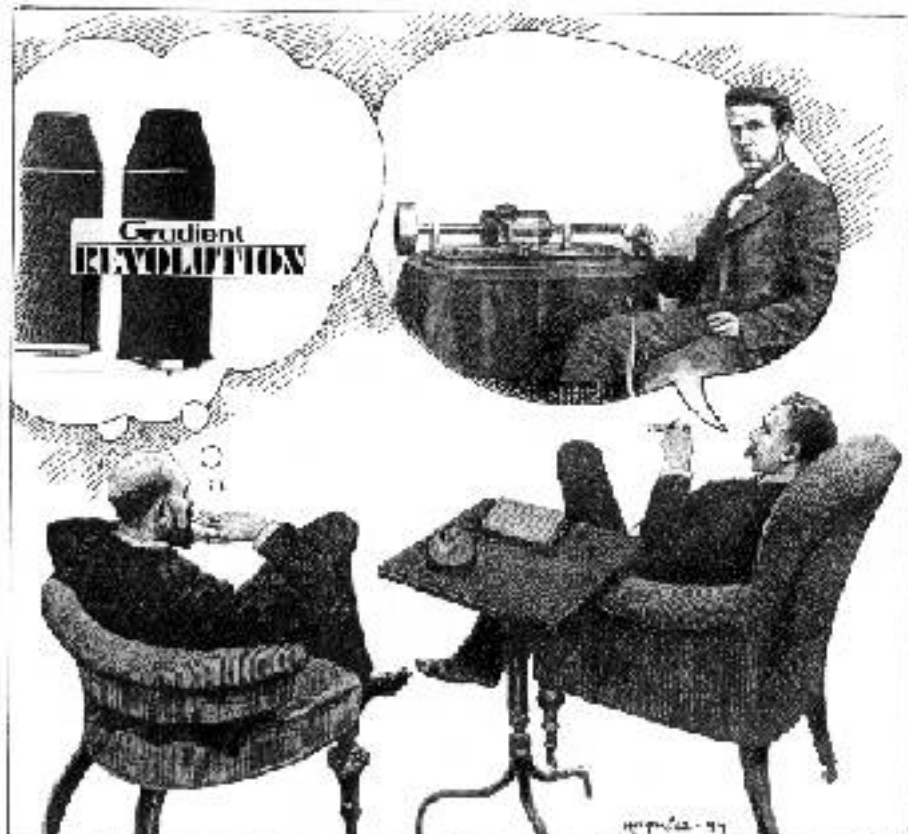
1984

Gradient 1.0



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**Gradient**



**Gradient**

1993

Gradient Revolution



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**Gradient**

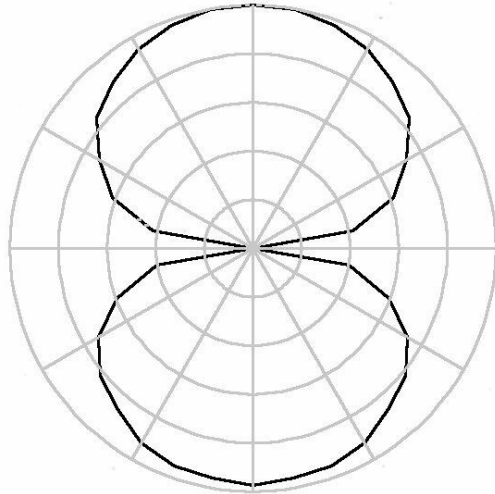




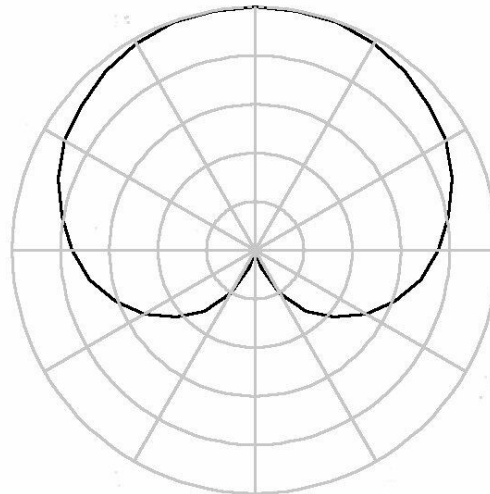
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**Gradient**

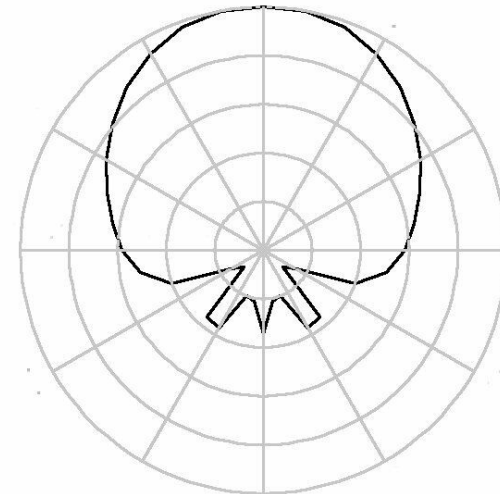
## Radiation patterns in horizontal plane



bass



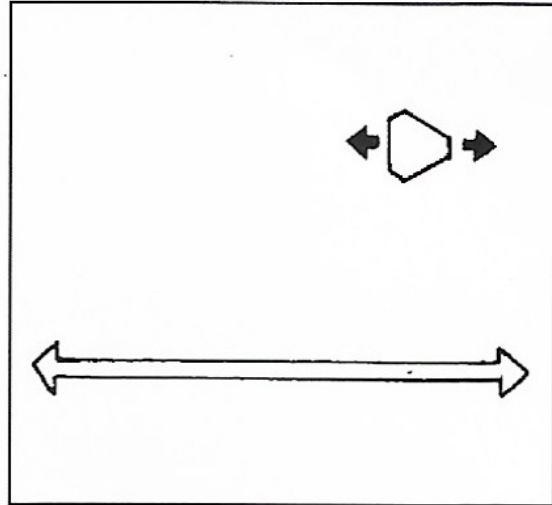
midrange



treble

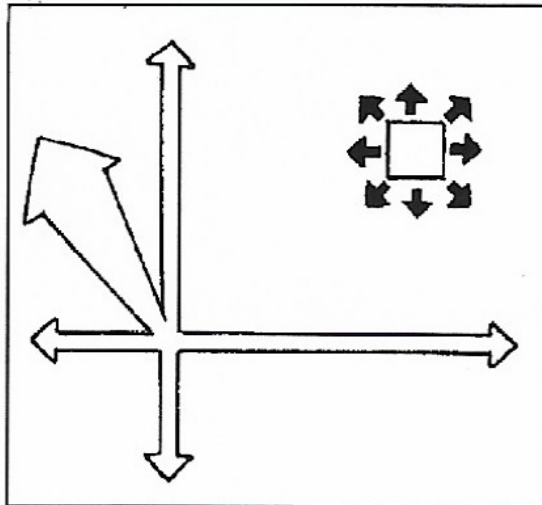


*Gradient Revolution. Standing waves are generated only in one dimension.*



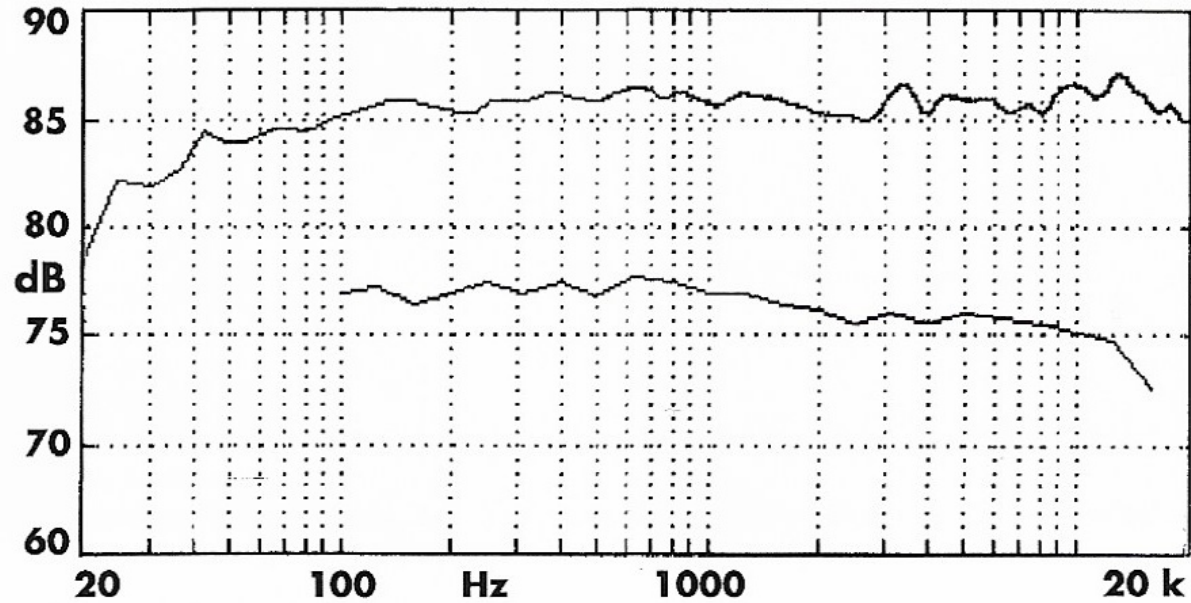
3.

*Ordinary box speaker. Standing waves are generated in three dimensions. Rotating the speaker has no influence on standing waves.*



4.





Freefield and energy (lower graph) responses



Olohuone: 2,5 m x 3,5 m x 4,75 m

Konserttisali

Tavallinen kaiutin

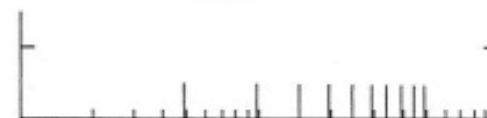
Gradient Revolution

14 m x 41 m x 4,75 m

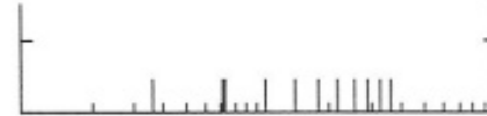
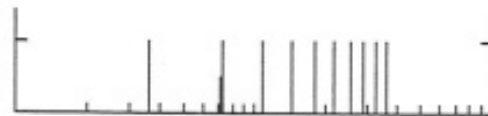
Pysty-  
suunta  
10 ensim.



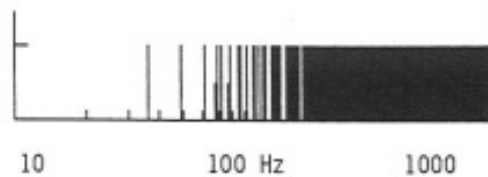
Leveys-  
suunta  
10 ensim.



Pituus-  
suunta  
10 ensim.



Kaikki  
yhteensä



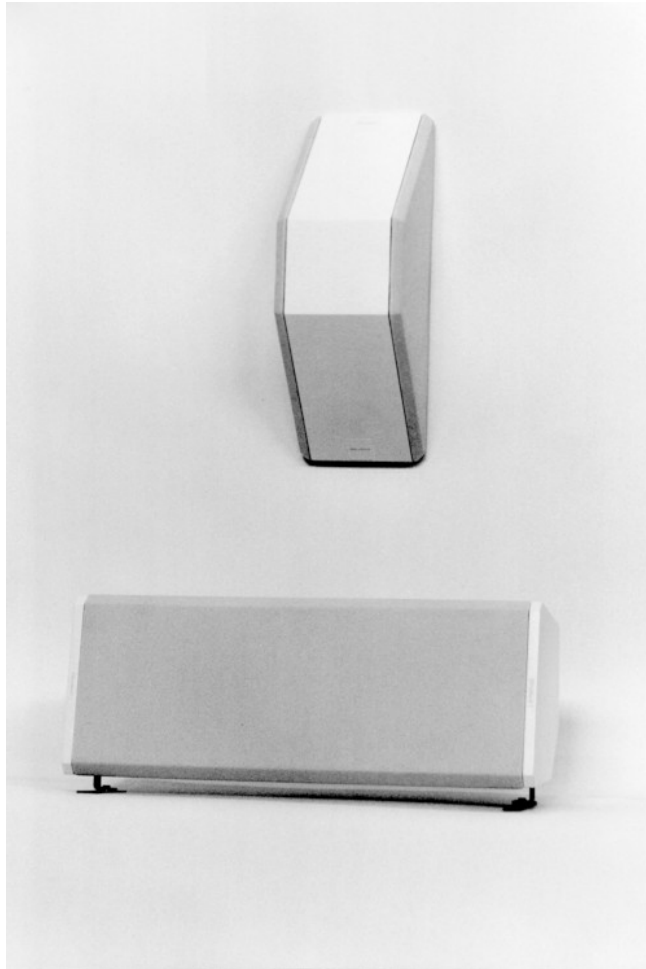
10 100 Hz 1000

10 100 Hz 1000

10 100 Hz 1000

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**Gradient**



Chicago Tribune, 23th June, 1995

matching, physically smaller, center channel speaker. Gradient showed the most versatile home theater speaker system, with DS-1 surround speakers designed to be mounted in every possible configuration, on walls, ceilings, stands. These \$695-apiece surrounds look good in any position.

Atlantic Technology officially introduced its System 350 Home DVD speaker system, with a

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**Gradient**



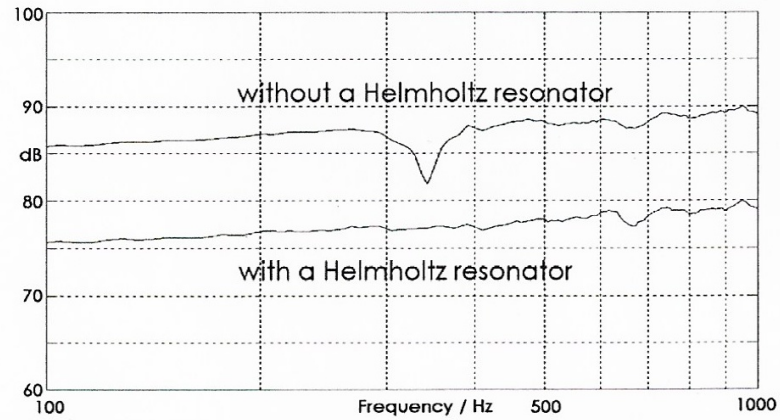
1996

Gradient Intro

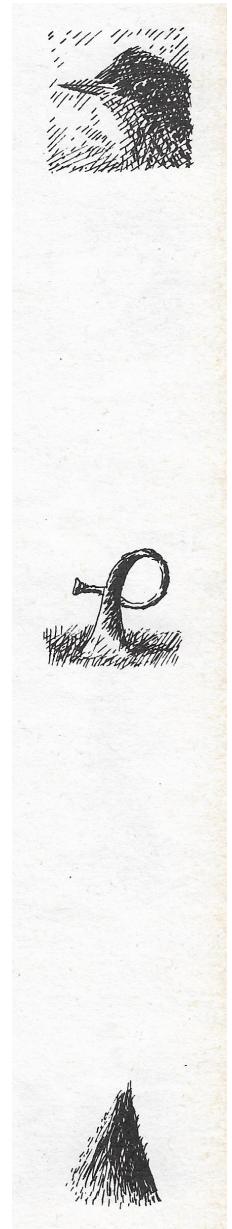
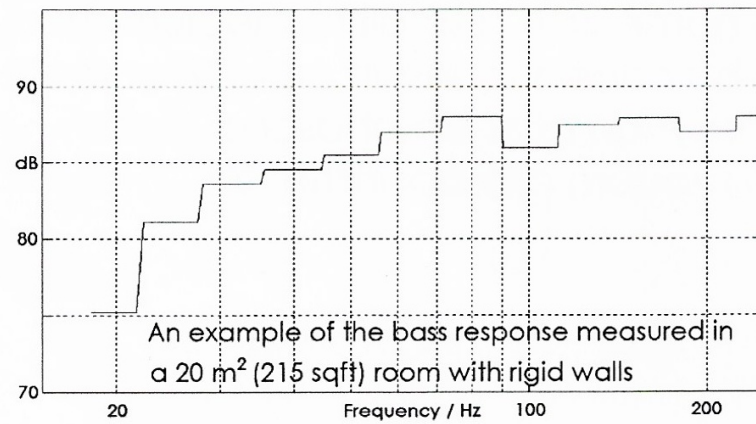
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**Gradient**

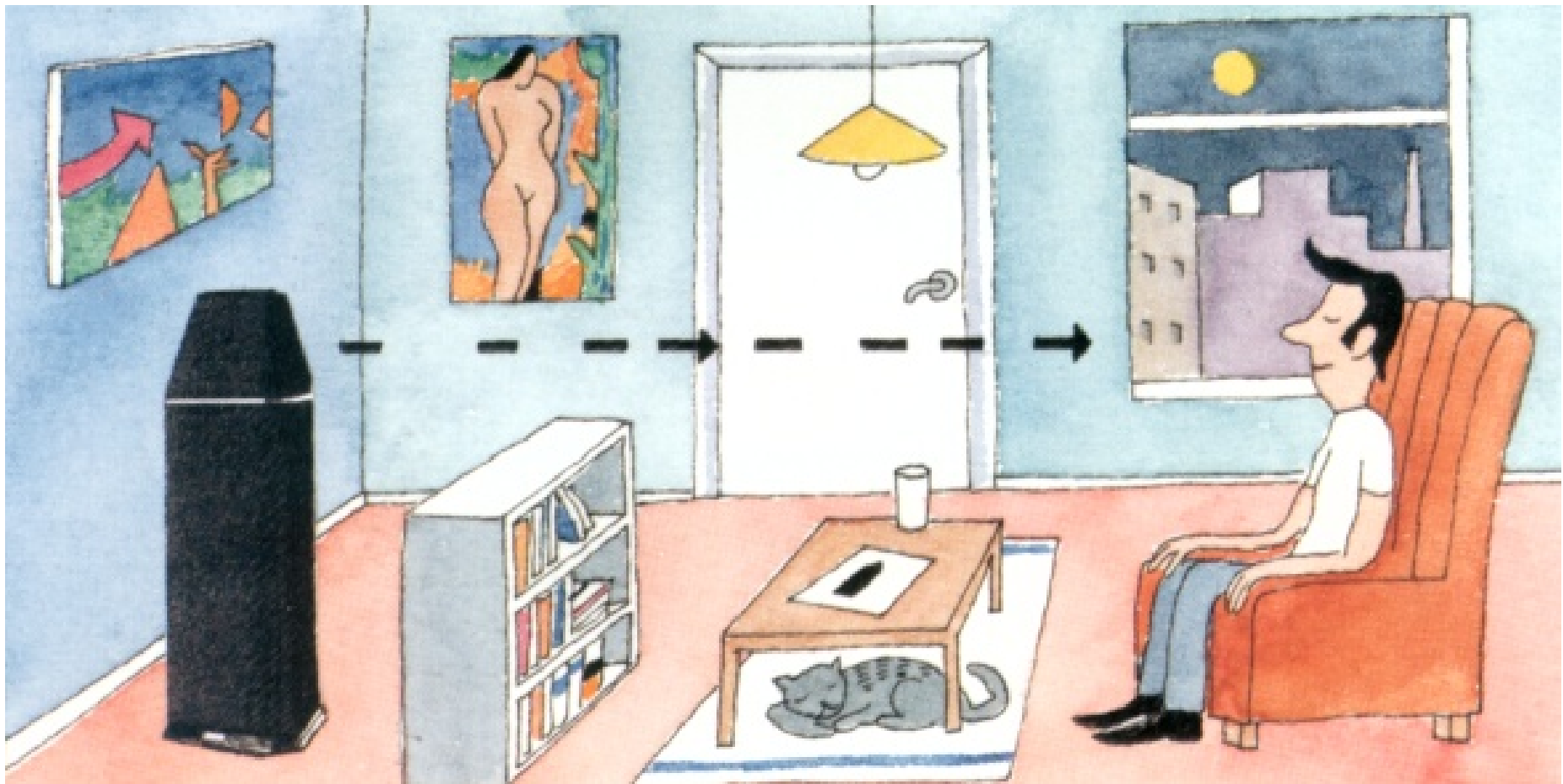
### The effect of a resonator to the frequency response



### Low frequencies are well produced to 30-40 Hz







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**Gradient**

2002

Gradient  
Revolution Active



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**Gradient**

2022

Gradient R-5/R-5A



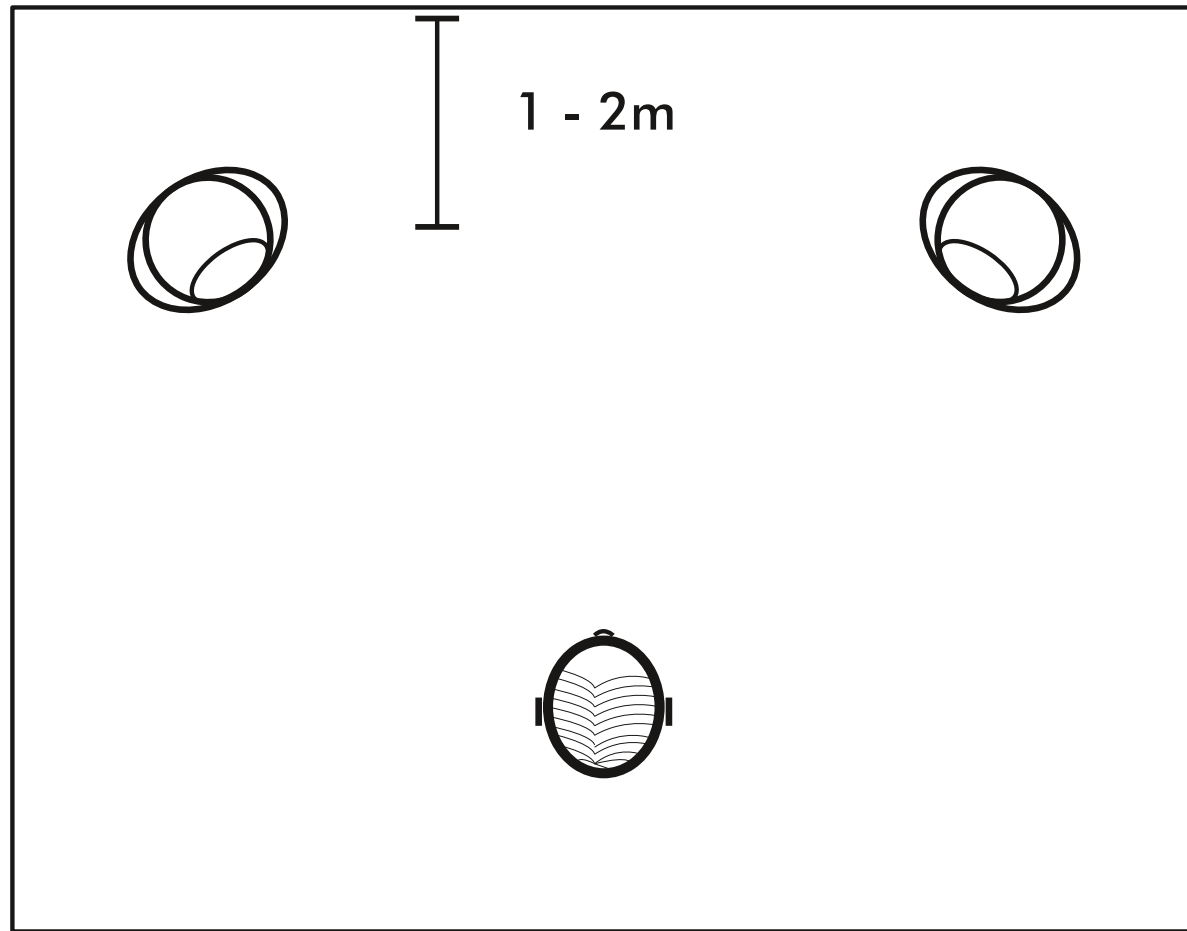
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**Gradient**



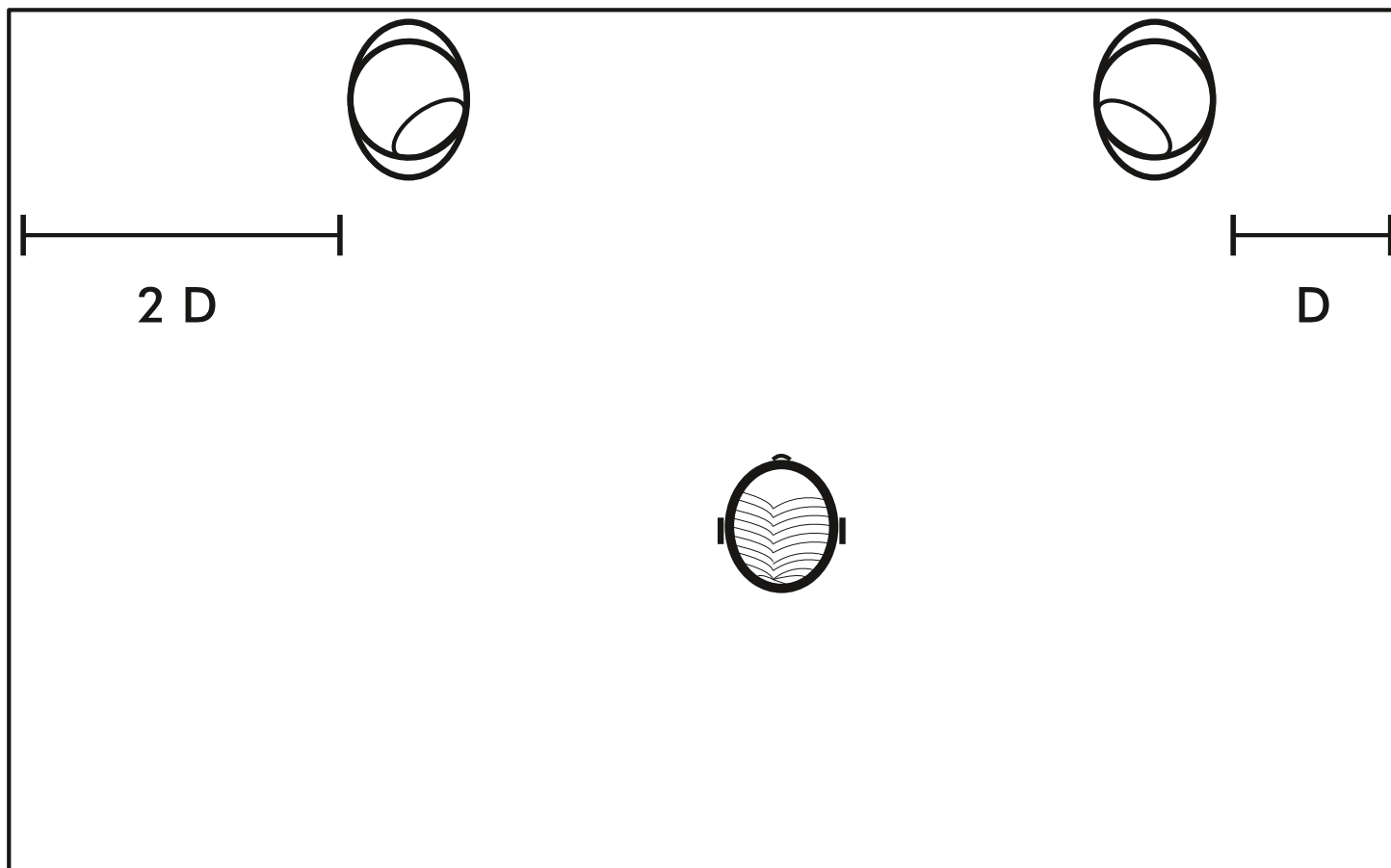
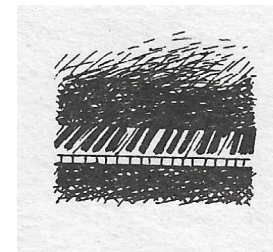
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**Gradient**



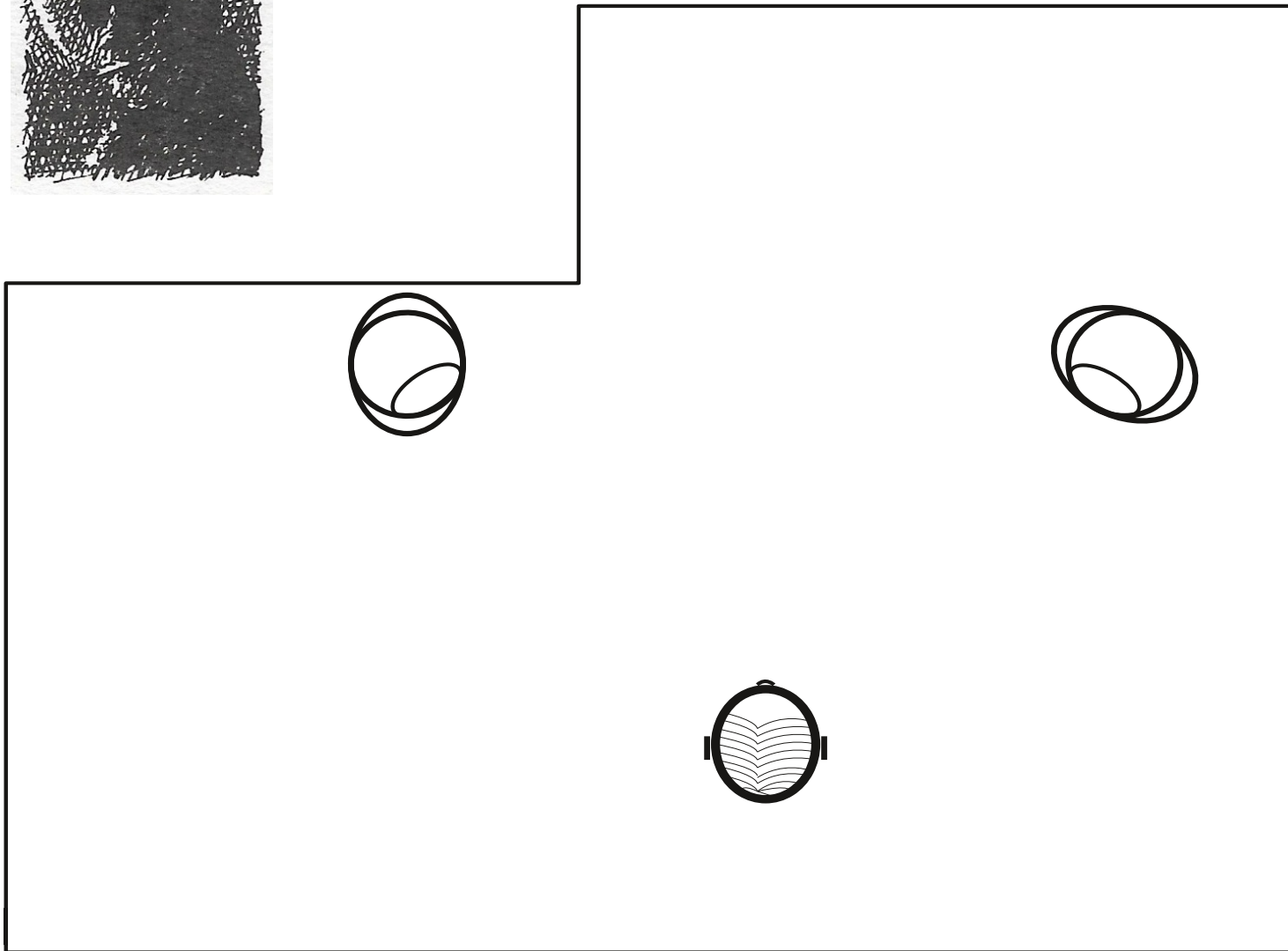
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**Gradient**



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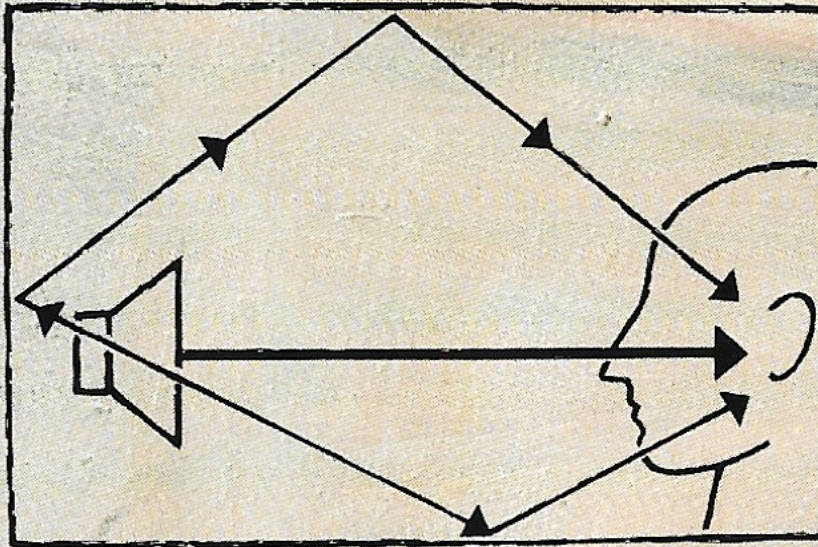
**Gradient**



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**Gradient**

Early reflections generate audible colourations. Due to its controlled directivity, the Gradient speaker generates significantly less early reflections than do normal speakers. That is why the Gradient sound perceived by the listener is exceptionally smooth and uniform.



[www.gradient.fi](http://www.gradient.fi)

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**Gradient**