AKUSTIKNET

Noise in educational environments

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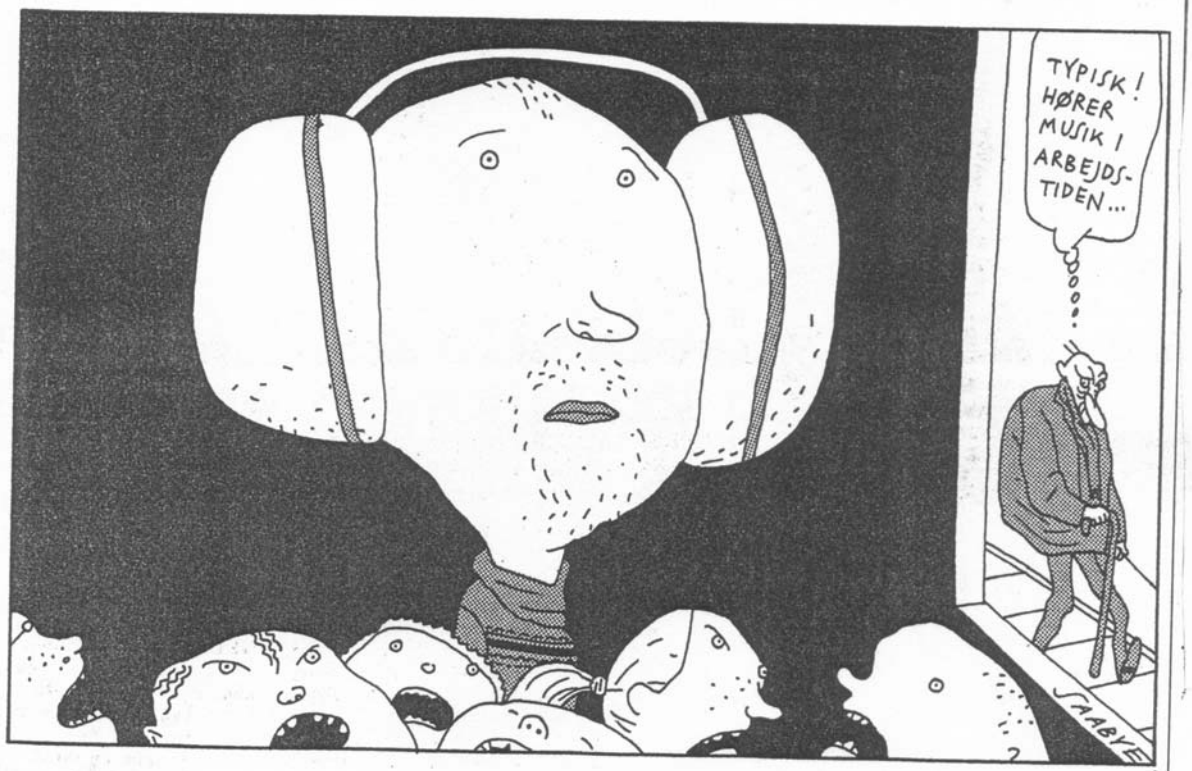
DEBAT

Hyletoner



Pædagoger udsættes efterhånden for så meget støj, at de må benytte høreværn for at undgå at blive ramt af tinnitus.

Danish Statistics chose a total of 176 day care centres as statistically representative for day care centres in Denmark

these were:

- 49 nurseries for children aged 6 months to 3 years
- 52 Kindergartens for children aged 3 to 6 years
- 75 SFO’s for children’s after school attendance (6 to 11 years)

- Measurements for one week in one group room in all centres (3 to 7 working days)
- Continuous measurement of room noise level in reference point in investigated room
- Noise dose meter measurements on staff in same room for full working days
- Control measurements in another group room (statistically chosen periods)
- Check of reverberation time in investigated room
- Staff filled out a log containing number of children present and activity for the period

Measurement equipment involved:

- 35 personal noise dose meters for direct measurement of dose during working days
- 10 PC based sound monitoring systems for continuous surveillance of room noise levels.

  both systems recorded 1 min values of $L_{A\,eq}$ facilitating the possibility to have time matched values of dose and room noise level.

Results: reverberation time

- Nurseries: average T = 0.45 sec,
  7 of 49 exceeded 0.6 sec.
- Kindergartens: average T= 0.41 sec.,
  4 of 52 exceeded 0.6 sec.
- SFO's: average T=0.46 sec.,
  8 out of 75 exceeded 0.6 sec.

Danish Building regulation requires T < 0.6 sec., where T is calculated as mean T for octave bands 125 to 2000 Hz.

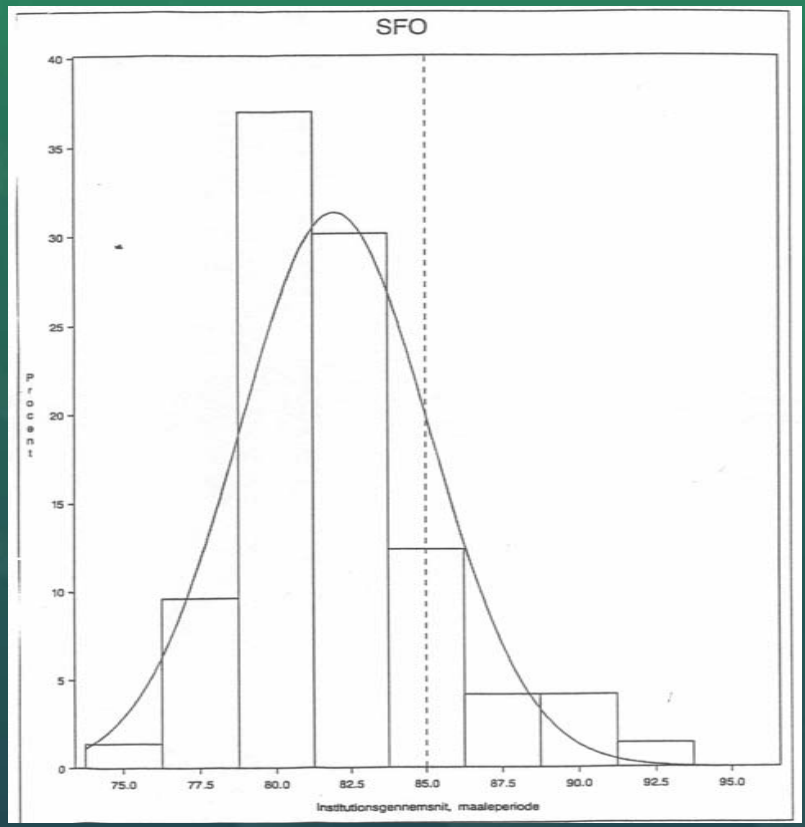
Thus, regulations where met for 90 % of centres

Results: noise exposure

Dose meter measurements, corrected to 8 hour equivalent noise exposure values, lead to centre average dose values:

- Nurseries: average noise exposure = 80.3 dB, S.D. = 3.1 dB
- Kindergartens: avr. noise exposure = 79.9 dB, S.D. = 3.4 dB
- SFO's: average noise exposure = 81.6 dB, S.D. = 4.4 dB

Assuming normal distribution:



allows us to calculate percentages

Estimated percentages of nurseries with average noise exposure above 75, 80, 85 and 90 dB

Center average for noise exposure	Estimated percentage %	Lower limit for 95% confidence interval %	Upper limit for 95% confidence interval %
>75 dB	95,7	89,8	98,5
>80 dB	54,3	43,0	65,2
>85 dB	6,6	2,8	13,8
>90 dB	0,1	0,0	0,8

In evaluation of these figures:

National Danish labour inspection survey the following rules:

- Max exposure level ($L_{A\ eq\ 8h}$) must not exceed 85 dB. Above 85 dB hearing protectors are mandatory.

- If max exposure level exceeds 80 dB the employer must provide hearing protectors for personal protection.

Estimated percentages of kindergartens with average noise exposure above 75, 80, 85 and 90 dB

Center average for noise exposure	Estimated percentage %	Lower limit for 95% confidence interval %	Upper limit for 95% confidence interval %
>75 dB	94,9	88,7	98,0
>80 dB	50,0	39,7	61,3
>85 dB	5,3	2,1	11,7
>90 dB	0,1	0,0	0,5

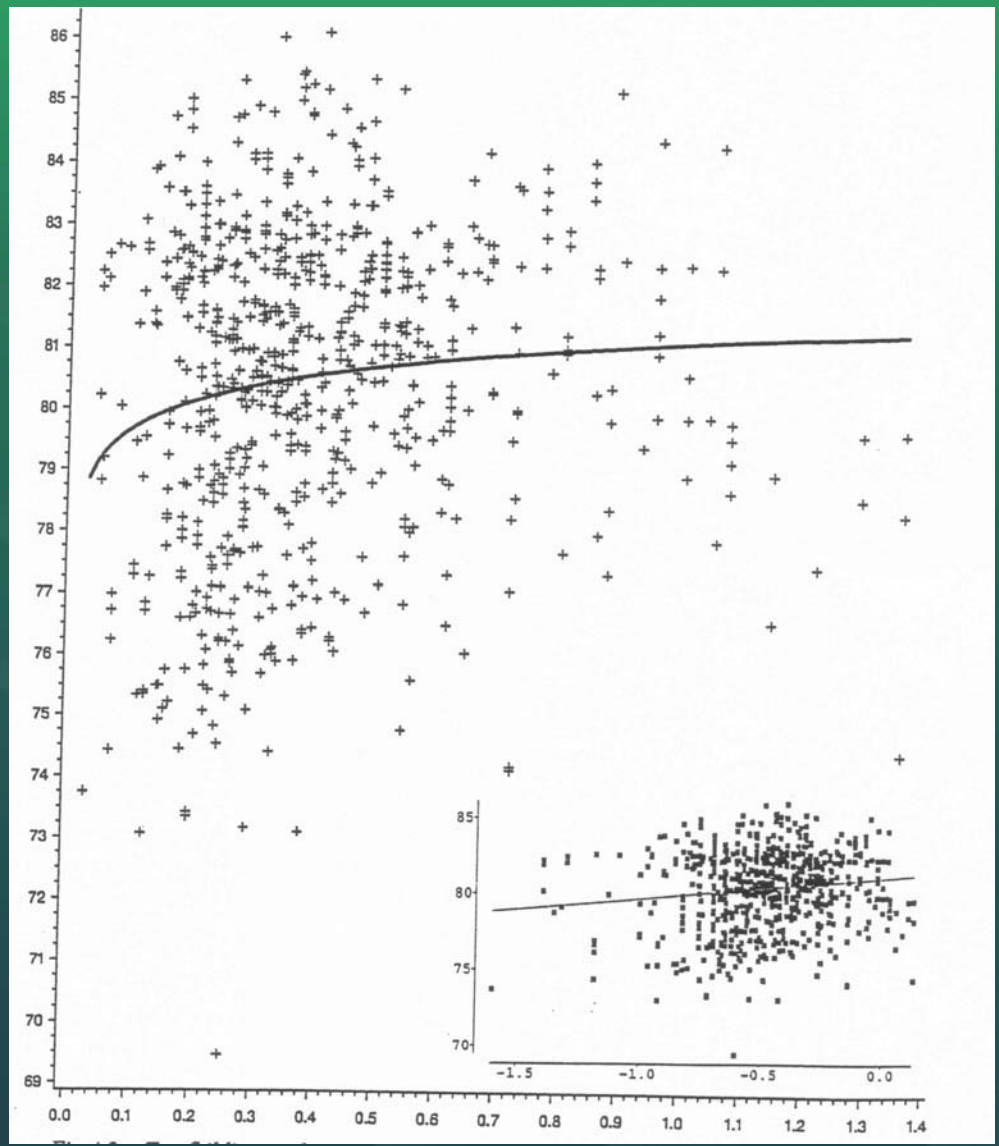
Estimated percentages of SFO's with average noise exposure above 75, 80, 85 and 90 dB

Center average for noise exposure	Estimated percentage %	Lower limit for 95% confidence interval %	Upper limit for 95% confidence interval %
>75 dB	95.6	90.9	98.0
>80 dB	66.6	57.4	74.8
>85 dB	20.0	13.4	28.4
>90 dB	1.7	0.6	4.5

Results: room noise levels

Room noise level, corrected by corresponding values of dose value and room value, and assuming again a normal distribution:

	Estimated percentage of Nurseries %	Estimated percentage of Kindergartens %	Estimated percentage of SFO's %
Average room-noise level > 75 dB	98	99	99
Average room-noise level > 80 dB	60	55	73
Average room-noise level > 85 dB	7	2	17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0.7
0.8
0.9
1.0
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-1.5
-1.0
-0.5
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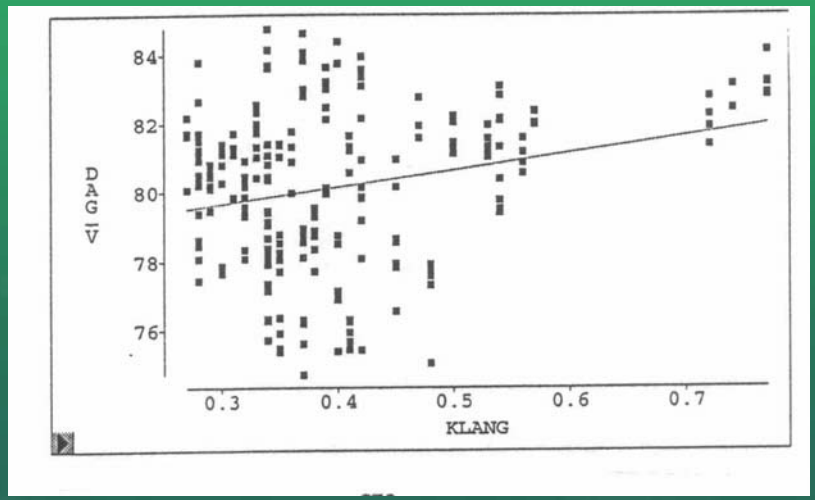
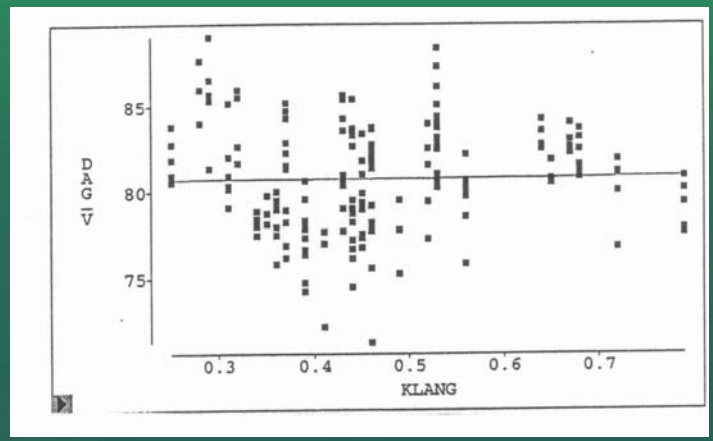
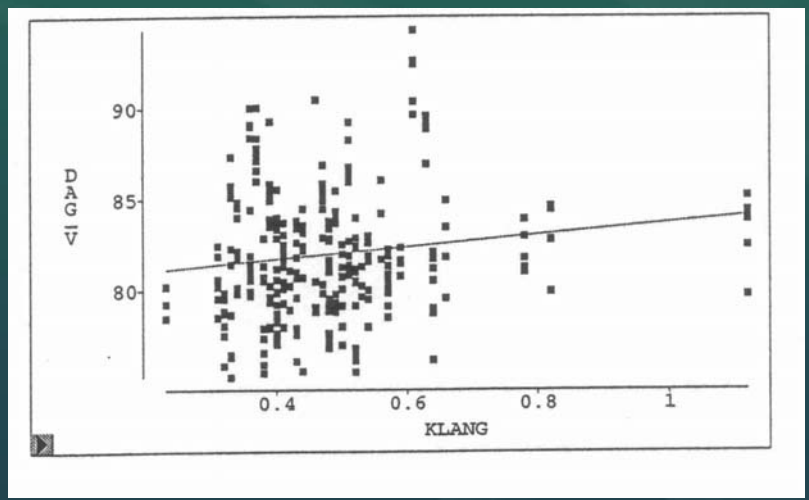


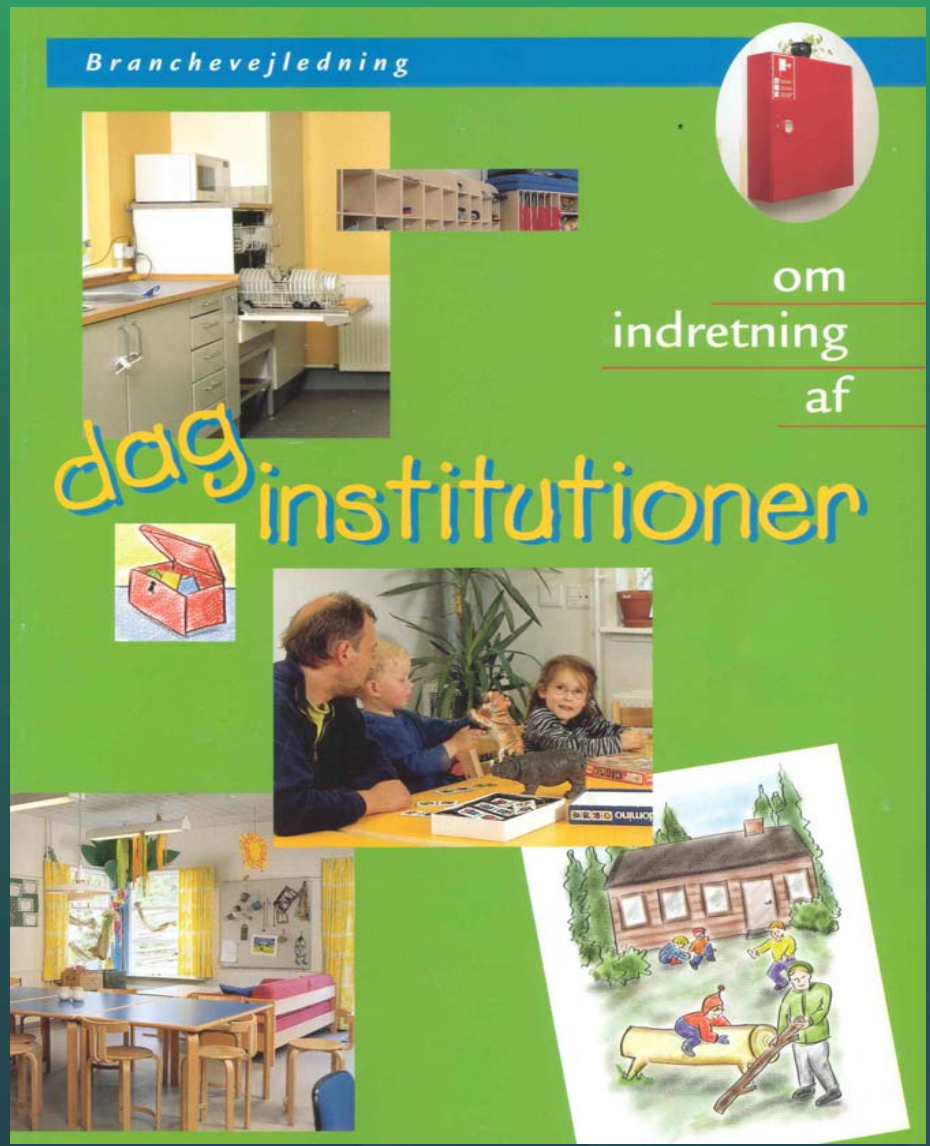
reverb. kindergartens

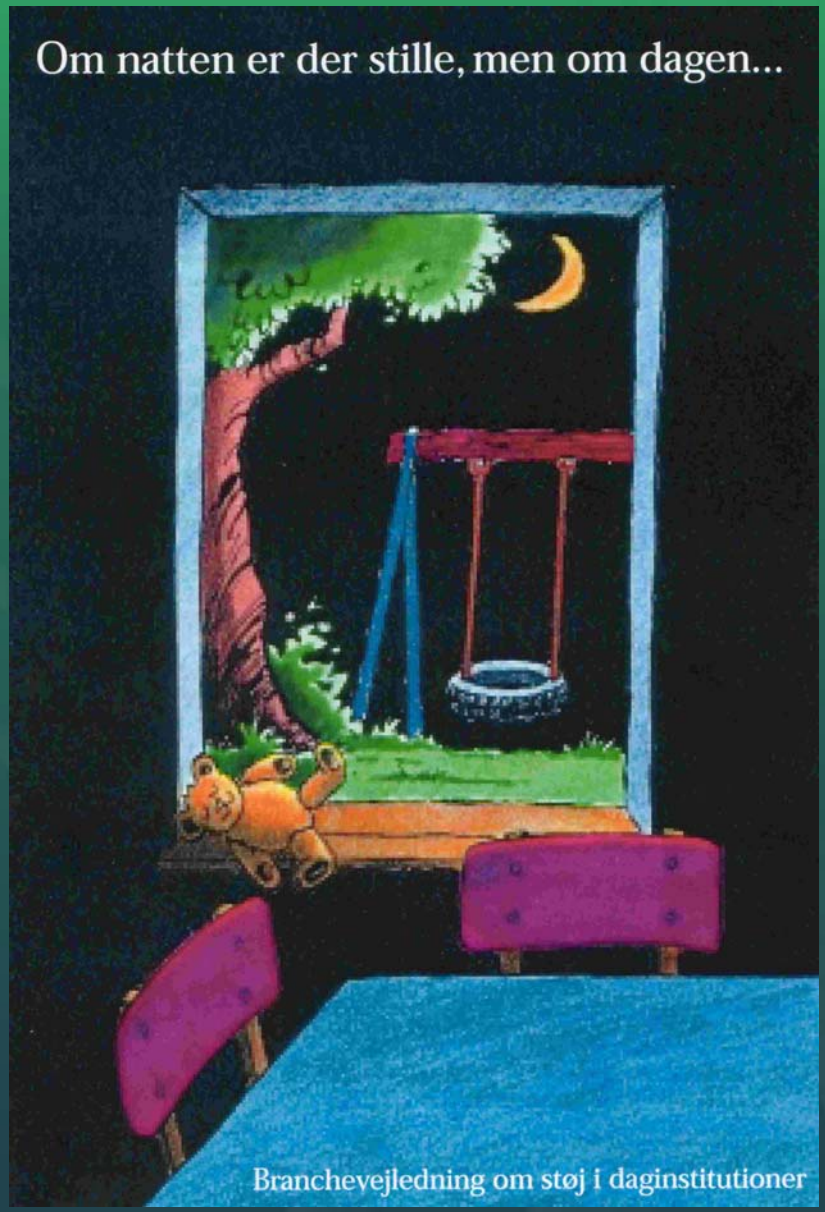


reverb. nurseries

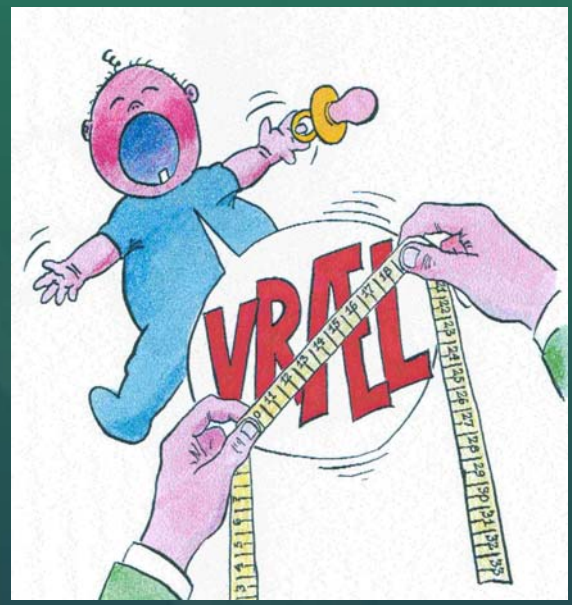


reverb. SFO's


Branchevejledning
om
indretning
af
dag institutioner


Om natten er der stille, men om dagen...
Branchevejledning om støj i daginstitutioner


100 dB
SPICE GIRLS
YEAH! YEAH! YEAH!
DER VAR
ENGANG...
70 dB
-SOREN

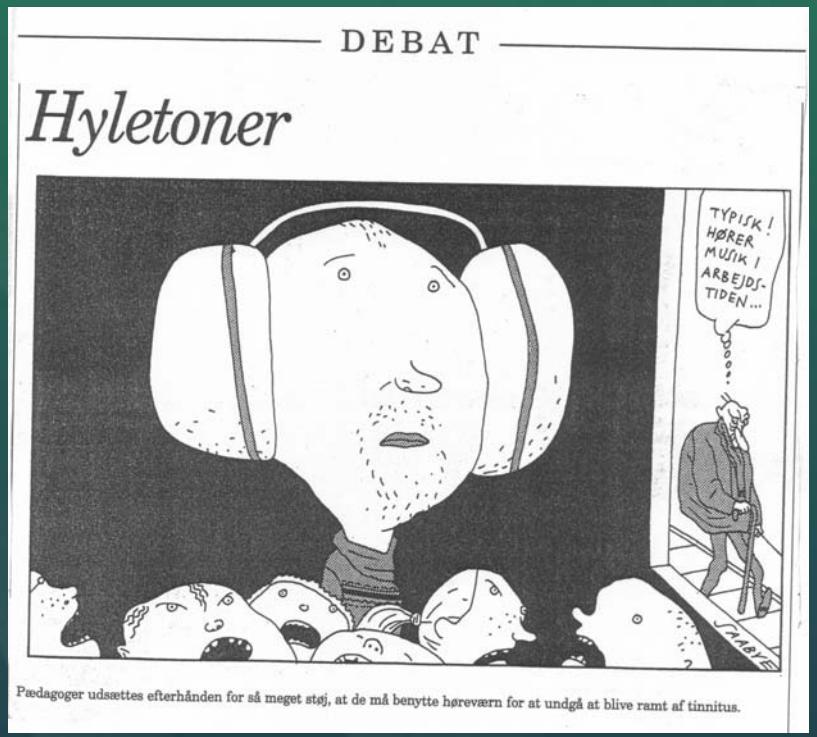

VRÅL

Conclusions

- A lot of effort is needed to convince people that taking care of children is very noisy
- To reduce noise you must work both with regulation, control, guidance and information
- Noise reducing measures are hardware, but also a change in educational attitudes

These investigations were done in order to convince society and authorities that the staff were exposed to a lot of noise

BUT:
what about the children



We know that noise may impair hearing

We know about the effect of noise on childrens learning

In a lot of ways young people grow up with a lot of noise:

Examples:

Noise exposure in discotecs: 93 to 105 db(A)

Noise exposure during rock concerts 95 to 104 dB(A)

What price do we pay:

Maybe the amount of noise you are exposed to in your youth make you unable to see the quality of quiet

Maybe this is an explanation that some people are even frightened of quiet

Now to go back to the childrens day care centres:

5 years later a similar follow up study were done in a smaller number of centres:

The result was that it could be statistically shown (p = 95%) that the noise exposures had decreased

(however not very much)

Noise is an issue that needs constant attention and awareness

Thank you