Significant between worker differences

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17:05 – 17:35
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British Occupational Hygiene Society
Working for a healthier workplace

Nederlandse Vereniging voor Arbeidshygiëne

The BOHS-NVvA Guidance (2011)

Testing Compliance with

Occupational Exposure Limits

for Airborne Substances

British Occupational Hygiene Society
Working for a healthier workplace

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"This document aims to give guidance to occupational hygienists and others on measurement strategies …. for determining compliance with occupational exposure limits".

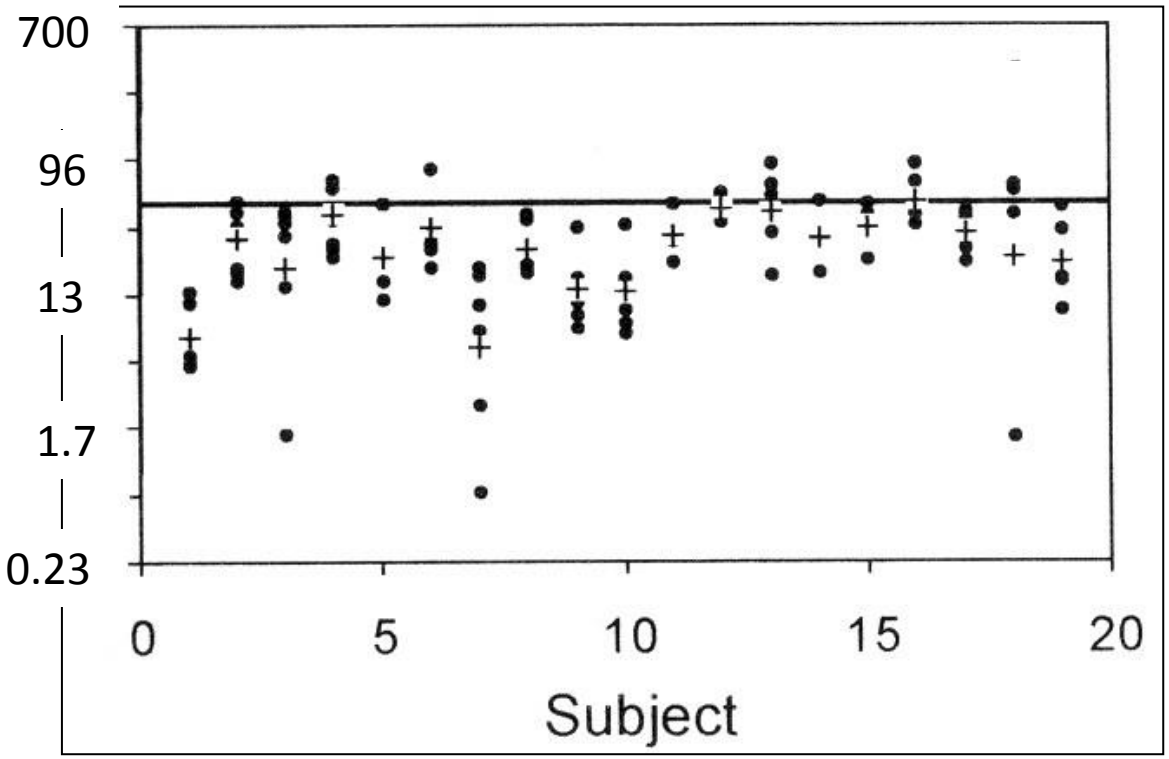
Demonstration of BW_Statv1. Thursday 25/4 /2013
Syndicate room running Sessions 'C' on the second floor

Important addition to CEN689: Introduction of individual compliance testing

If the between-worker variation within a SEG makes an important contribution to the total variation, it is necessary to test individual compliance.

Based on reports of big variation in exposure between workers doing the same job

Real or a small sample size caused differences in location GM?



From Rappaport and Kupper, 2008, "Quantitative Exposure Assessment", ISBN 978-0-9802428-0-5, www.lulu.com

Why big or small exposure variability in SEGs?

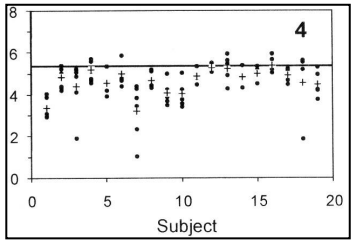
Big:

- since the 70^{s}
  - Single task based jobs disappeared, multi-craft jobs in industry
  - Less variability dimming background levels
  - So: levels decreased, exposure variability increased!

Small:

- high-tech clean rooms,
- Well defined Tasks/Operational Conditions (as in REACH CSR),
- as an artifact in:
  - 2-decades analytical methods (like gravimetric dust sampling)
  - simple methods to handle undetectables (LoQ/2).

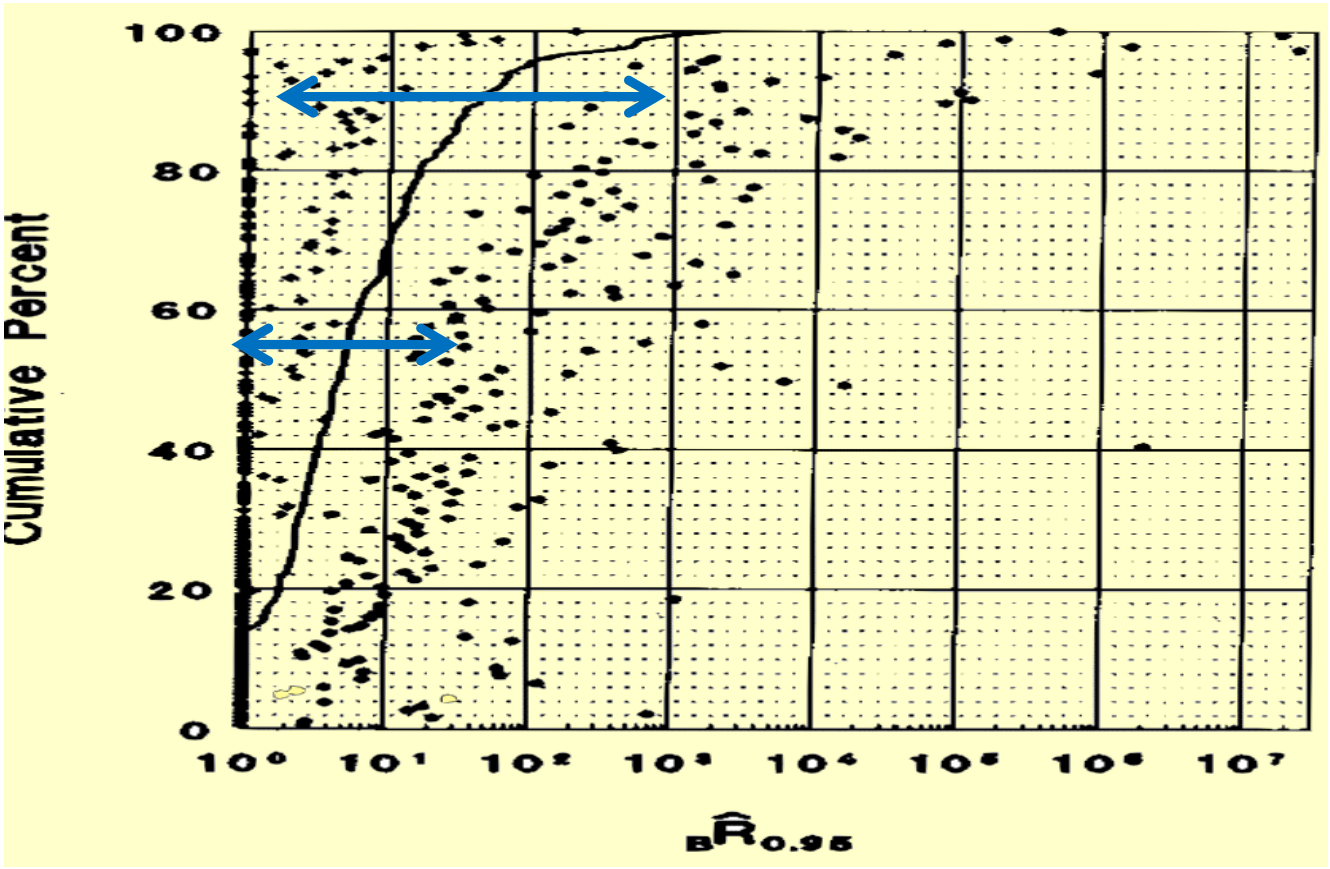
Why significant differences between workers in a SEG?



- Personal: age, experience, physical, behavoir

- Random sampling: Small # per worker -> different sampled tasks.
  spraying or laminating in boat manufacture
- Bad LoD handling: Lower GSD's for workers near the LoD,
- Bad statistics

1993: Rappaport/Kromhout: important B&W variability in 85% SEGs.



- $R_{0.95}$ = ratio of 95% upper & lower mean of workers in SEG
- With confidence intervals ≤ 30% SEG significant B&W differences
- LoD artifacts
- 5% significant B&W differences due to chance
- Limited evidence that B&W is important ?

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Approach NVvA/BOHS guidance

Individual differences within a SEG may exists but this must by checked.

NVvA-BOHS Guidance ad hoc criterion

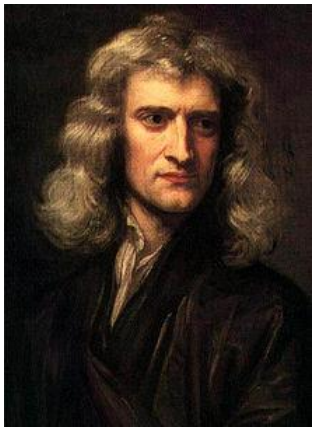
- If the between-worker variance is exceeds 20% the total variance need to perform the individual compliance test.
- **“No additional value for P(ANOVA)<5%”**

Supported by simulation data (?)

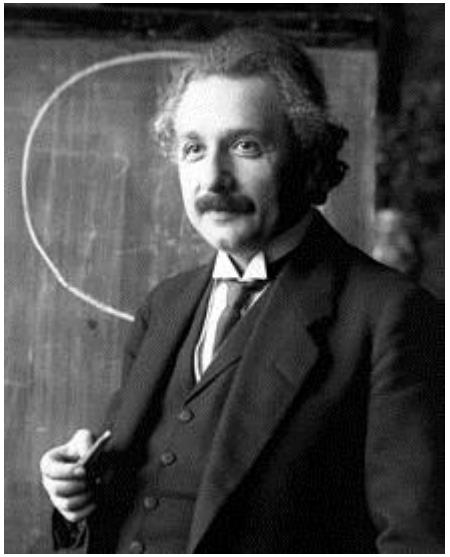
Too optimistic ?

Your approach has no additional value

$$F = G\frac{m_1 m_2}{r^2}$$



$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$



Consequences

- Sample size SEG based -> worker based
  - increase in sampling effort
  - ≥6 samples per worker in stead of per SEG
- chasing the “dirty worker” with statistics
- Interests other than pure science are involved

- Careful consideration if individual differences exists