

Is occupational exposure & risk assessment scientific sound?

Is het beoordelen van blootstelling op de werkplek gebaseerd op wetenschappelijke toevalligheden?

Sessie G, 12/04/2017 13:30

Theo.scheffers@tsac.nl

Jon P. Ioannidis

Open access, freely available online

Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

- Non-reproducible findings
- Over analysis of data
- Methodological flaws
- Happy publishers

Anatomische Les, AMC 18-11-2016



John Ioannidis
Professor of Medicine
and Statistics at
Stanford University;
Author of 2005 paper
"Why Most Published
Research Findings
are False", published
in PLOS Medicine.

'Happy' publishers

Leukemia Risk in Caprolactam Workers Exposed to Benzene

GERARD M.H. SWAEN, MPH, PhD, THEO SCHEFFERS, IR, JOHAN DE COCK, IR,
JOS SLANGEN, AND HINKELIEN DROOGE, IR

Ann Epidemiol 2005;15:21–28. © 2004 Elsevier Inc.

PURPOSE: To investigate the leukemia risk in a group of benzene exposed workers.

METHODS: We conducted a retrospective cohort mortality study on 311 men who worked between January 1, 1951 and December 31, 1968 in a Caprolactam plant in the Netherlands. In the production of

- Blind conduct: exposure assessment and mortality rates independent investigated
- Pure benzene, relative high exposure levels
- Dutch, healthy cohort
- Outcome: Leukemia risk < prevailing risk estimates
- Dutch Health Council OELV setting



5th World Conference
on Research Integrity

Netherlands Research Integrity Network

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Sign-up!

Sign-up for the Netherlands Research Integrity Network! Use the 'Sign up' button in the top menu.

5th World Conference on Research Integrity

📅 4th WCRI, Agenda, Newsletter nr1

When: May 28th-31st, 2017

Where: Amsterdam

Regeling Commissie wetenschappelijke integriteit Netwerk Levensbeschouwelijke Universiteiten

Preambule

Binnen de in het Netwerk Levensbeschouwelijke Universiteiten (NLU) samenwerkende instellingen rust op alle betrokkenen bij het onderwijs en onderzoek een eigen verantwoordelijkheid voor de instandhouding van de wetenschappelijke integriteit. De algemene beginselen van professioneel wetenschappelijk handelen dienen daartoe te allen tijde te worden nageleefd.

Homogeneous/Similar Exposure Group concept is false (Kromhout NvVA symp 2016)

Ann. occup. Hyg., Vol. 37, No. 3, pp 253–270, 1993
Printed in Great Britain.

0003-4878/93 \$6.00 + 0.00
Pergamon Press Ltd

© 1993 British Occupational Hygiene Society.

A COMPREHENSIVE EVALUATION OF WITHIN- AND BETWEEN-WORKER COMPONENTS OF OCCUPATIONAL EXPOSURE TO CHEMICAL AGENTS

HANS KROMHOUT,*† ELAINE SYMANSKI† and STEPHEN M. RAPPAPORT†

VARIATION OF EXPOSURE BETWEEN WORKERS IN HOMOGENEOUS EXPOSURE GROUPS

S. M. Rappaport, H. Kromhouta & E. Symanski

Industrial Hygiene Association Journal, 54:11, 654-662, DOI: [10.1080/15298669391355198](https://doi.org/10.1080/15298669391355198)

Between worker differences in HEG

- 2 publication indicating the HEG concept is false: too much between worker variability

Based on this:

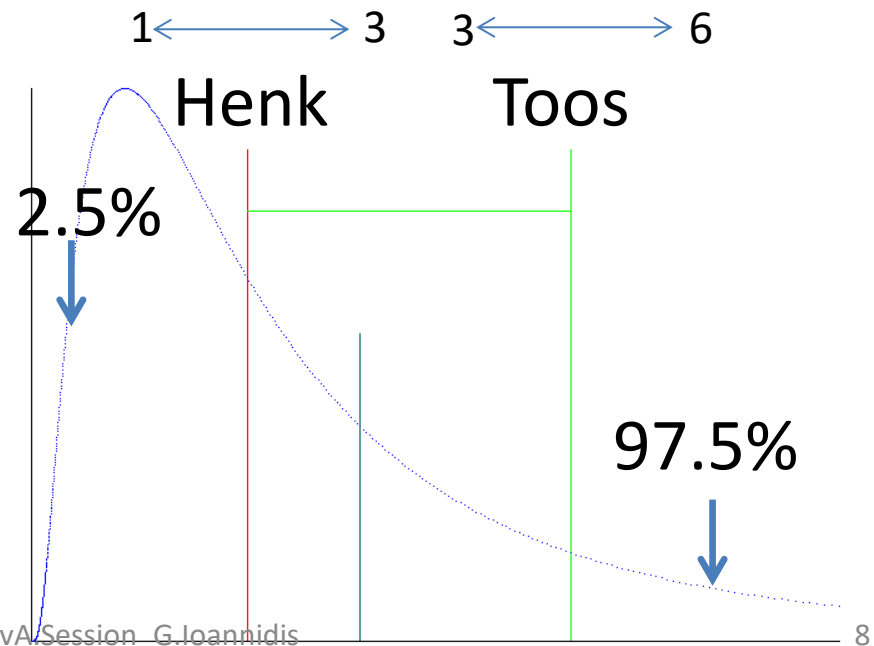
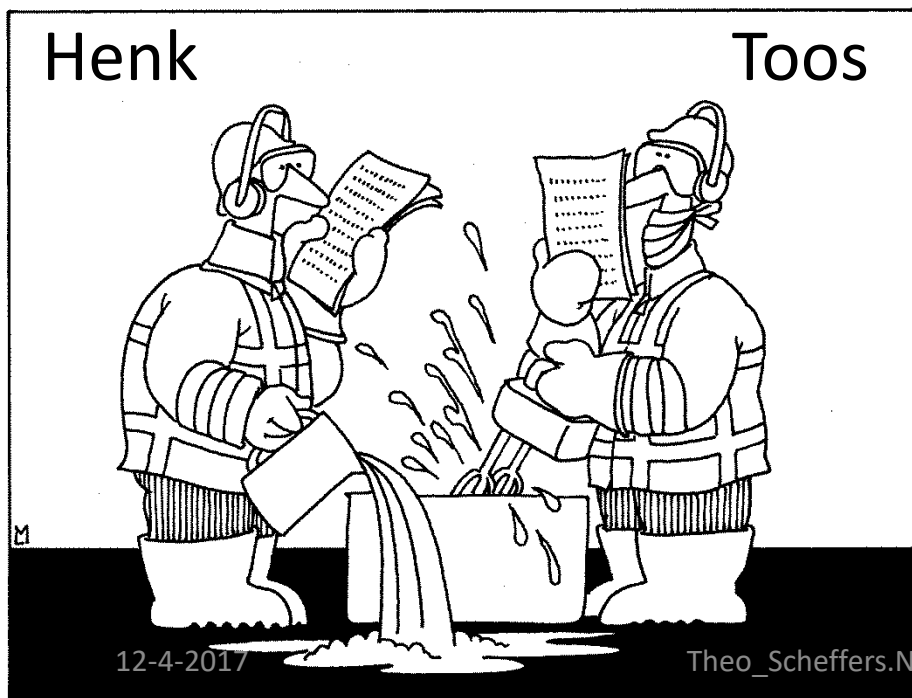
- Annals, best cited publication
- Books are written
- Tools SPEED, ART, EXPOSTATS (ALTREX)

Between worker differences

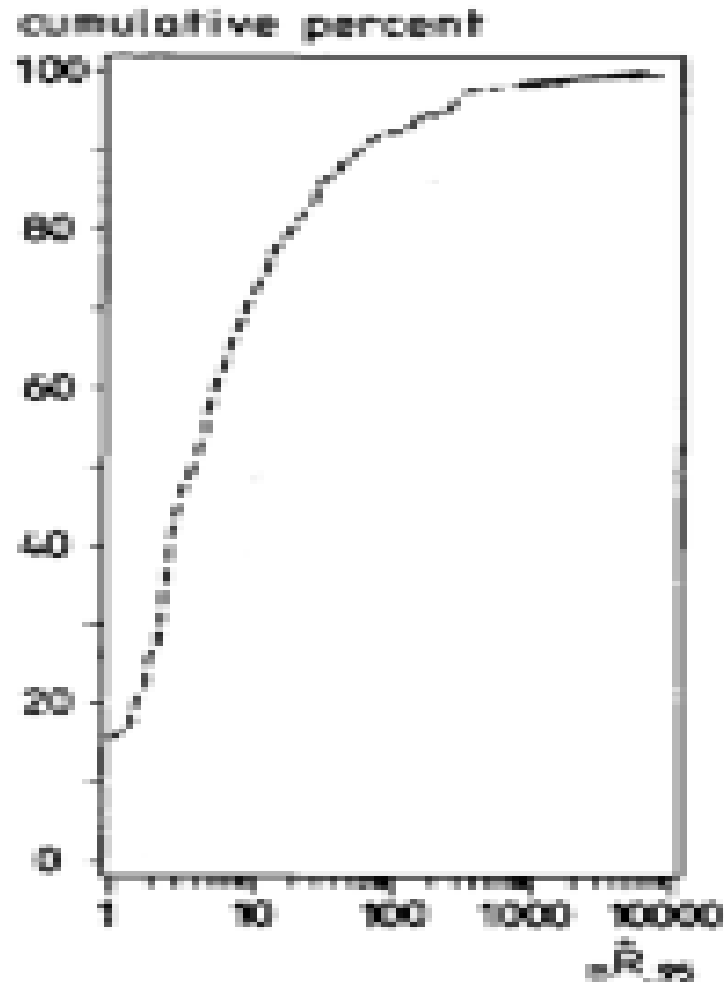
Henk $AM_{unbiased}=2$

Toos $AM_{unbiased}=4.5$

$$B R_{.95} = AM_{97.5\%} / AM_{2.5\%}$$



$B R_{.95}$ values of 165 groups, 1574 workers & 13945 measurements



85% of the $B R_{.95} > 2$

LETTERS TO THE EDITOR

Dear Sir:

Recently Rappaport and Kromhout [AIHAJ 54:654 (1993)] explored the "between worker" exposure variability of 183 homogeneous exposure groups (HEGs) with serial personal air sampling, including more than 15,000 measurements. They showed that about 80% of the groups exceeded an ad hoc upper limit of at most two-fold difference among 95% of the individual mean exposures ($B\hat{R}_{0.95} = 2$, suggested by Rappaport 1991 page 101) and concluded that most HEGs in industrial hygiene are not homogeneous at all.

Theo M.L. Scheffers
DSM Chemical Company

Confidence limits of $B\hat{R}_{0.95}$?

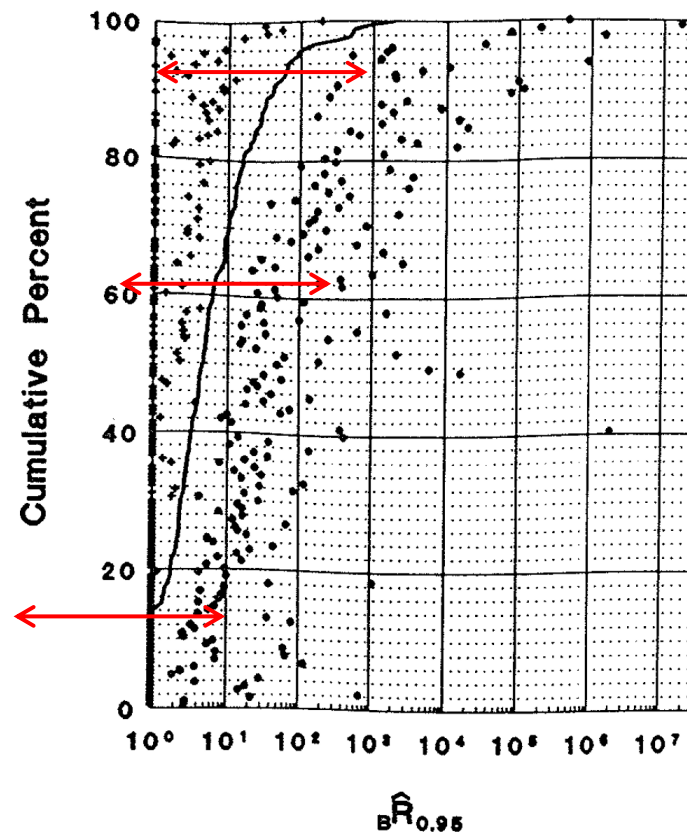
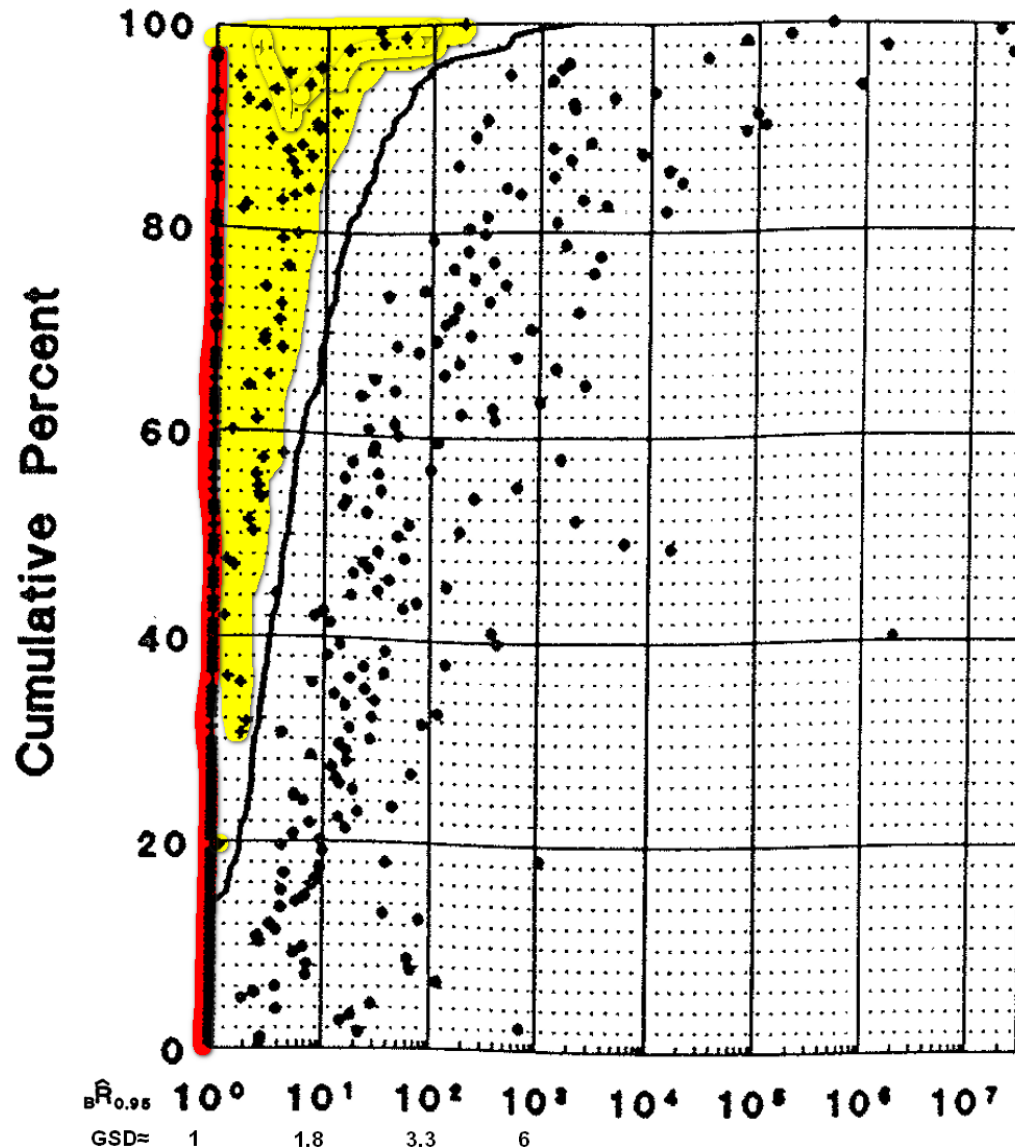


FIGURE 1. The solid curve depicts the empirical cumulative distribution function of $B\hat{R}_{0.95}$ for 183 HEGs.¹¹ Individual points represent lower (+) and upper (•) bounds on a 95% confidence interval for $\mu R_{0.95}$ for each group.

S.M. Rappaport, Ph.D.
E. Symanski
R. Lyles
University of North Carolina

H. Kromhout, Ph.D.
Wageningen Agricultural University

lower confidence limit of $B R_{L.95}$



$B R_{L.95}$ 10^0 10^1 10^2 10^3 10^4 10^5 10^6 10^7
 GSD \approx 1 1.8 3.3 6

yellow: 54 (\approx 29%) HEGs with significant between worker differences $B R_{0.025} > 1$.

AIHAj vol(55)
 sept1994 p873-7

Other methodological flaws

HEG and SEG differences

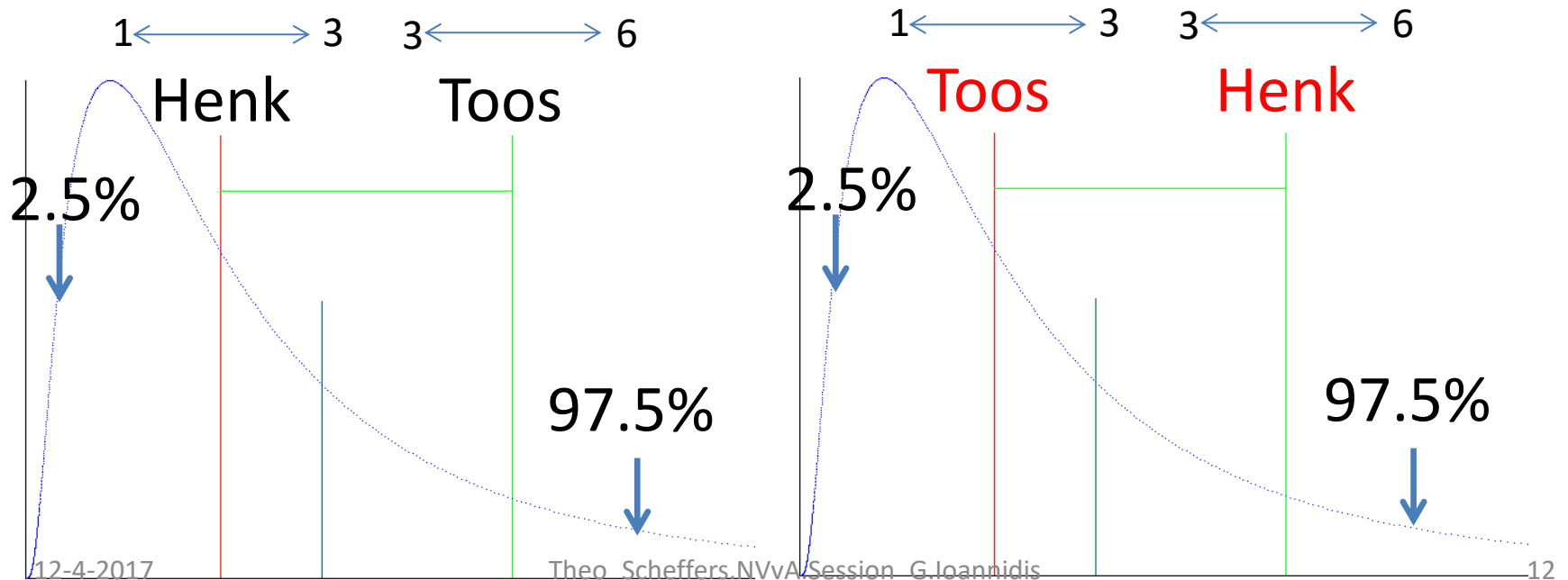
Handling undetects

autocorrelation

Long-term, repeated measurements

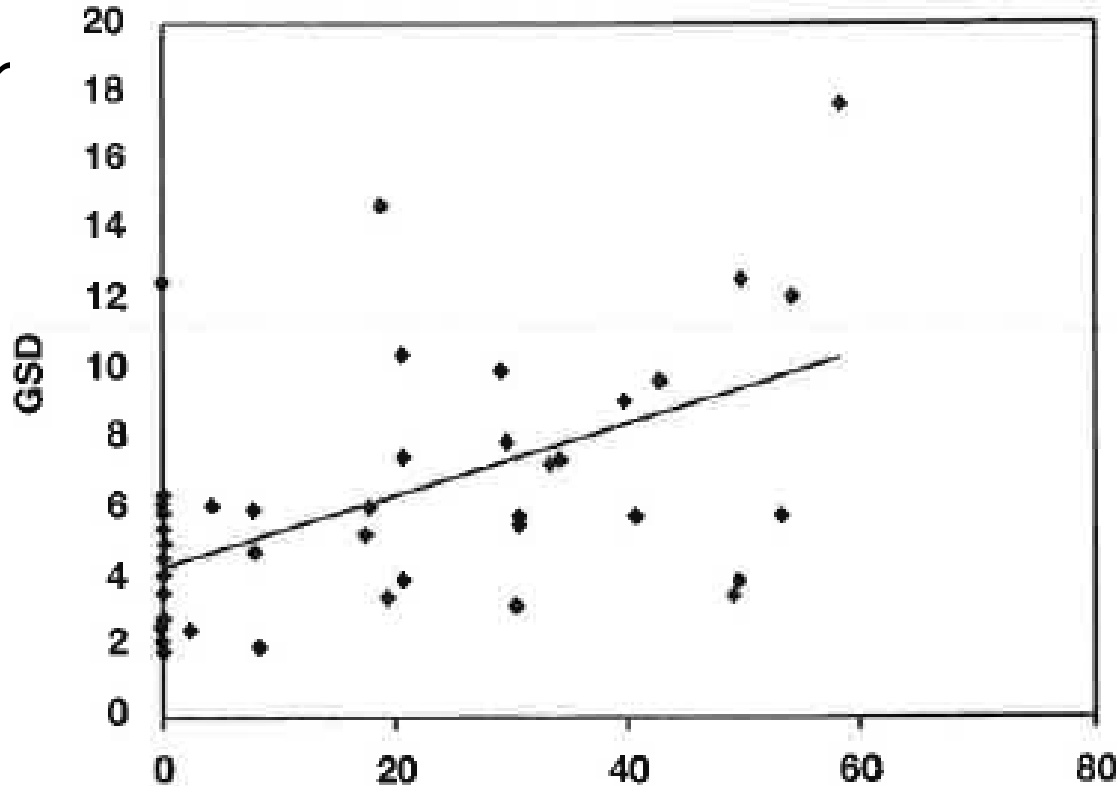
This week

Next week



GSD increases with time (months) in long-term sampling programs

- Percer



This knowledge is incorporated in the BOSH-NVvA Guidance ANOVA procedure for repeated measurements

Recommendation

Repeated measurements on individual workers in SEG's:

- Not in short term campaigns
- In long-term campaigns use BOHS-NVvA guidance
- Use ANOVA procedure guidance and BWStat tot test if individuals differ.

Is more exposure & risk assessment methodology scientific not sound?

- Bayesian statistics ?
- GSD's < 3?
- Lognormality in the tails of the exposure distribution?
- Selecting key studies in OELV setting?
- Exposure modeling/Control Banding?

Conclusions

- Ioannidis is relevant for Industrial Hygiene & OELV setting
- Use BOSH-NVvA for repeated measurements
- Transparency and codes on integrity are also important for stakeholder institutes performing scientific research



John Ioannidis
Professor of Medicine
and Statistics at
Stanford University;
Author of 2005 paper
"Why Most Published
Research Findings
are False", published
in PLOS Medicine.

Thanks!
Questions & suggestions?

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