

Chemical Risk Assessment

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a tightrope walk between science, policy and
stakeholder demands



Exposure / Hazard

Chemical Risk Assessment is specific

- ☐ Human and public health, Risks for the Environment
- ☐ Chemical use (Pesticides, Biocides, Pharmaceuticals, Industrial Chemicals,...)
- ☐ Country
- ☐ Prospective, retrospective



CRA is hugely successful

Individual substances

Visible effects

Acute effects

Point sources



CRA is hugely successful

BUT



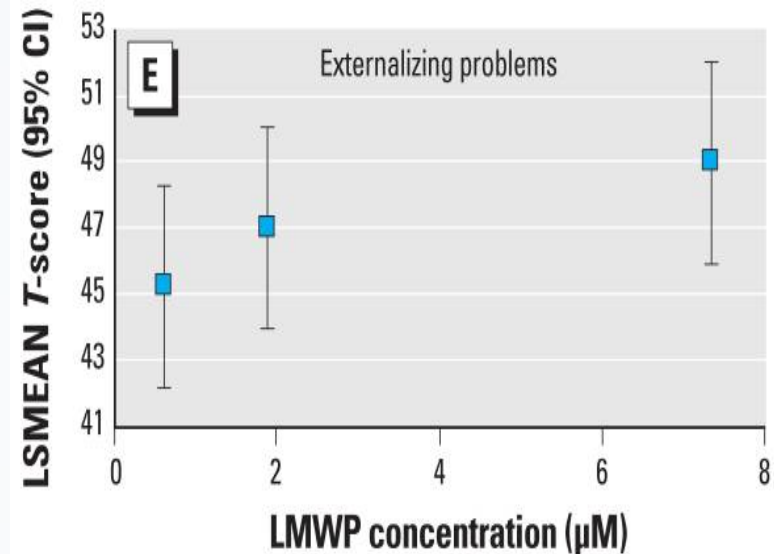
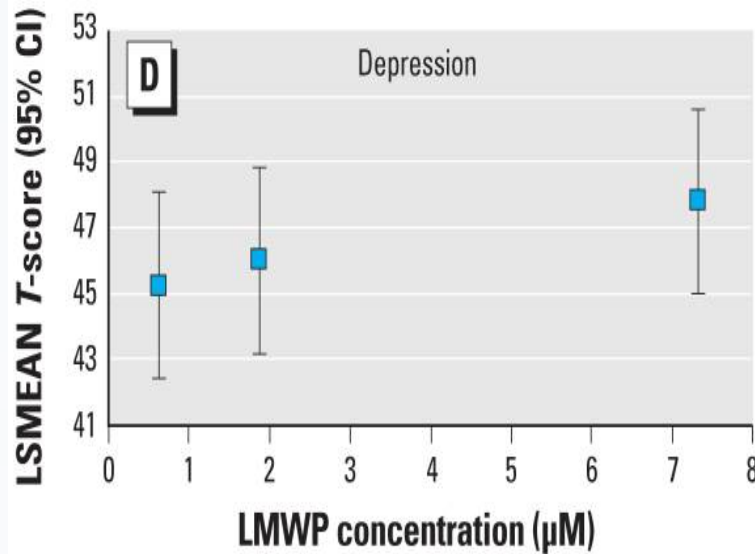
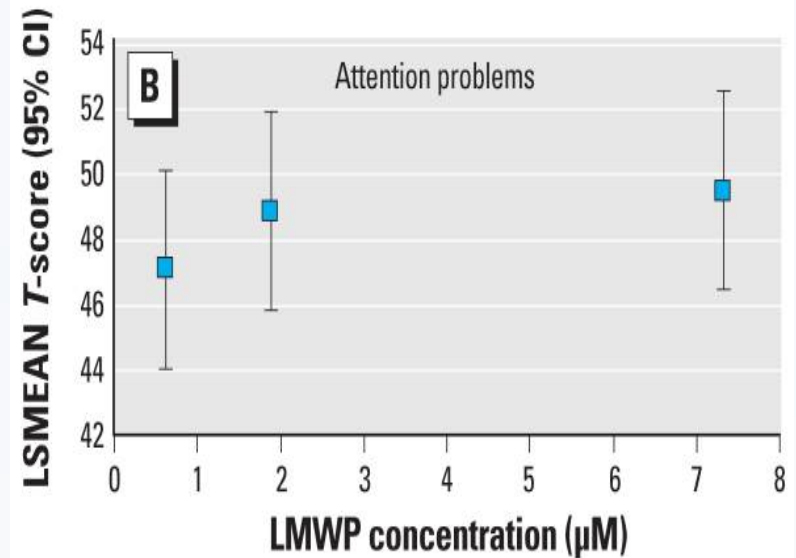
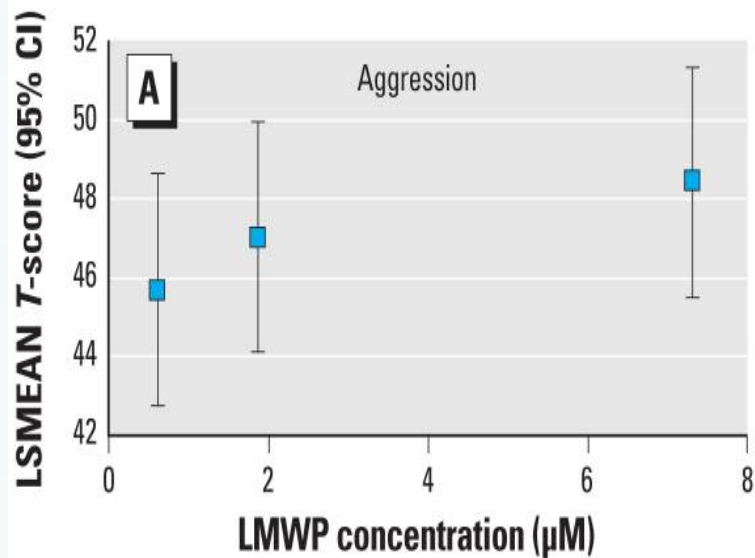
Chemical use and exposure is changing

Individual substances

Visible effects

Acute effects

Point sources



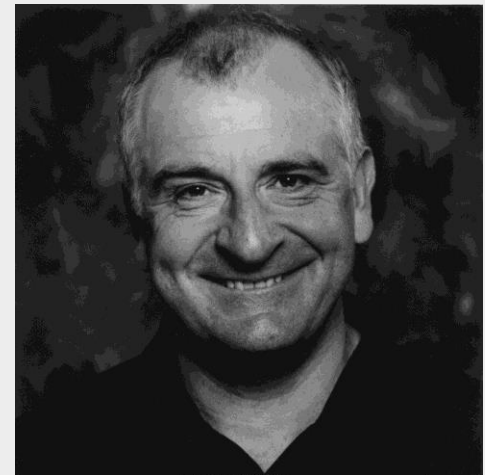
Engel et al. Prenatal Phthalate Exposure Is associated with Childhood Behavior and Executive Functioning, Env Health Persp, 2010

LMWP: Low molecular weight phthalate metabolites

Correlation is obviously no causation, but...

If it looks like a duck, and quacks like a duck, we have at least to consider the possibility that we have a small aquatic bird of the family anatidae on our hands.

Douglas Adams



Effects of copper on fish predation



- ☐ Salmon is preyed upon by trouts
- ☐ An injured salmon excretes a chemical cue, a so-called „schreckstoff“ into the water
- ☐ The chemical warns nearby salmon, who stop moving so that they are harder to find by the predators

Effects of copper on fish predation



- ☐ Copper interferes with the salmon's sense of smell
- ☐ They don't recognize the presence of the „schreckstoff“ any more
- ☐ Hence, they continue to move, even if nearby salmon are injured by predators
- ☐ Ergo...



UNIVERSITY OF GOTHENBURG

Chemicals are Janus-faced

The diagram consists of two large blue arrows pointing towards each other, meeting at a central point. The left arrow points right and contains the text 'Societal Use and Benefits'. The right arrow points left and contains the text 'Detrimental Effects on Human Health and the Environment'. The arrows are set against a light gray background.

Societal Use and
Benefits

Detrimental Effects
on Human Health
and the
Environment

Stakeholder Comments to REACH

“ [...] we need to get to the Swedes and Finns and neutralize their environmental arguments. “

“[We need] to educate [other countries] so that they can join the United States in raising concerns [against REACH]”

Collin Powell, US Secretary of State, 2003

From: US House of Representatives: A special interest case study: The chemical industry, the Bush administration and European Efforts to regulate chemicals. The report is available under http://www.house.gov/reform/min/pdfs_108_2/pdfs_inves/pdf_admin_reach_rep.pdf

MONSANTO COLLABORATORS
DOCUMENTING THE HISTORY OF THE AGRICULTURAL HOLOCAUST

JOURNALISTS

PUBLICATIONS

SCIENTISTS



MONSANTO

IST
RATORS

"More than a quarter of a million Indian farmer
over the past 16 years as their crops have fail
financial ruin, largely as a result of Monsanto's
seeds."

<http://articles.mercola.com/sites/articles/archive>



An upcoming dark era

"We are sliding back into a dark era, [...]
I am profoundly depressed at just how difficult
it has become merely to get a realistic
conversation started"

Nina Fedoroff



Let's play the game of “junk science”

- ❑ Ridiculing, distorting and misrepresenting scientific research,
- ❑ in order to generate uncertainty and thereby delaying or preventing appropriate action.

Herrick, C.N., Jamieson D. (2001) Junk science and environmental policy: obscuring public debate with misleading discourse. *Philos Public Policy* Q 21, 11–16.

Mixture Conclusions of the EU Council

- ❑ [...] further action in the field of chemicals policy, research and assessment methods to address combination effects of chemicals is required, [...]

(2988th Council Meeting Brussels, 22. Dec 2009)

State of the Art Report

- ☐ Commissioned by the Directorate General for the Environment of the EU Commission
- ☐ Draft published on the internet in 2009
- ☐ Invitation of comments from stakeholders
- ☐ Final discussion with EU member states and stakeholders in Brussels, 2010

Kortenkamp, Backhaus, Faust (2009): State of the Art Report on Mixture Toxicity (DG Environment, EU Commission)

Industry reactions...

First, given the above mentioned challenge and important consequences of future policy decisions, we strongly believe that it is fundamental to consider as much as possible the relevant available knowledge that allows for a robust scoping of the next steps. In addition, it is essential that conclusions of such a State-of-the-Art report should be supported by this relevant literature in order to be a robust basis for policy making. In that respect, the current report has serious shortcomings. In Annex I, we have compiled a series of additional studies (not considered in the report), pertinent to the issue at hand.

Serious shortcomings...

Annex I

Some additional pertinent literature (not cited in the report)

- Escherich
Warner
residue

Integrated Envir (accepted).

Meador JP,
tissue

- Kolkwitz, R., and M. Marson
Bot. Ges. 261:261-519.

1908.

...r pflanzlichen Saprobien, Ber. Dtsch.

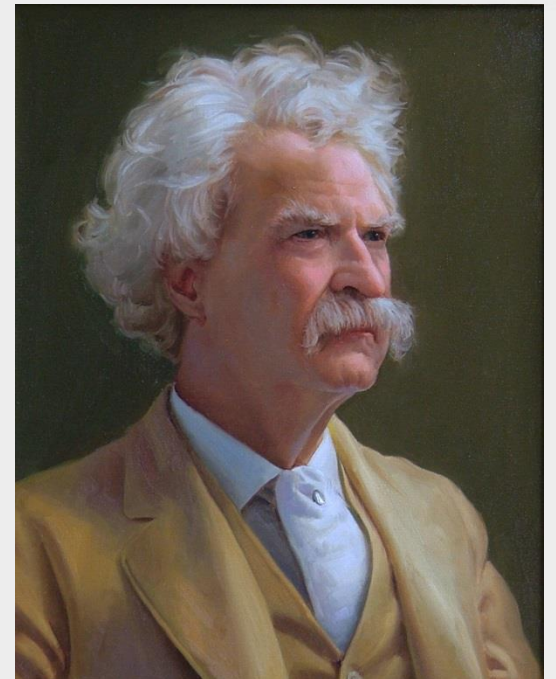
NGO reactions...

[...] they assume no synergistic toxicity of mixes,
and it will be easier to only consider results from
the vast library of single-compound tests,
helpfully supplied by the party whose profit
depends on no toxicity being found.

Really...

Get your facts first, then you can distort them as you please.

Mark Twain





The problem: Normative Science

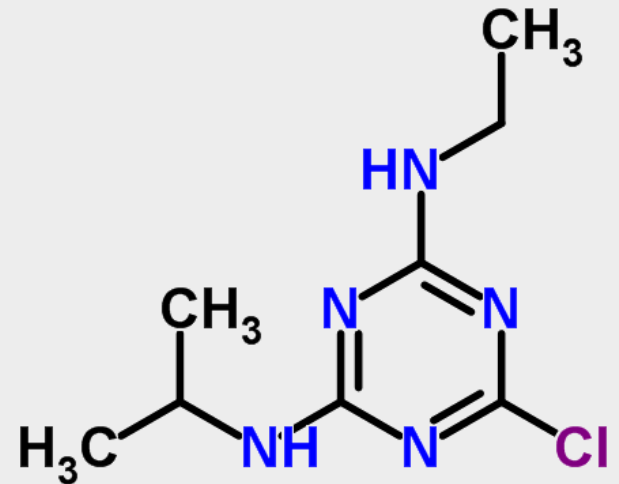
Scientific information [...] that contains tacit policy preferences and thus, by extension, promotes particular policy options. [...]

R.T. Lackey. (2007). Science, scientists, and policy advocacy. *Conservation Biology*. 21(1): 12-17.

T. Backhaus et al (2010): Chemical Risk Assessment: Pressures, Perceptions and Expectations, *Int. Env. Ass. and Man.* 6(3), 323

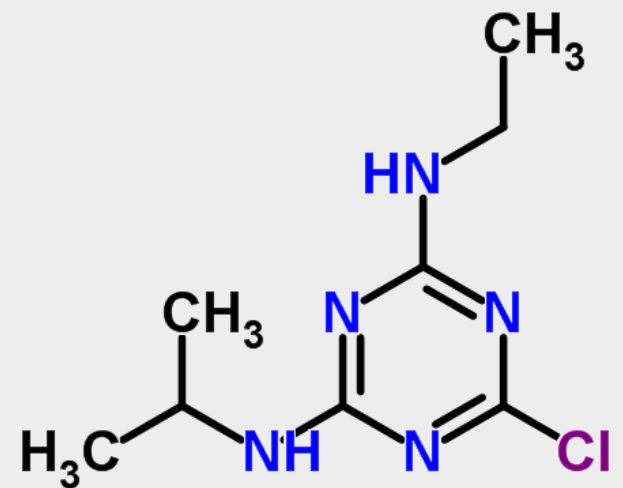
Review of endocrine effects of atrazine

“The central theory that environmentally relevant concentrations of atrazine affect reproduction and/or reproductive development in fish, amphibians, and reptiles is not supported [...]”



Re-Review of endocrine effects of atrazine

“ this most recent industry-funded review (Solomon et al. 2008) [...] misrepresented over 50 studies and had 122 inaccurate and 22 misleading statements”



Jason R. Rohr & Krista A. McCoy (2010), Preserving environmental health and scientific credibility: a practical guide to reducing conflicts of interest, *Cons. Letters*, 3, 143-150

Re-Review of endocrine effects of atrazine

Solomon *et al.* (2008)
describe adverse
effects of atrazine at
ecologically relevant
concentrations

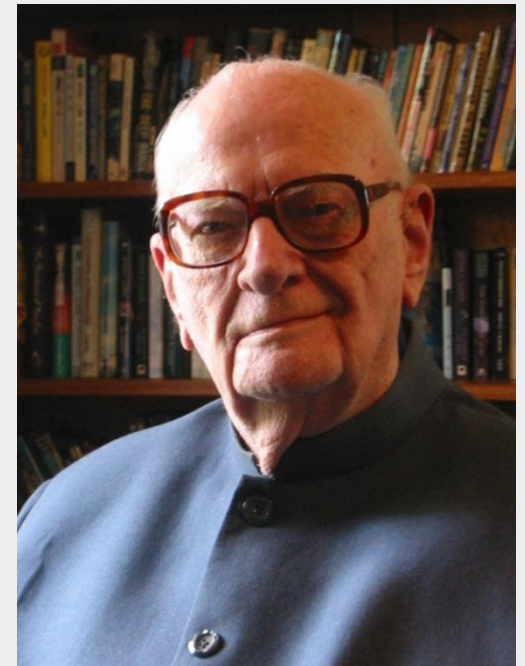
Solomon *et al.* (2008)
criticize, or cast doubts on
the validity of, the study

	No	Yes	Total
No	68	2	70
Yes	4	59	63
Total	72	61	133

Jason R. Rohr & Krista A. McCoy (2010), Preserving environmental health and scientific credibility: a practical guide to reducing conflicts of interest, *Cons. Letters*, 3, 143-150

Clarke's 3rd law

“Any sufficiently advanced technology is indistinguishable from magic.”







Three random thoughts

1. We need to act on the fact that we have precious little understanding of chemical effects on human health and the environment under realistic conditions.



Three random thoughts

2. We need a stronger and more independent regulatory system.



Three random thoughts

3. Academics need to work towards reviving academic thinking, academic methods and academic science as *the* golden standard.

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