

DIFFICULT CONVERSATIONS

About pesticides and risk

Kaci Buhl, Professor of Practice
Department of Environmental & Molecular Toxicology
March 3, 2026



**Oregon State
University**



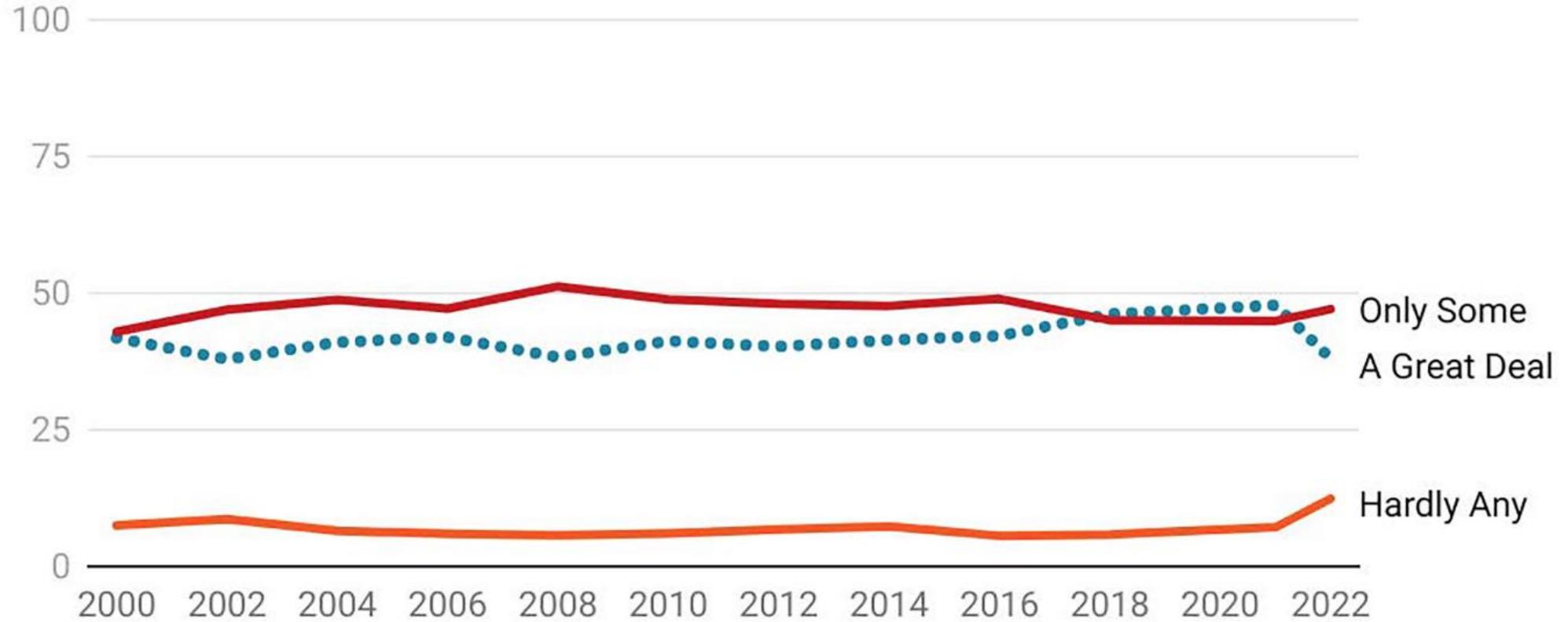
EDITORIAL ▶ Proc Natl Acad Sci U S A. 2024 Mar 4;121(11):e2319488121. doi: [10.1073/pnas.2319488121](https://doi.org/10.1073/pnas.2319488121) 

Trends in US public confidence in science and opportunities for progress

[Arthur Lupia](#)^{a,1,2}, [David B Allison](#)^{b,3}, [Kathleen Hall Jamieson](#)^{c,2}, [Jennifer Heimberg](#)^{d,4}, [Magdalena Skipper](#)^{e,2},
[Susan M Wolf](#)^{f,2}

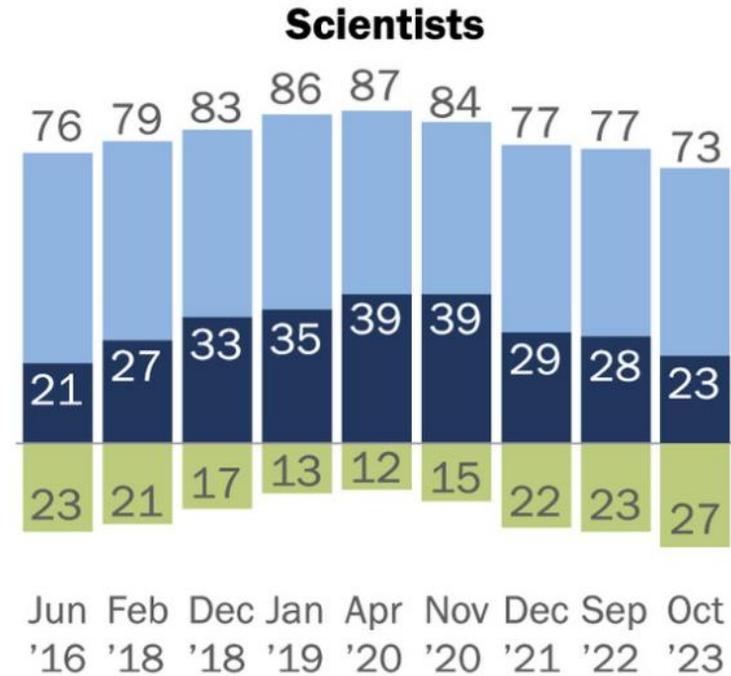
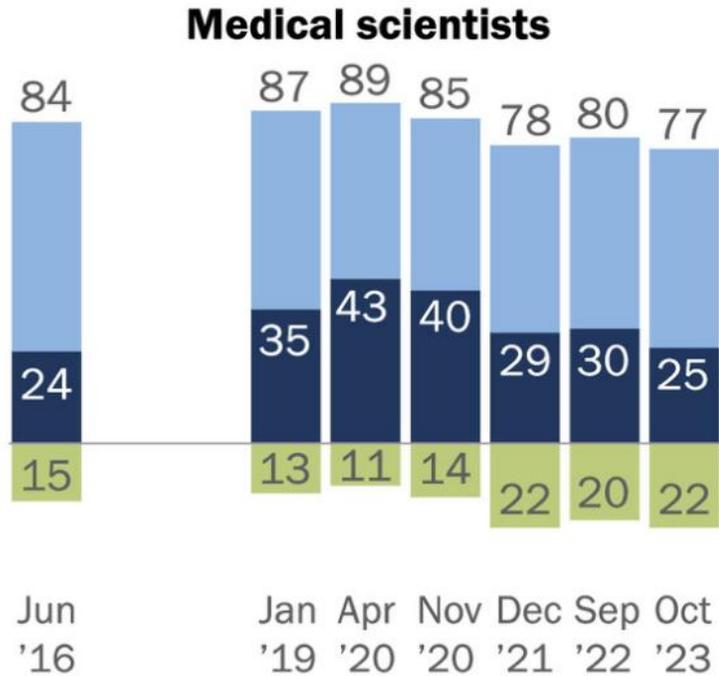
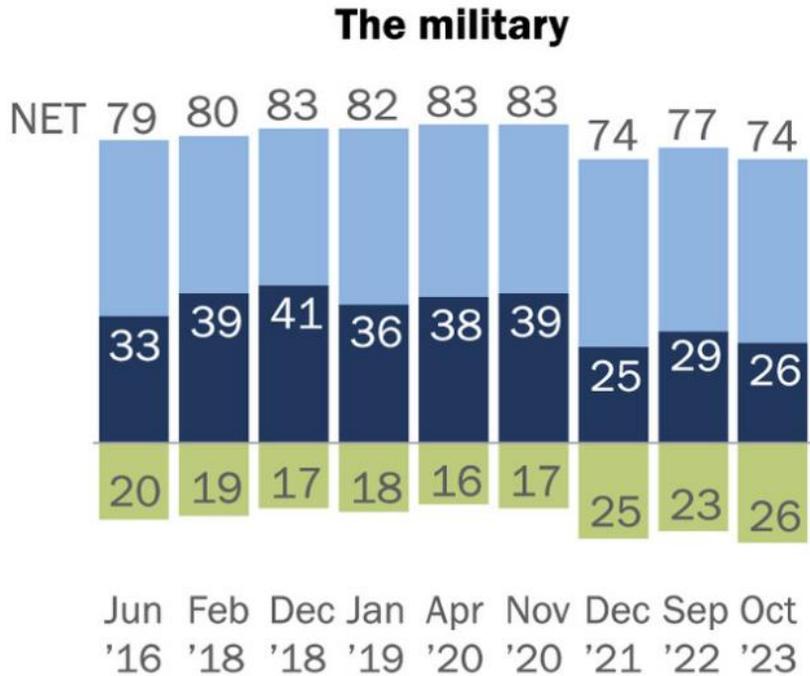
Overall Confidence in the Scientific Community

Percent of adults.



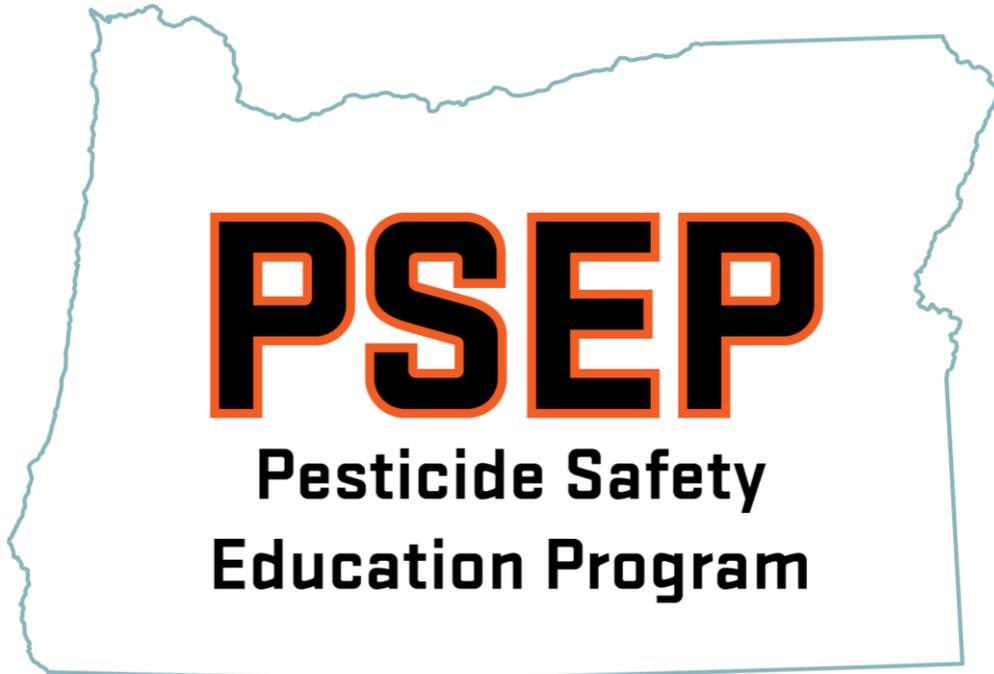
% of U.S. adults who have ___ of confidence in the following groups to act in the best interests of the public

● A great deal ● A fair amount ● Not too much/No confidence at all

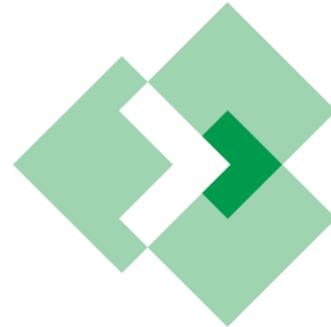


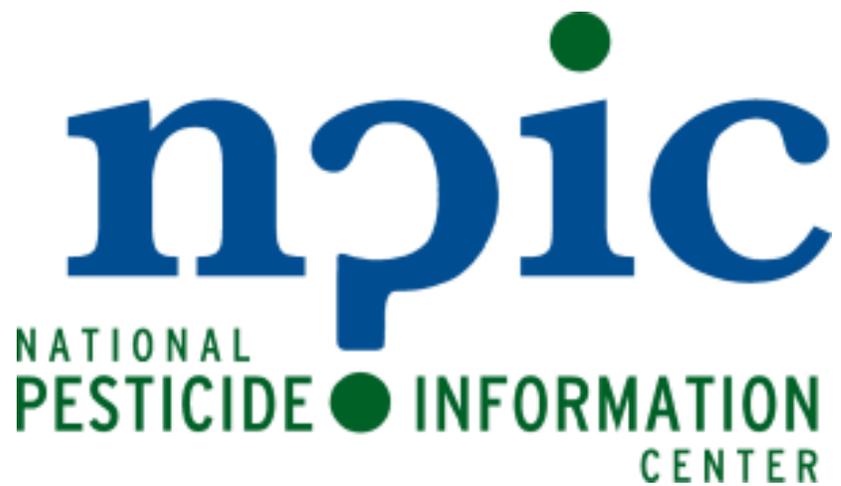
Note: Respondents who did not give an answer are not shown.
 Source: Survey of U.S. adults conducted Sept. 25-Oct. 1, 2023.
 "Americans' Trust in Scientists, Positive Views of Science Continue to Decline"





Kaci Buhl, MS
Kaci.Buhl@oregonstate.edu

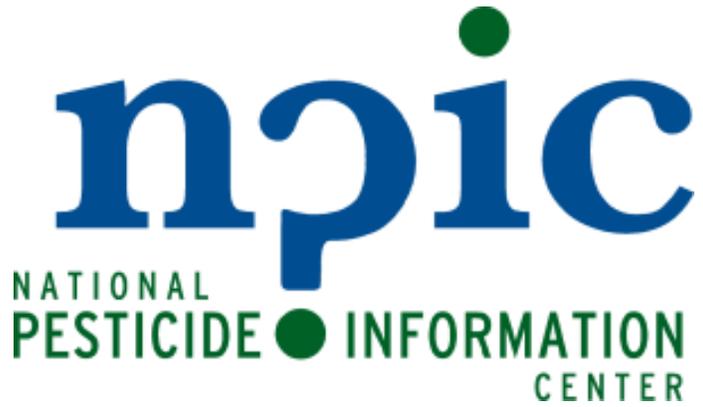




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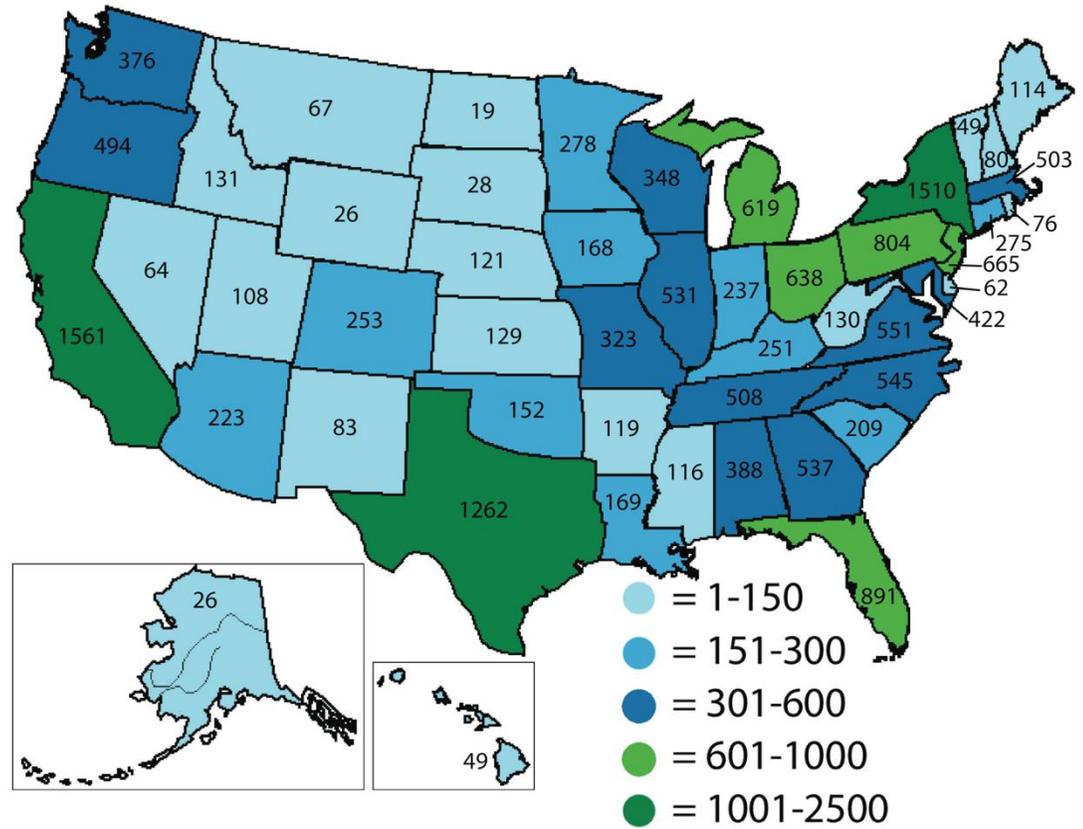
*“Pesticide
Information,
How can I help
you?”*





Science-based information
Toll-free phone service M-F:
11:00 – 3:00 Eastern
8:00 – 12:00 Pacific

Funded through a cooperative agreement with EPA



<http://npic.orst.edu>

English and Spanish
Over 700 pages
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Search... A-Z Index

It's just vinegar... OR IS IT???

Learn about concentrated vinegar as a weed killer.



DID YOU KNOW:
Acetic acid at concentrations commonly found in weed killers can cause PERMANENT EYE DAMAGE!

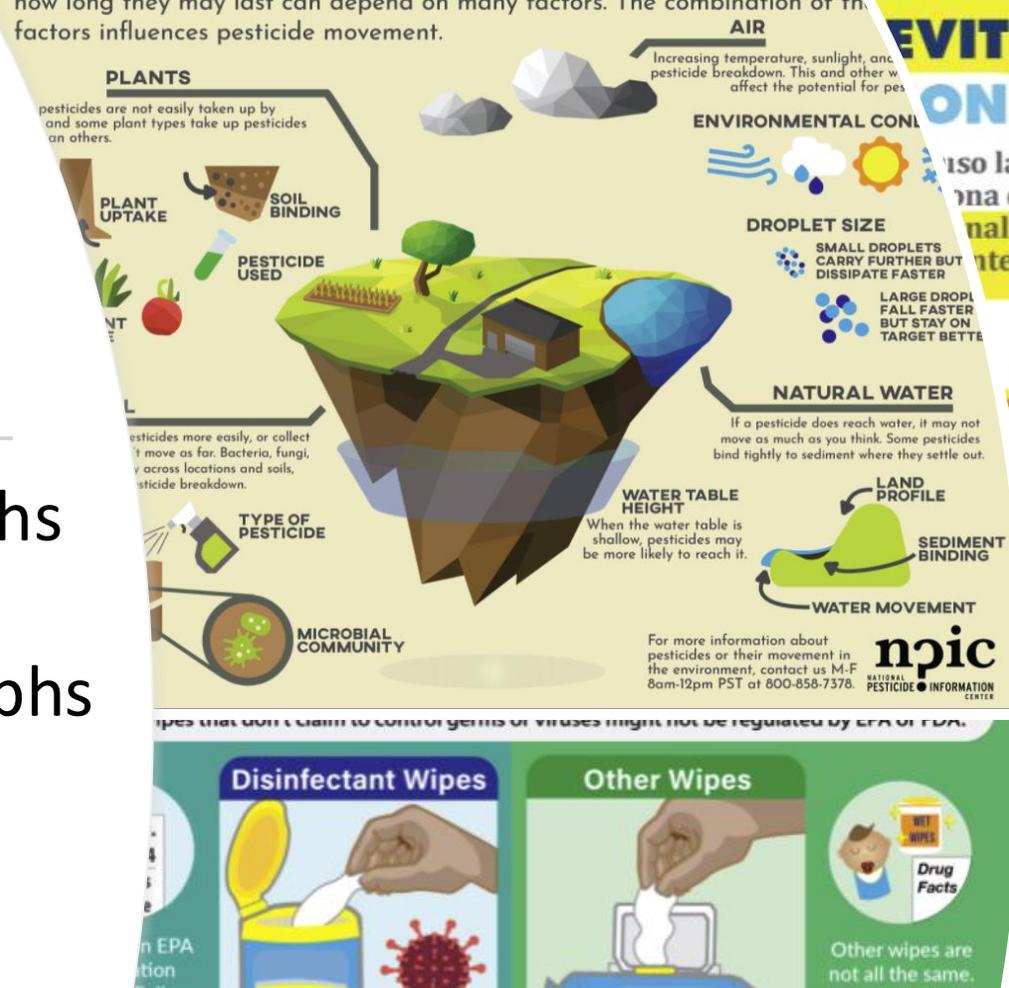


Acetic acid vapors can irritate the nose and throat

"NATURAL" does NOT mean "SAFE!"

Changing with the Times

- Bullets > Paragraphs
- Familiar visuals > charts, tables, graphs
- Step by step, one concept at a time



EVITE EXPONERSE A LOS PESTICIDAS CON ROPA PROTECTORA

...so la toxicidad "natural" o baja de un producto puede causar daño a la ropa que queda expuesta. Minimice el riesgo usando un equipo de protección personal (PPE). Es posible que diferentes productos necesiten PPE diferentes. Antes de usar pesticidas, siempre lea y entienda la etiqueta.

- Use gafas de seguridad o gafas protectoras.
- Guarde la protección para los ojos en un lugar seguro y lejos del sol.
- Limpie las gafas contaminadas de inmediato.

- Revise la etiqueta para obtener más instrucciones.
- Inspeccione con frecuencia en busca de agujeros o rasgaduras.
- Diferentes guantes dan niveles diferentes de protección.
- Tire los guantes desechables después de cada vez que los use.

...mangas largas y pantalones largos.

...contaminada separada de la ropa limpia.

...o pañuelos para cubrir

...cerrados con

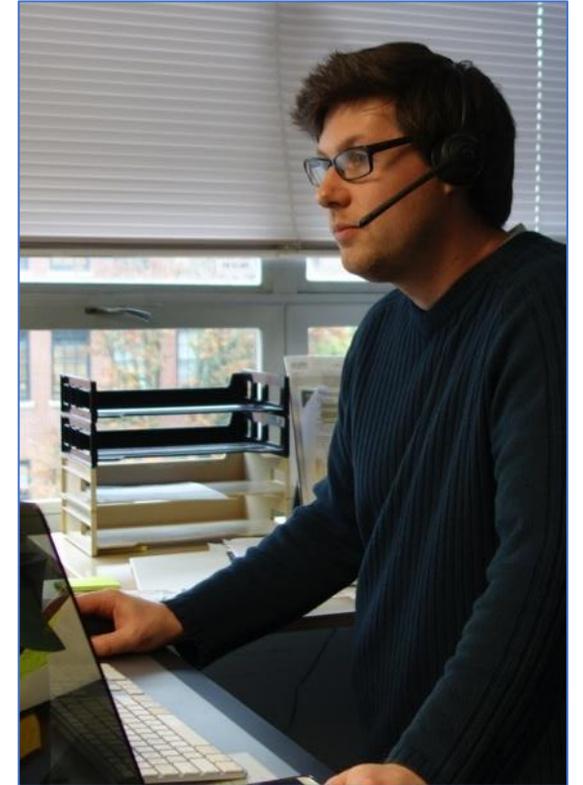


Call the National Pesticide Information Center



- To compare the toxicity of products
- To discuss their risks to groundwater, fish, bees, or pets
- To understand pesticide labels
- To find local resources

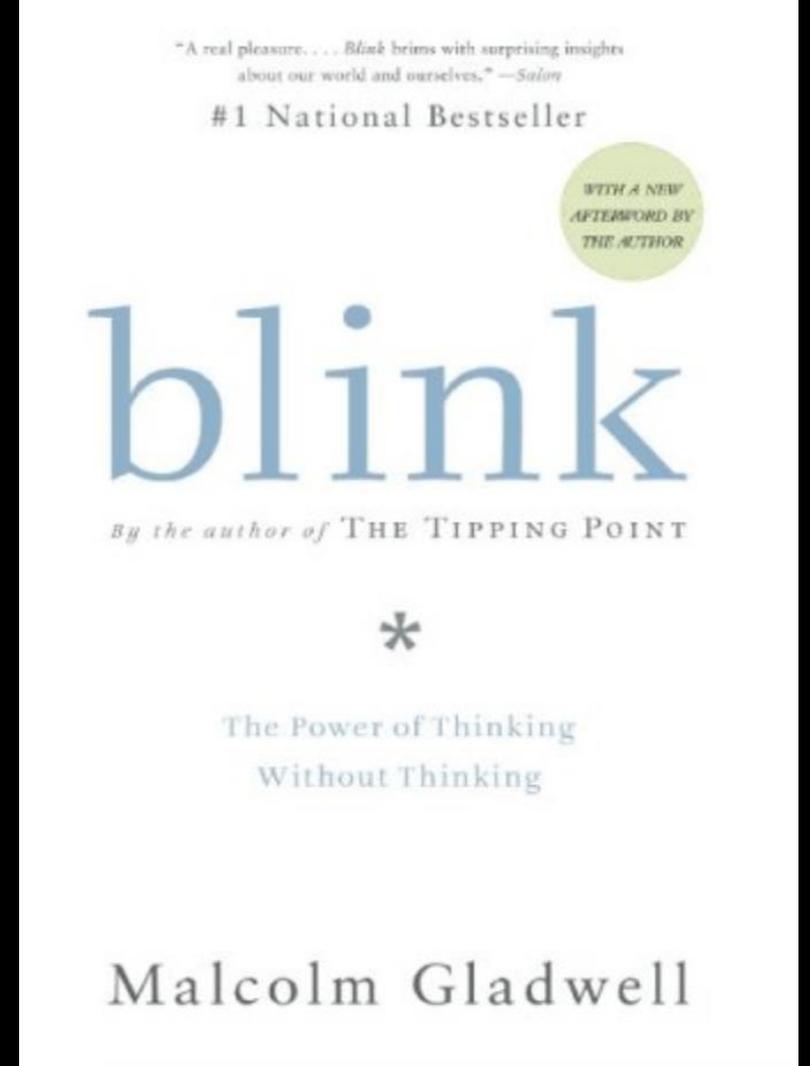
- Two pesticide specialists
- Operating 3 days/week
- Hoping for increased funding to restore operations 5 days/week



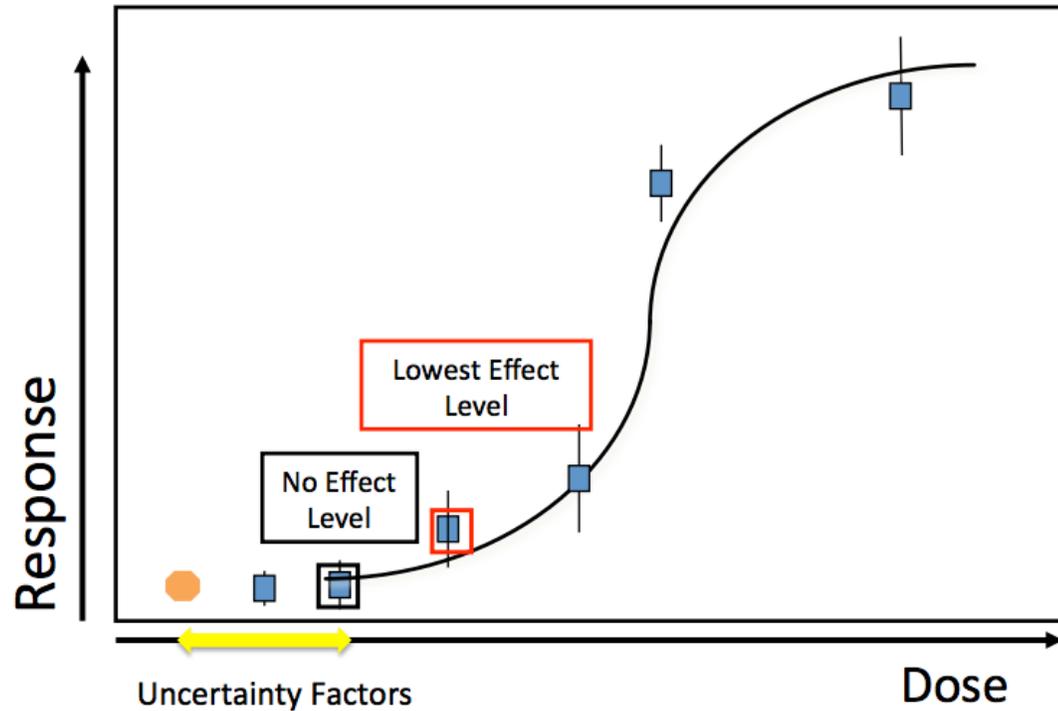
- Risk does not exist “out there,” independent of our minds and cultures, waiting to be measured.
- Human beings invented the concept risk to help them understand the uncertainties of life.
- Many communities perceive risks differently.
- Trauma can inform risk-perception (internal calculations)



- Most risk perception is determined by *fast* intuitive feelings.
- Understanding risk perception is critical for effective communication.



When scientists say “risk,”
we’re thinking of probability.



Risk is measured at the population level.

When others hear “risk”
they may think “danger.”



Risk is understood at the
individual level.
-Will it hurt me or not?-

Safety

Yes or No

No precautions necessary

Safe is safe for everyone

Easy to explain

Risk

More risky-----Less risky

Precautions reduce risk

Risk is higher for certain people

Harder to explain



The word "safe" is unsafe.

Re-frame the “safe” question

Is it safe?



The risk is low, but
tell me about your
specific concerns...

Listen

Quickly explain
why “safe” isn’t
the right word or
mindset

Discuss risk level
and things that
affect it

“LEAP” over the barriers.



- Listen
- Empathize
- Apologize
- Problem-Solve

Barriers

- Values
- Experiences
- Personality
- Roles

$$\mathbf{Risk} = \mathbf{Toxicity} \times \mathbf{Exposure}$$



- Toxicology of active ingredient
- Product signal word
- Dose estimate
- Effects (signs, symptoms) reported in the literature
- Onset, duration and resolution of symptoms



- Distance to application site
- Route of potential exposure
- Physical/chemical properties of active ingredient
- Duration/frequency of exposure
- Bioavailability by the route in question

THERE ARE 3 SIGNAL WORDS:



DANGER

High toxicity

WARNING

Moderate toxicity

CAUTION

Low toxicity



Products that are highly toxic by ingestion, skin absorption, or inhalation must also include the word "**POISON**" next to **DANGER**, with a skull and crossbones symbol.



<http://npic.orst.edu/factsheets/signalwords.html>

TOXICITY CLASSIFICATION - GLYPHOSATE

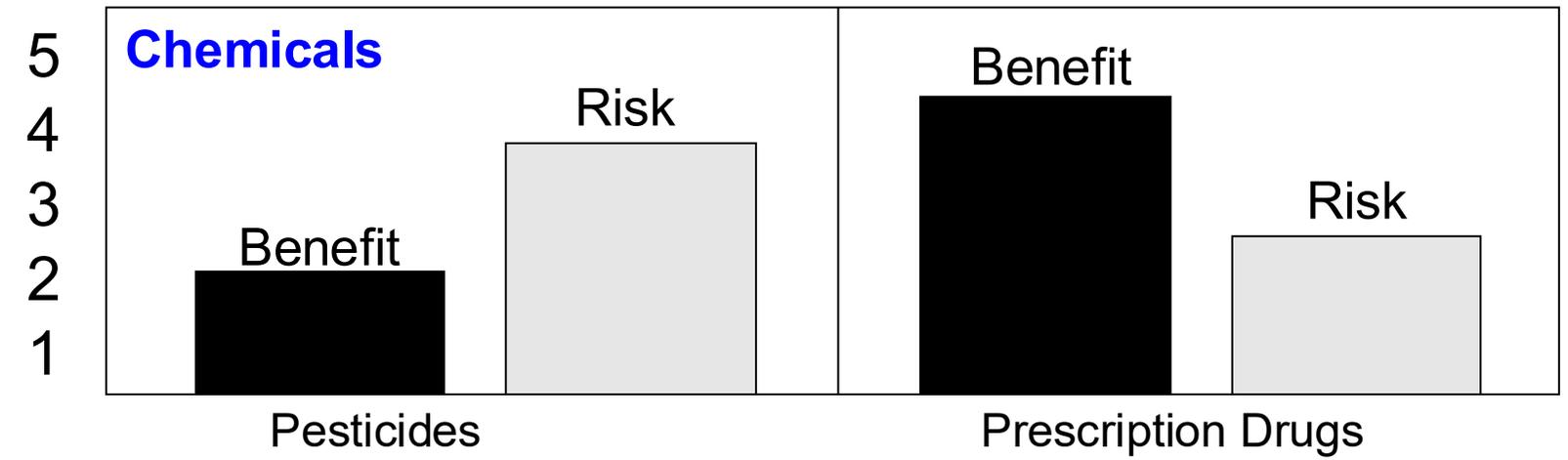
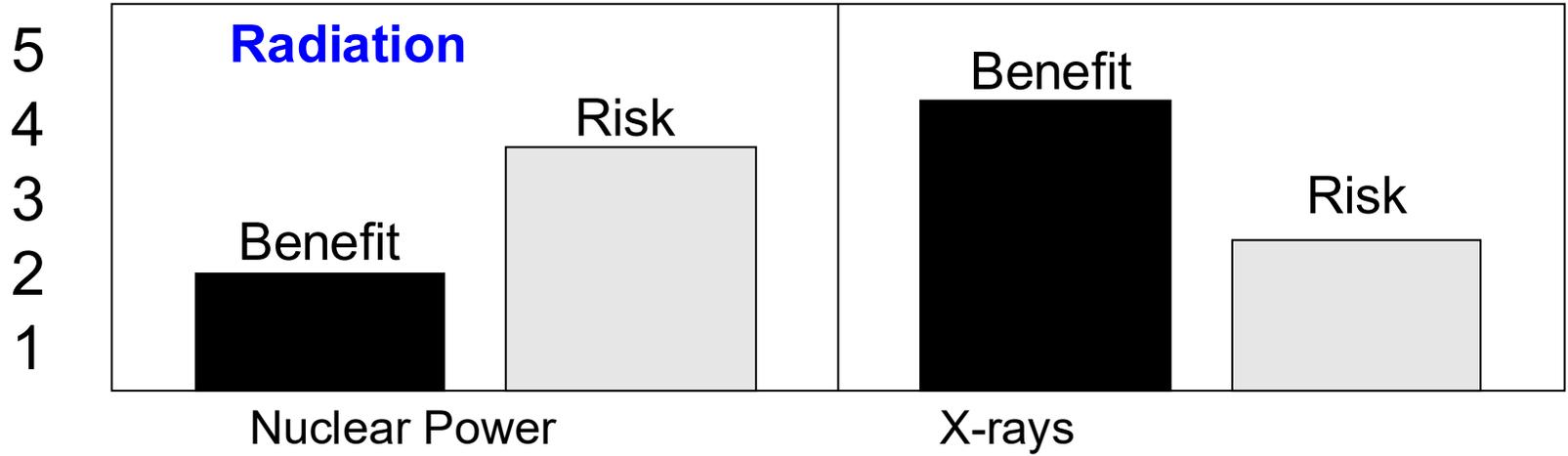
	High Toxicity	Moderate Toxicity	Low Toxicity	Very Low Toxicity
Acute Oral LD₅₀	Up to and including 50 mg/kg (≤ 50 mg/kg)	Greater than 50 through 500 mg/kg (>50-500 mg/kg)	Greater than 500 through 5000 mg/kg (>500-5000 mg/kg)	Greater than 5000 mg/kg (>5000 mg/kg)
Inhalation LC₅₀	Up to and including 0.05 mg/L (≤0.05 mg/L)	Greater than 0.05 through 0.5 mg/L (>0.05-0.5 mg/L)	Greater than 0.5 through 2.0 mg/L (>0.5-2.0 mg/L)	Greater than 2.0 mg/L (>2.0 mg/L)
Dermal LD₅₀	Up to and including 200 mg/kg (≤200 mg/kg)	Greater than 200 through 2000 mg/kg (>200-2000 mg/kg)	Greater than 2000 through 5000 mg/kg (>2000-5000 mg/kg)	Greater than 5000 mg/kg (>5000 mg/kg)
Primary Eye Irritation	Corrosive (irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days	Corneal involvement or other eye irritation clearing in 8 - 21 days	Corneal involvement or other eye irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hours
Primary Skin Irritation	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at 72 hours (moderate erythema)	Mild or slight irritation at 72 hours (no irritation or erythema)

The highlighted boxes reflect the values in the "Acute Toxicity" section of this fact sheet.

Informed Risk Decision-Making



*There is no acceptable **risk**
in the absence of **benefit**.*



Mean perceived risk and perceived benefit for medical and nonmedical sources of exposure to radiation and chemicals. Each item was rated on a scale of perceived risk ranging from 1 (very low risk) to 7 (very high risk) and a scale of perceived benefit ranging from 1 (very low benefit) to 7 (very high benefit).

Data are from a national survey in Canada by Slovic et al., 1991.

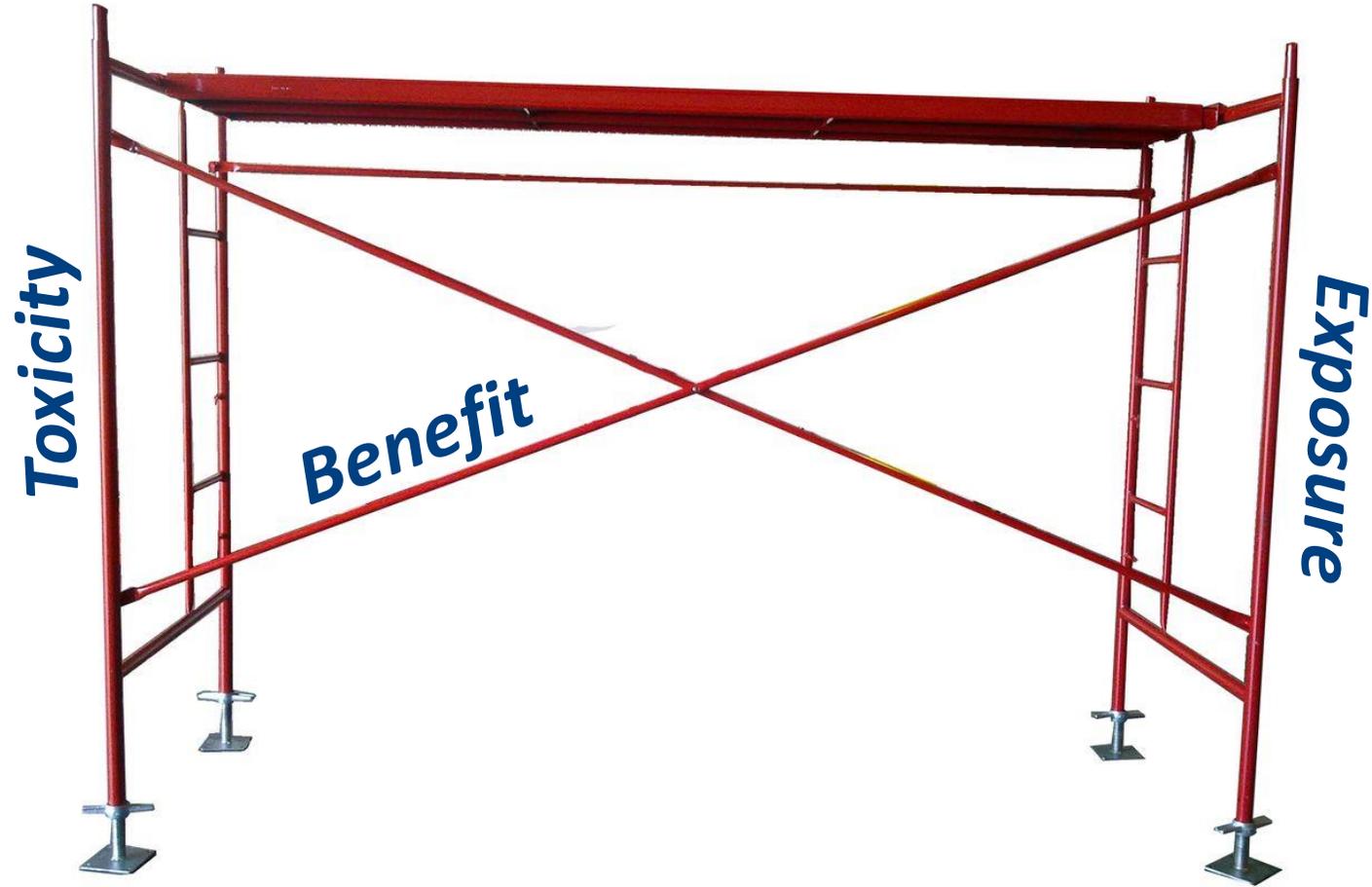
Risks are less likely to be acceptable if the benefits are hidden from view, or if they are not fairly distributed among those who bear the risks.

A close-up photograph of several golden wheat stalks, showing the intricate texture of the grain heads and the fine hairs on the awns. The background is a soft, out-of-focus golden-brown color.

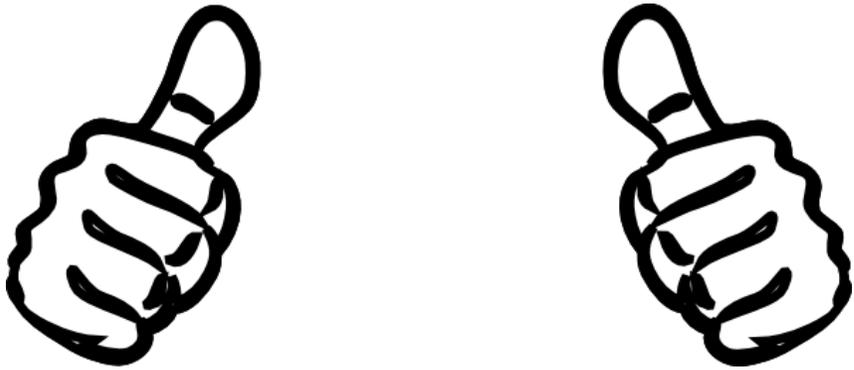
Benefits of Pesticides



Informed Risk Decision-Making



Risk denial increases with perceived control



Sjoberg, L. Factors in Risk Perception. 2000. *Risk Analysis* 20:1

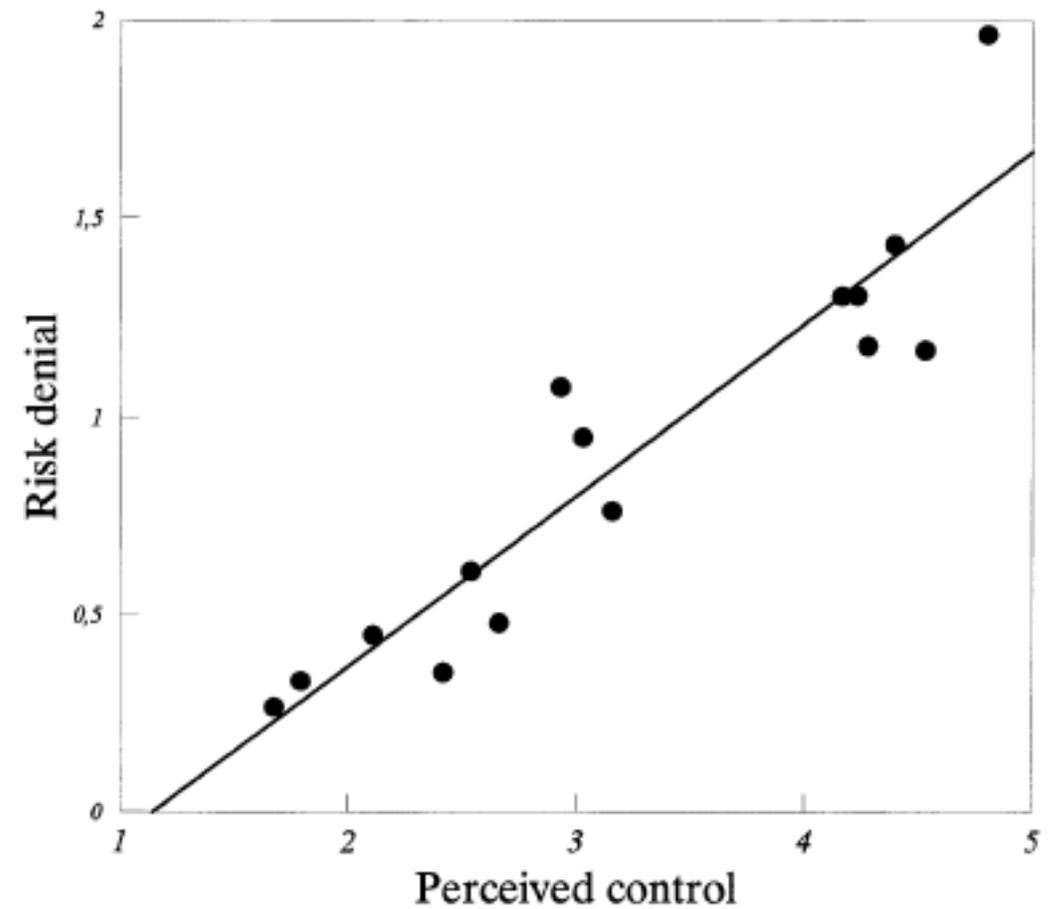


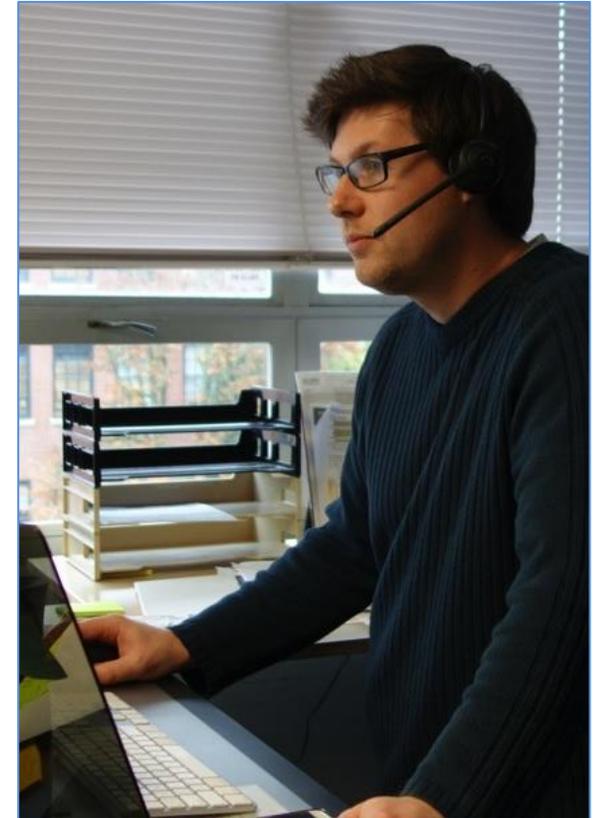
Fig. 2. Risk denial (general minus personal risk) plotted against perceived control over risks. Each point corresponds to one hazard; mean ratings are plotted.

Ways to Minimize Exposure

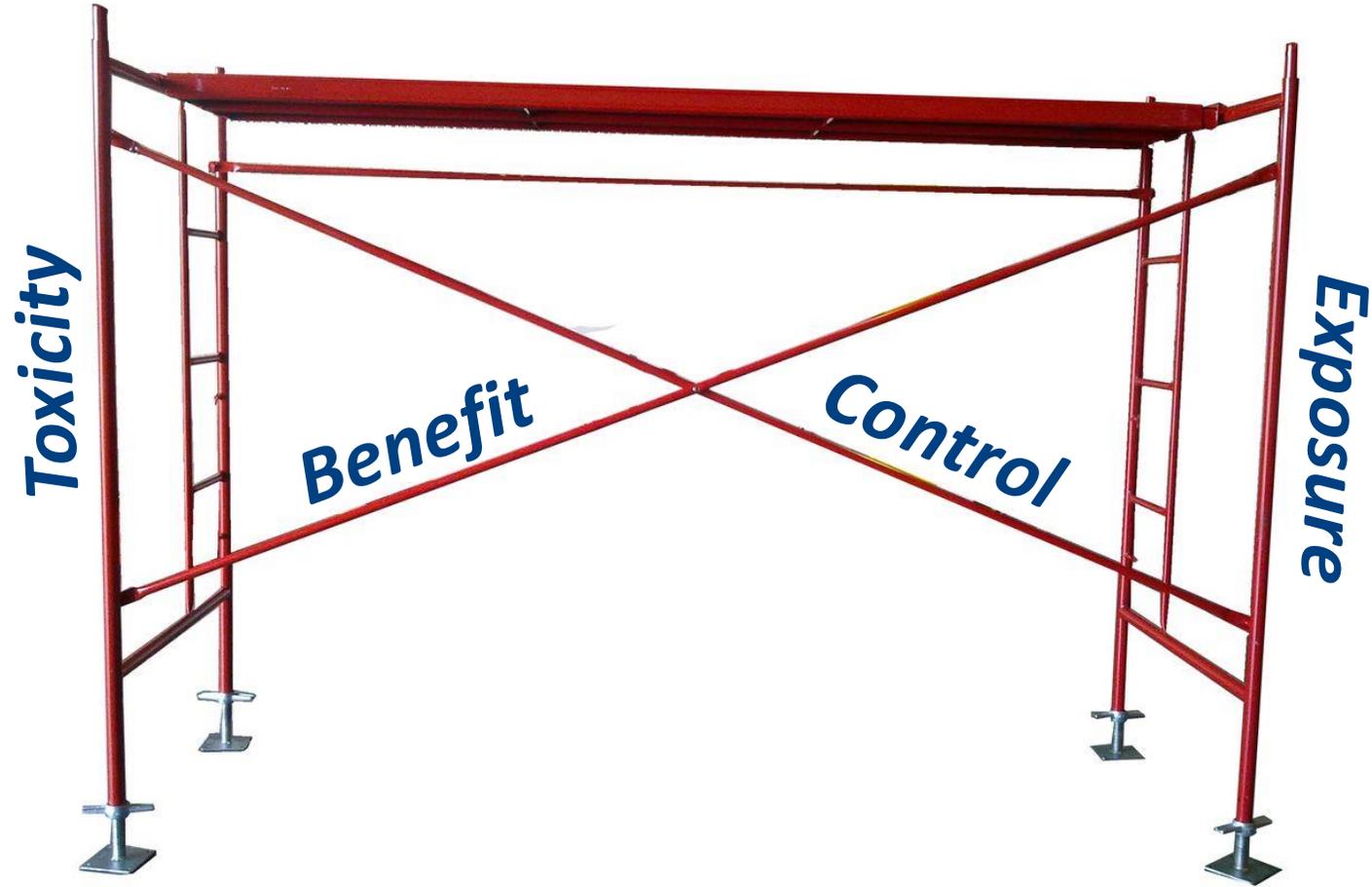
"Disc WME"

Liquid pesticide applied to a residential yard:

- Read, understand and follow all label instructions.
- Avoid contact with the pesticide when the product is wet.
- Avoid area during application, especially downwind from application.
- Apply at low pressure to avoid generating pesticide "mist."
- Be aware that wet or shaded areas may not dry as fast as sunny locations.
- Keep people and pets off treated area for amount of time specified on label, or until dry if not specified.
- If you have to walk on the treated area, remove shoes before going inside to minimize 'tracked-in' residue on floors.
- Do not apply on windy days. This will minimize the potential for drift and improve efficacy.
- Apply only in areas where there is an active pest problem.
- Read, understand and follow all label instructions.
- Remove any items that may accidentally come in contact with the product (toys, swings, plants).
- Immediately following application, wash hands, face and clothing.
- Using appropriate PPE (following label directions), wipe up any puddles of product.
- If you have a well, follow product directions for maximum proximity of the application to the well-head and use products with low soil-mobility.



Informed Risk Decision-Making



Psychology of Risk: Key Points

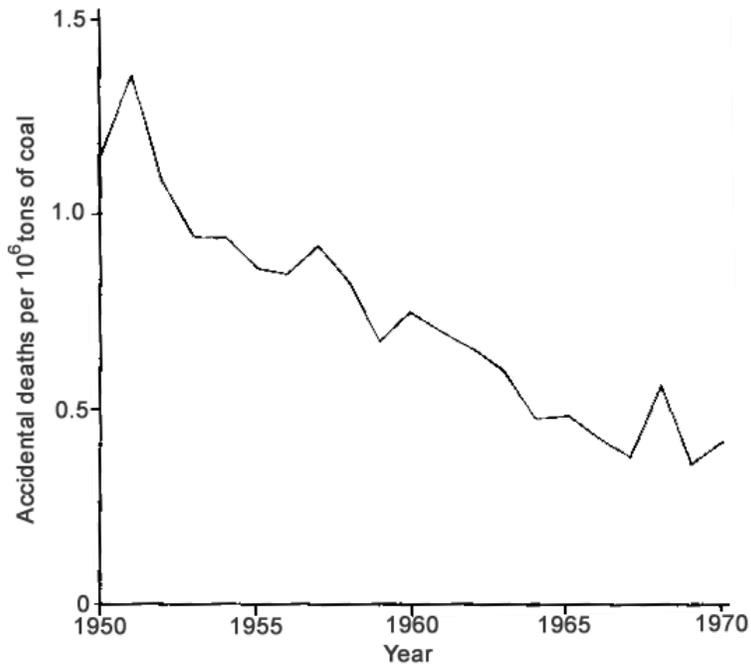
- Trust is critical: hard won, easily lost
- Risk and risk assessment are subjective and value-laden
- If you define risk one way, the best solution might be (this).
If you define it another way, the best solution might be (that).

Paul Slovic
University of Oregon
November 13, 2014

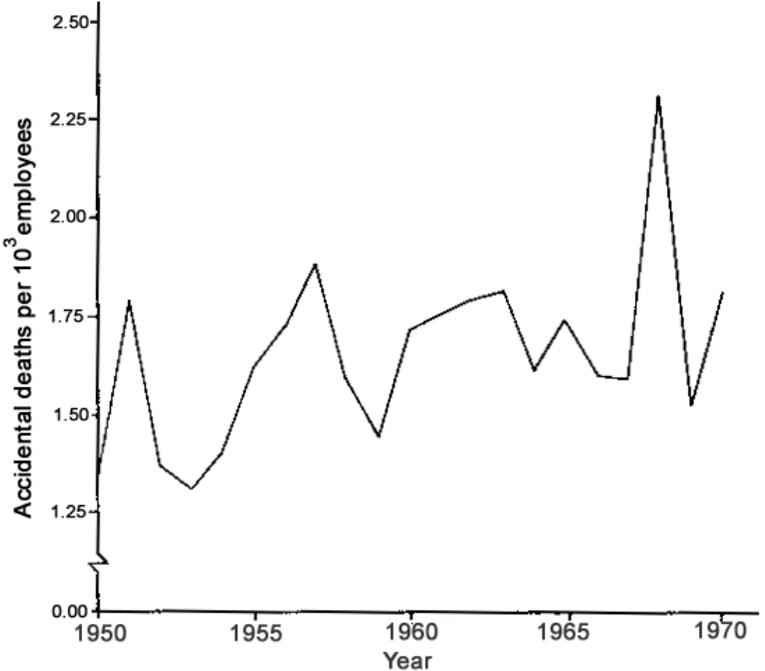
Defining risk is an exercise of power.

How is Risk Defined? Who Decides?

Accidental deaths per million tons of coal mined in the United States



Accidental deaths per thousand coal mine employees in the United States



Is coal mining getting safer?

Counting *fatalities* gives equal weight to:

- Young and old
- Painful and painless deaths
- Voluntary and involuntary exposure(s)
- Fair (beneficial) and unfair (no benefit)

Defining risk is an act of power.

The “Deficit Model”



Knowledge

Lacking
knowledge

Here, have another fact sheet, video...



They don't get it. I can't help it if people don't understand science...

In reality...



Knowledge,
values, status

Knowledge,
values, status

A better model for community meetings



Knowledge,
values, status

Knowledge,
values, status

In this study, people with different worldviews were asked about their attitudes towards nanotechnology, before and after being given information about nanotechnology.

Some questions that measure worldviews (agree?)

- The government should stop telling people how to live their lives (Individualism)
- The government should do more to advance society's goals, even if that limits the freedom of individuals (Communitarian)
- Our society would be better off if the distribution of wealth was more equal (Egalitarianism)
- We should let the experts make all the risk decisions for society (Hierarchism)

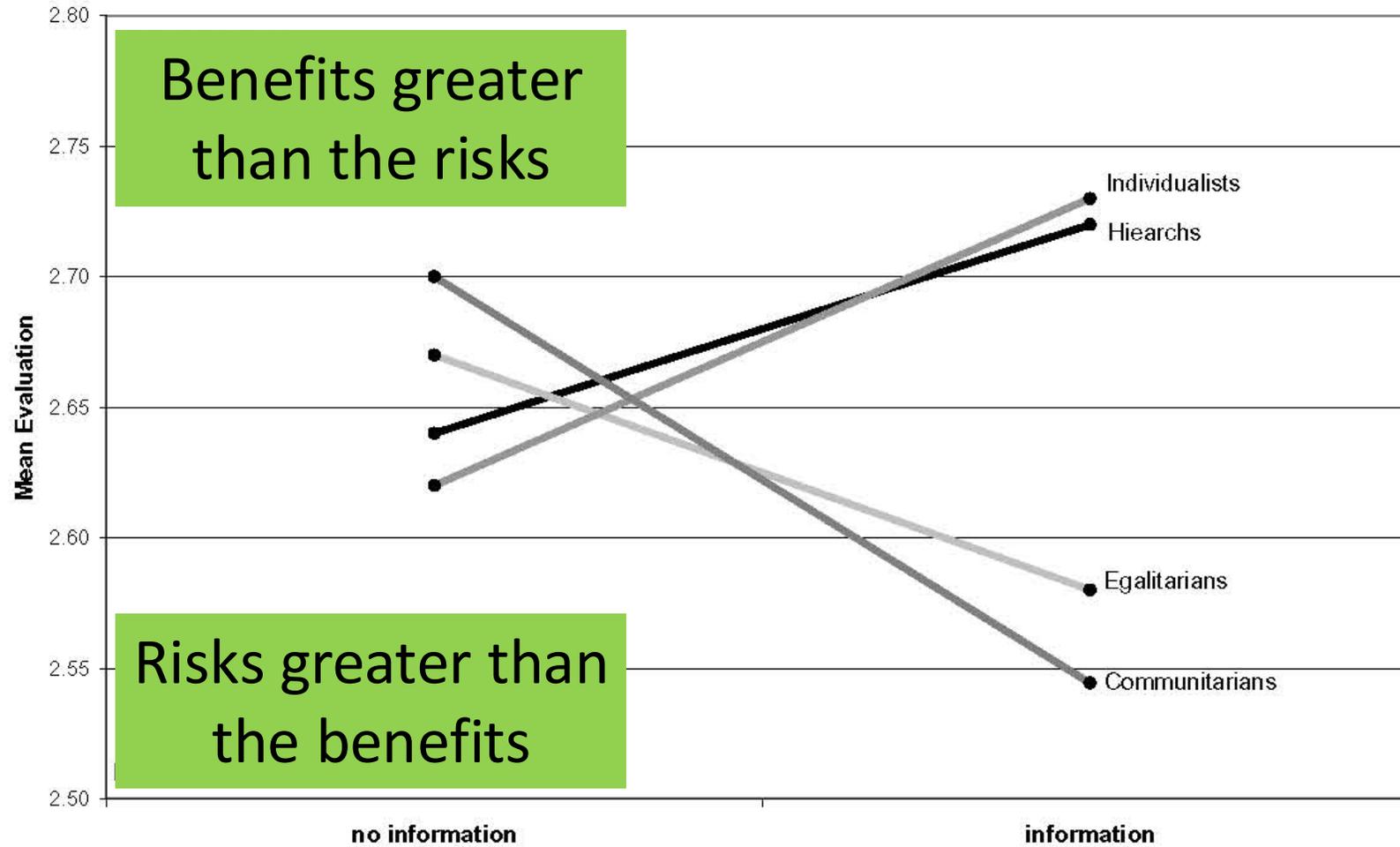
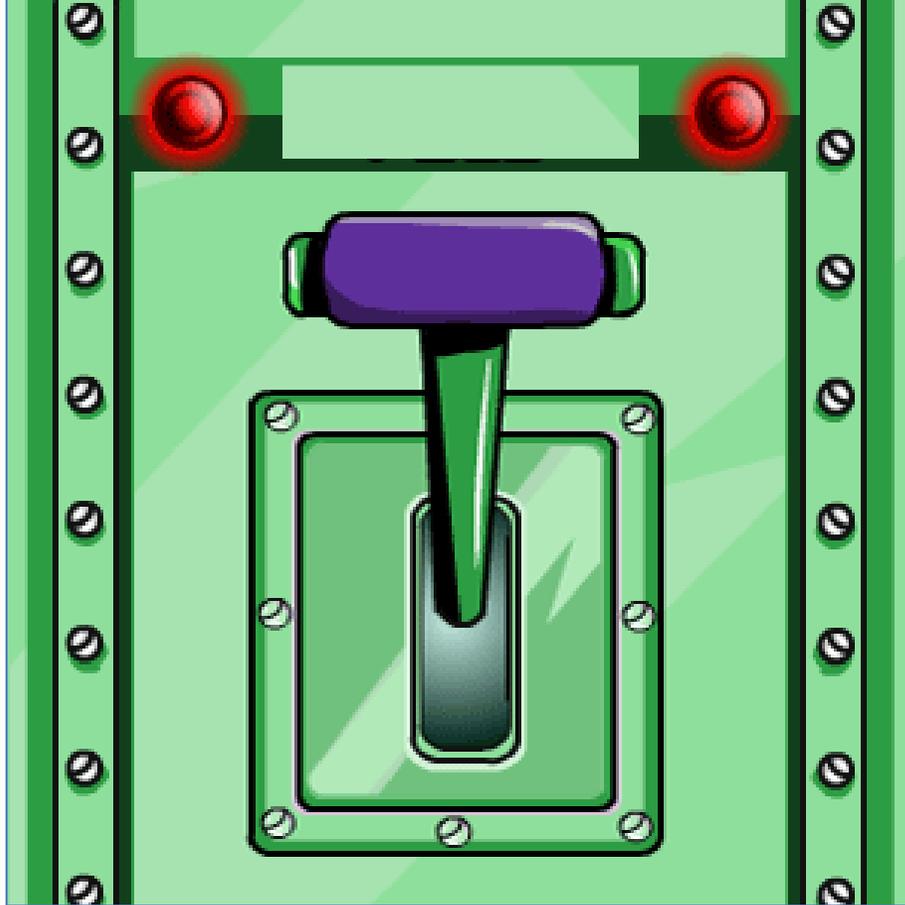
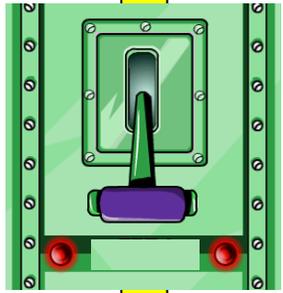


Figure 4. Impact of Information Across Condition by Dimension of Cultural Worldview

Increase perceived
benefit and/or
control...



Decrease perceived **risk**.



Lower risk
perceived

In person's control ----- Out of person's control

Voluntary ----- Imposed

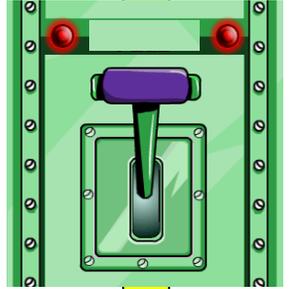
Beneficial ----- Not beneficial

Natural ----- Man-made

Affects only adults ----- Affects children

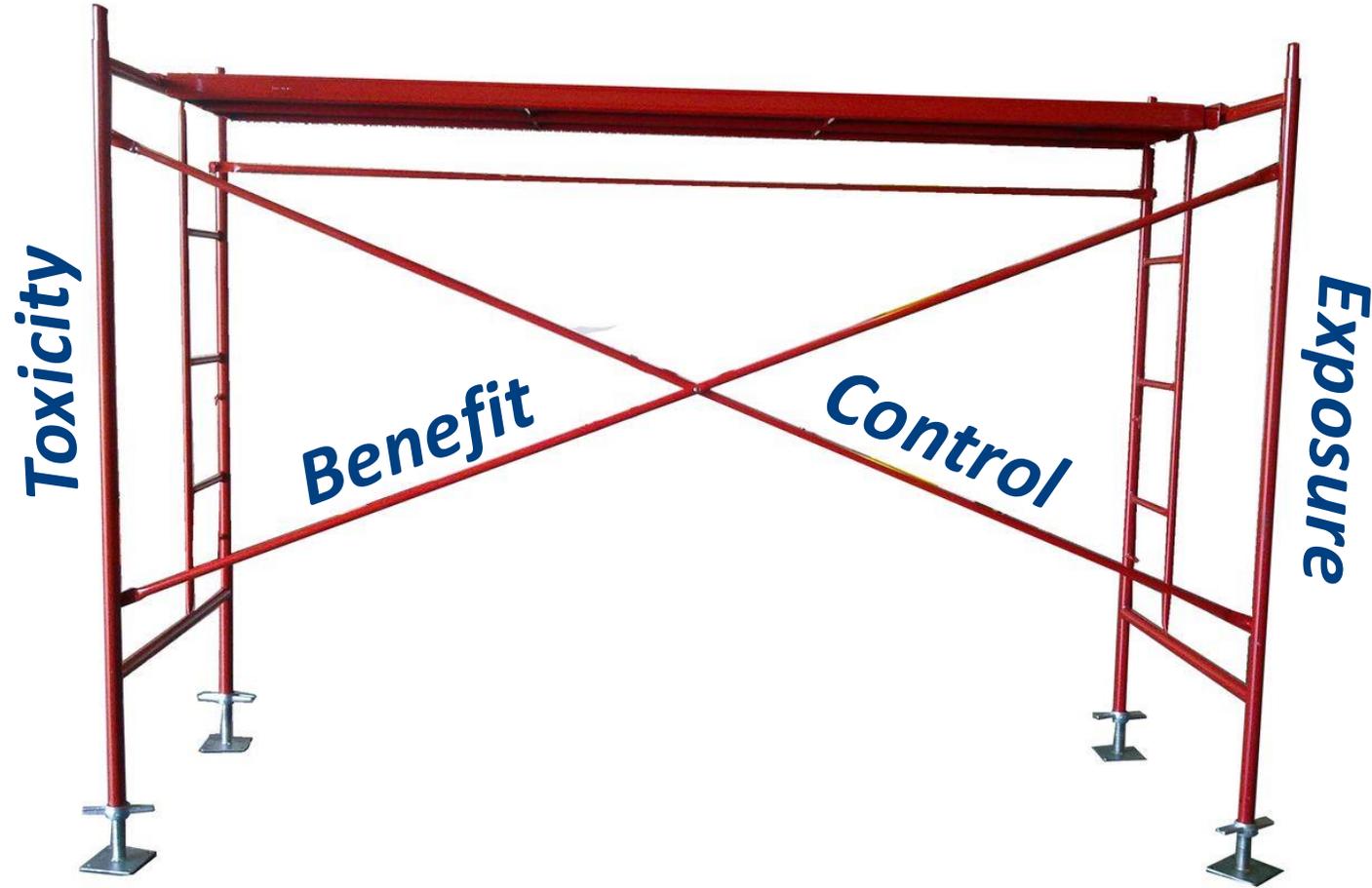
Familiar ----- Exotic

Trusted entity ----- Untrusted entity



Higher risk
perceived

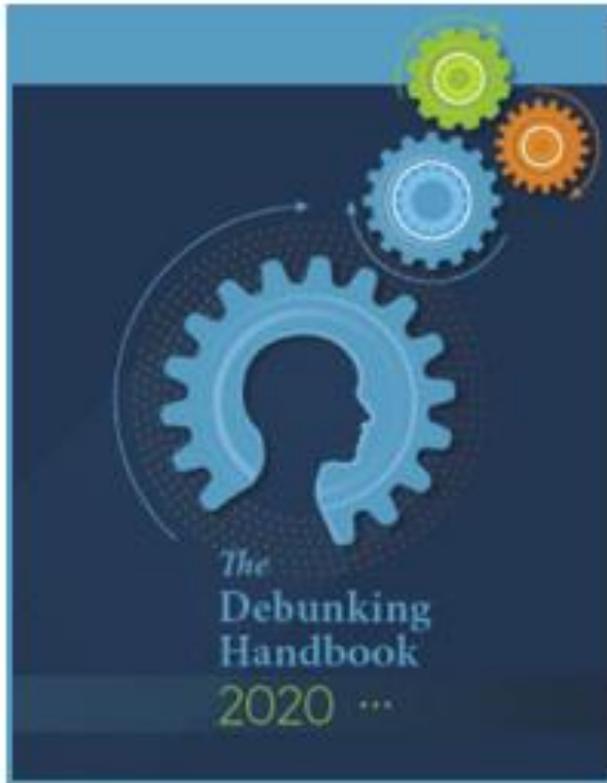
Informed Risk Decision-Making



A Proposed Checklist:

- Listen, ask questions, clarify: _____
- Frame as risk rather than safety: _____
- Provide hazard/toxicity information: _____
- Provide exposure information: _____
- Benefit(s) of the activity/thing: _____
- Action items in person's control: _____
- Where to get more information: _____





**Misinformation
can do damage**



**Misinformation
can be sticky!**



**Prevent
misinformation
from sticking
if you can**



**Debunk often
and properly**

Lewandowsky, S., Cook, J., Ecker, U. K. H., Albarracín, D., Amazeen, M. A., Kendeou, P., Lombardi, D., Newman, E. J., Pennycook, G., Porter, E. Rand, D. G., Rapp, D. N., Reifler, J., Roozenbeek, J., Schmid, P., Seifert, C. M., Sinatra, G. M., Swire-Thompson, B., van der Linden, S., Vraga, E. K., Wood, T. J., Zaragoza, M. S. (2020). The Debunking Handbook 2020. Available at <https://sks.to/db2020>. DOI:10.17910/b7.1182

The “Overkill” backfire

MYTH
FACT FACT FACT
FACT FACT FACT
FACT FACT FACT
FACT FACT FACT



MYTH
FACT
FACT
FACT



the
DEBUNKING
handbook

Cook, J., Lewandowsky, S. (2011), *The Debunking Handbook*. St. Lucia, Australia: University of Queensland. November 5. ISBN 978-0-646-56812-6. [<http://sks.to/debunk>]

In summary, **some suggestions:**

- Chemical risk assessment measures the probability of harm by comparing dose levels.
- Personal risk perception varies with world-view, strength of emotion, and perceived benefit.
 - **Listen first, paraphrase the concern, get agreement**
 - **Respect differences in values**
 - **Don't be silent about the benefits of chemicals when talking about the risks**

In summary, **some suggestions:**

- Benefit(s) often inform risk perception more than the probability of harm.
- Defining risk is an act of power.
- 'Safe' is not a safe word.
- The messenger's trustworthiness matters.
 - **Don't define risk for people. They may feel dominated.**
 - **Discuss risk, and ways to reduce it. Empower people.**
 - **Build trust with transparency, listening, and follow-through**

A Proposed Checklist:

Listen, ask questions, clarify: _____

Frame as risk rather than safety: _____

Provide hazard/toxicity information: _____

Provide exposure information: _____

Benefit(s) of the activity/thing: _____

Action items in person's control: _____

Where to get more information: _____



EDITORIAL ▶ Proc Natl Acad Sci U S A. 2024 Mar 4;121(11):e2319488121. doi: [10.1073/pnas.2319488121](https://doi.org/10.1073/pnas.2319488121)

Trends in US public confidence in science and opportunities for progress

[Arthur Lupia](#)^{a,1,2}, [David B Allison](#)^{b,3}, [Kathleen Hall Jamieson](#)^{c,2}, [Jennifer Heimberg](#)^{d,4}, [Magdalena Skipper](#)^{e,2},
[Susan M Wolf](#)^{f,2}

Two big recommendations for scientists:

- Disclose funding sources openly and often.
- Demonstrate willingness to change your mind based on new evidence.

ORIGINAL RESEARCH article

Front. Public Health, 13 May 2025

Sec. Public Health Policy

Volume 13 - 2025 | <https://doi.org/10.3389/fpubh.2025.1557786>

How risk communication affects public trust in government: the moderating role of policy expectations



Nuoxue Li



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University of Electronic Science and T

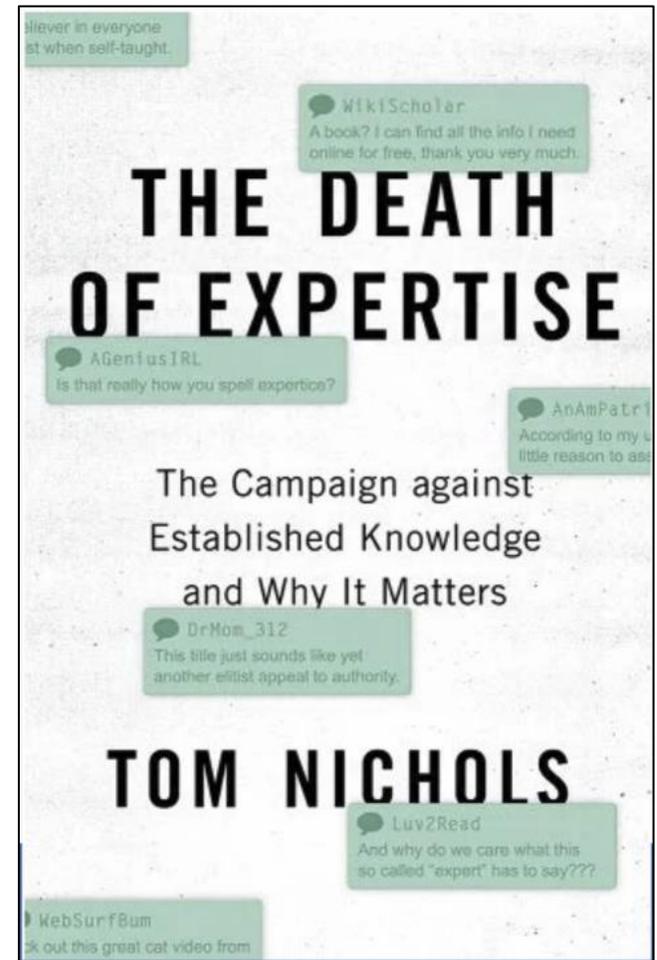
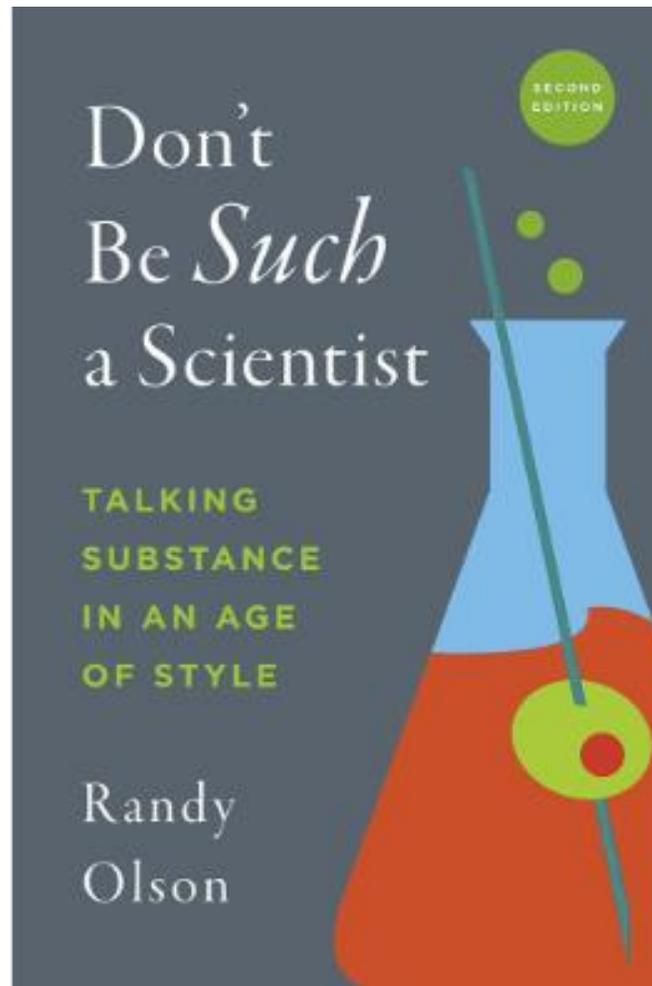
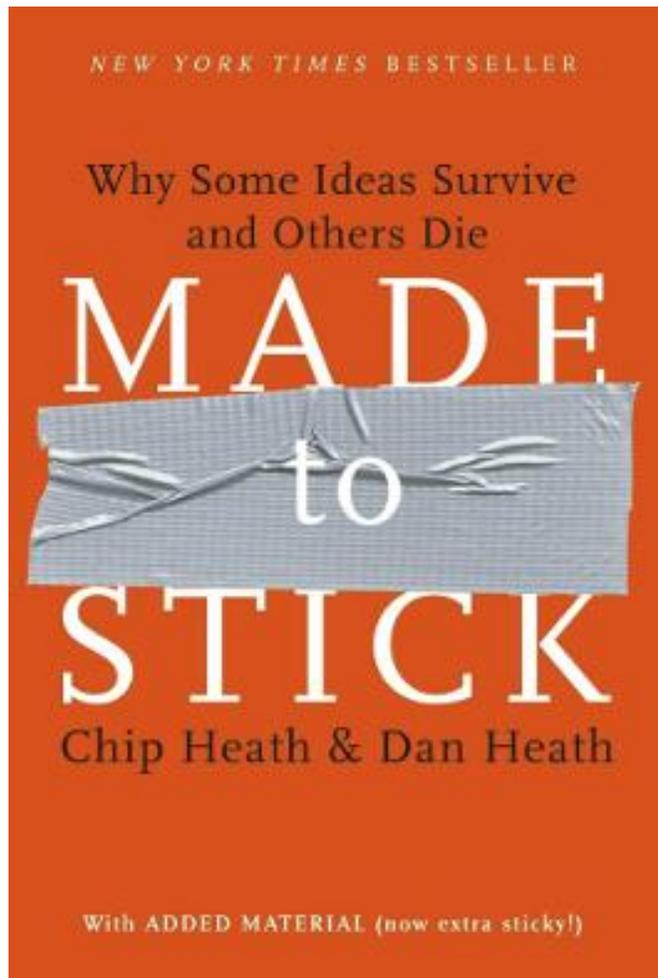
Introduction: Conspiracy narratives fuel public fear and defensive reactions, undermining social governance.

Method: Through two survey experiments, this study explores the effects of conspiracy narratives on public trust



Recommendations:

- Governments should respond to strong conspiracy narratives with transparency, third-party validation, and direct engagement.
- Without this engagement & transparency, public trust in government is eroded.



DIFFICULT CONVERSATIONS

About pesticides and risk

Kaci Buhl, Professor of Practice

Department of Environmental & Molecular Toxicology

March 3, 2026

buhl@oregonstate.edu



**Oregon State
University**