RISK COMMUNICATION

Is it Safe?

August 29, 2025

Kaci Buhl, Associate Professor of Practice
Department of Environmental & Molecular Toxicology

Oregon State University

PSEP

Pesticide Safety Education Program

Kaci Buhl, MS
Professor of Practice, Toxicology
Kaci.Buhl@oregonstate.edu

Serving as a leader in two national programs:
Pesticide Educational Resources Collaborative (PERC), and
The National Pesticide Information Center (NPIC)

NATIONAL PESTICIDE INFORMATION CENTER

1.800.858.7378

npic@ace.orst.edu

"Pesticide Information, How can I help you?"

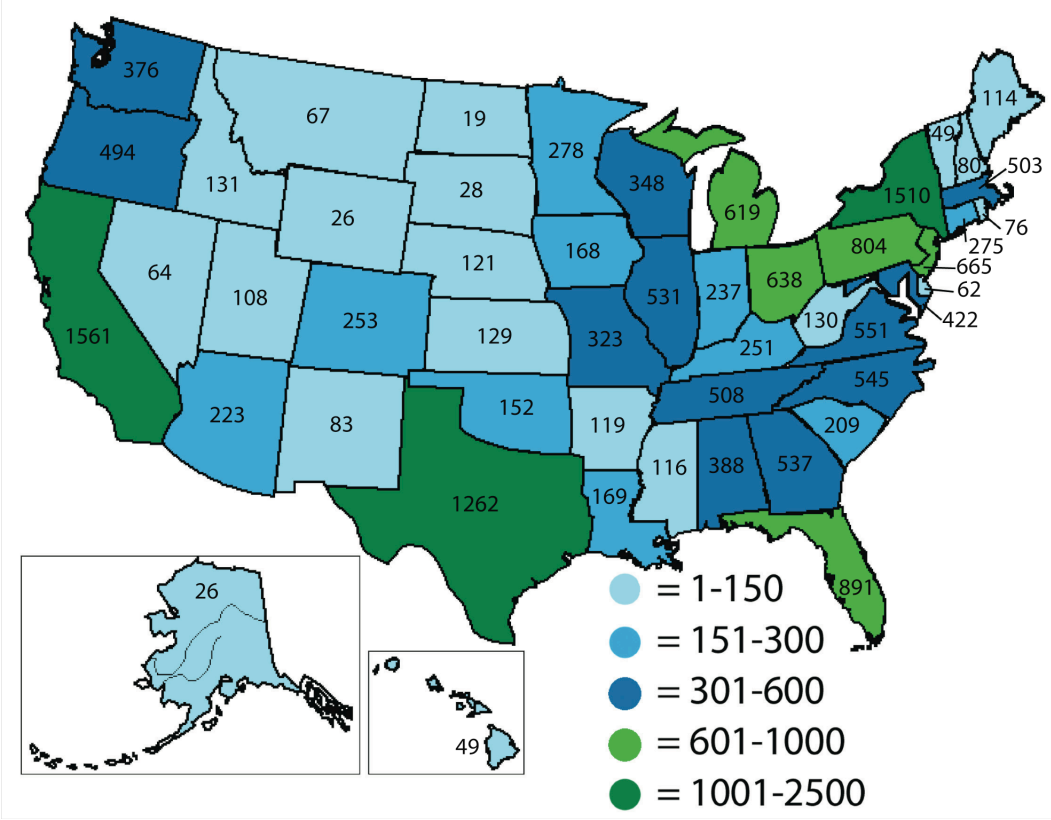
http://npic.orst.edu

English and Spanish

Over 700 pages

Over 5 million unique page views last year

NATIONAL PESTICIDE INFORMATION CENTER



Science-based information about pesticides

Toll-free phone service available:

11:00 – 3:00 Eastern; 8:00 – 12:00 Pacific

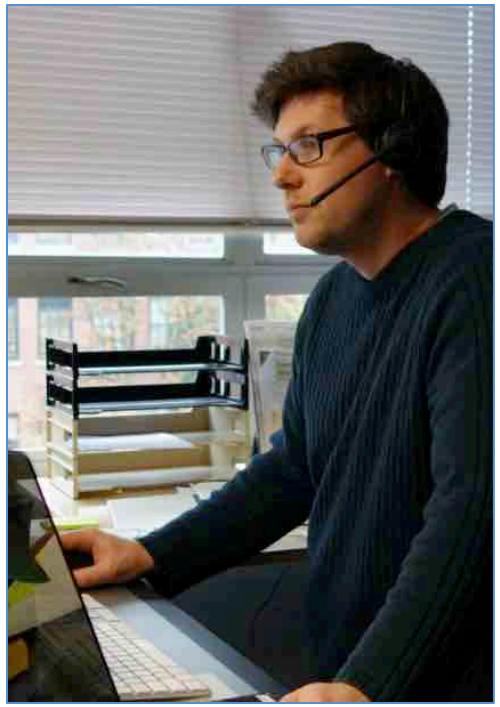
Funded through a cooperative agreement with EPA

Multi-lingual services are available

Call the National Pesticide Information Center

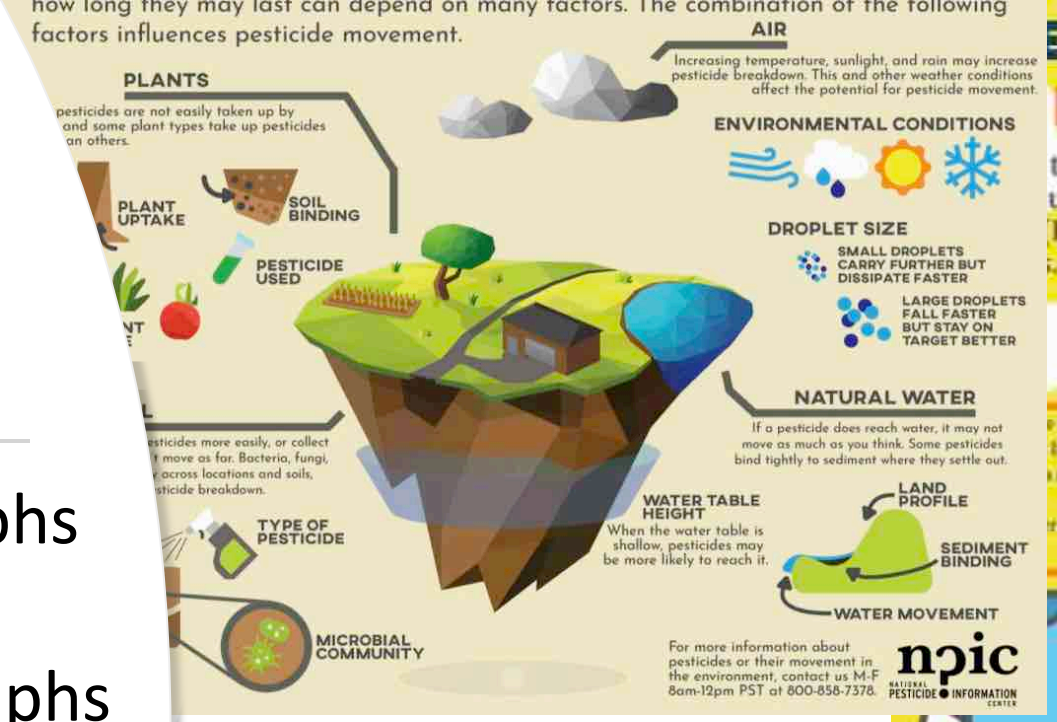
1.800.858.7378

- To compare the toxicity of products
- To evaluate the persistence of pesticides
- To discuss specific pesticides and potential health effects
- To discuss risk to groundwater, fish, bees, or pets
- For help with confusing label statements
- To find local resources



Changing with the Times

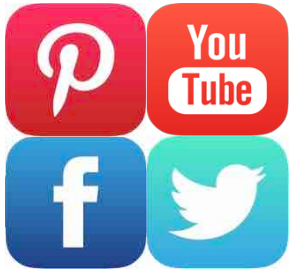
- Bullets > Paragraphs
- Familiar visuals > charts, tables, graphs
- Step by step, one concept at a time




New live chat feature
TALK TO AN EXPERT!

One-on-One

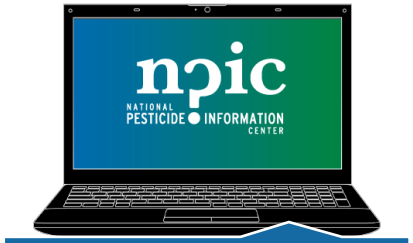
Website



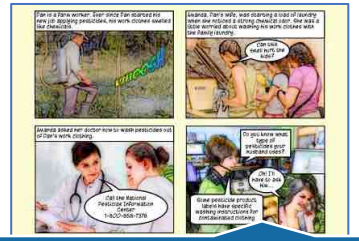
Social Media

Mobile apps

Podcasts

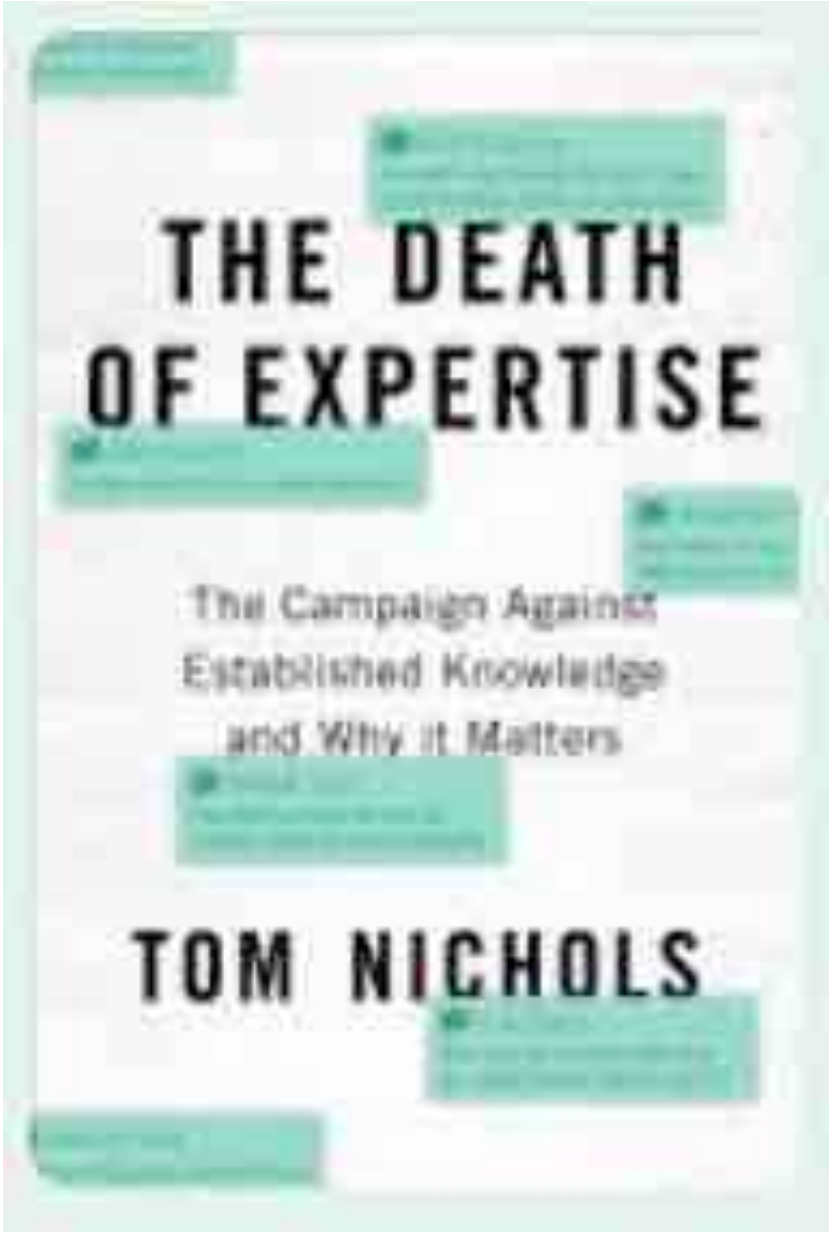


Webinars



Comics

Videos

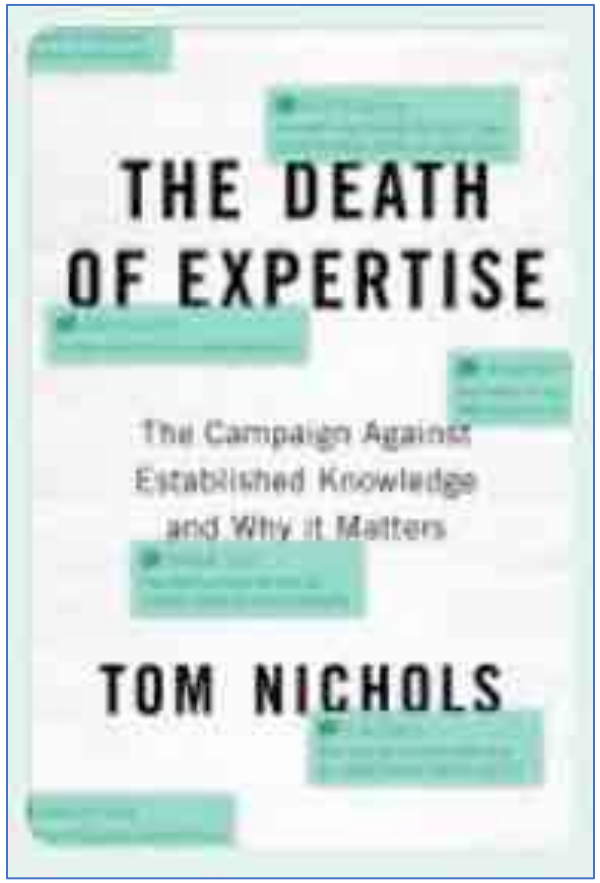


There has been an **erosion of respect** for facts, logical analysis, and critical thinking.

Uninformed opinions carry the same weight as expert opinions. Beliefs are treated as facts.

There is no vetting sources of information, good from bad.

When facts conflict with our values, ‘almost everyone finds a way to stick with their values and reject the evidence.’ Jonathan Haidt, social psychologist



"The guesses of an experienced astrophysicist and a college sophomore are not equivalently good."

EDITORIAL ▸ Proc Natl Acad Sci U S A. 2024 Mar 4;121(11):e2319488121. doi: 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]

▸ Author information ▸ Article notes ▸ Copyright and License information

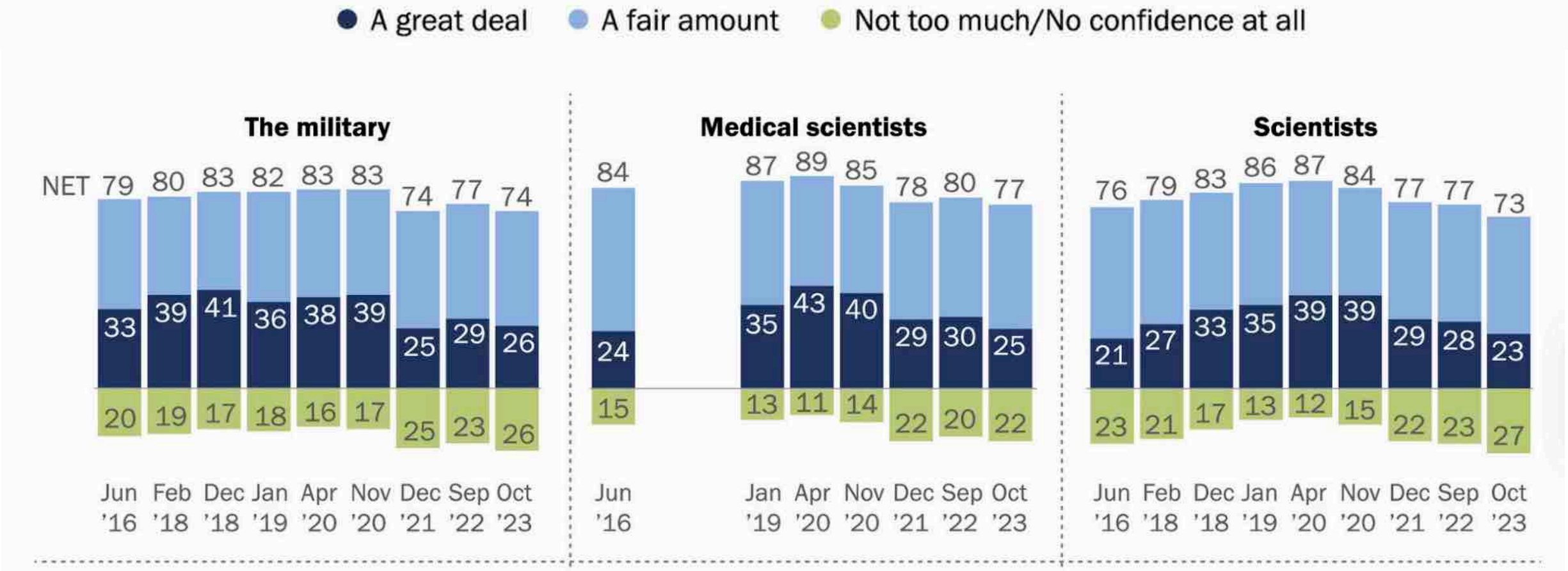
PMCID: PMC10945819 PMID: 38437563

Abstract

In recent years, many questions have been raised about whether public confidence in science is changing. To clarify recent trends in the public's confidence and factors that are associated

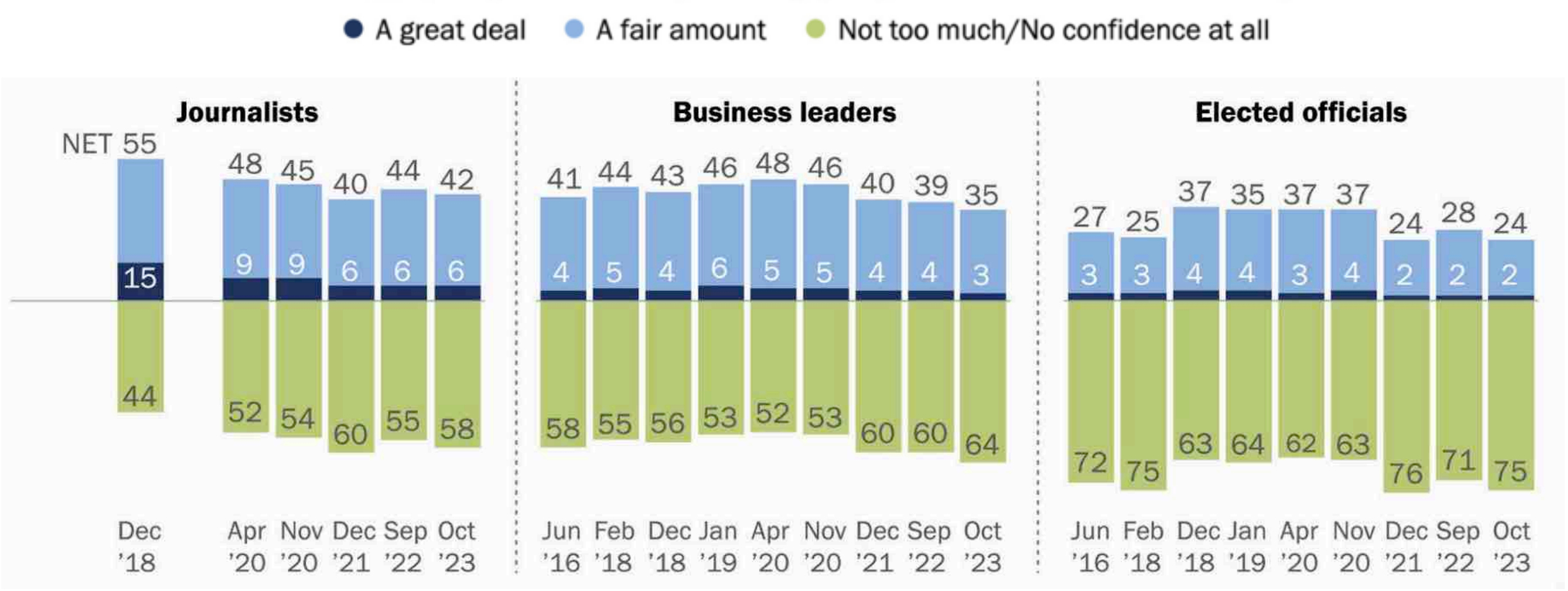
Majorities of Americans say they have at least a fair amount of confidence in scientists, but ratings have fallen since early in the coronavirus outbreak

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



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"

PEW RESEARCH CENTER

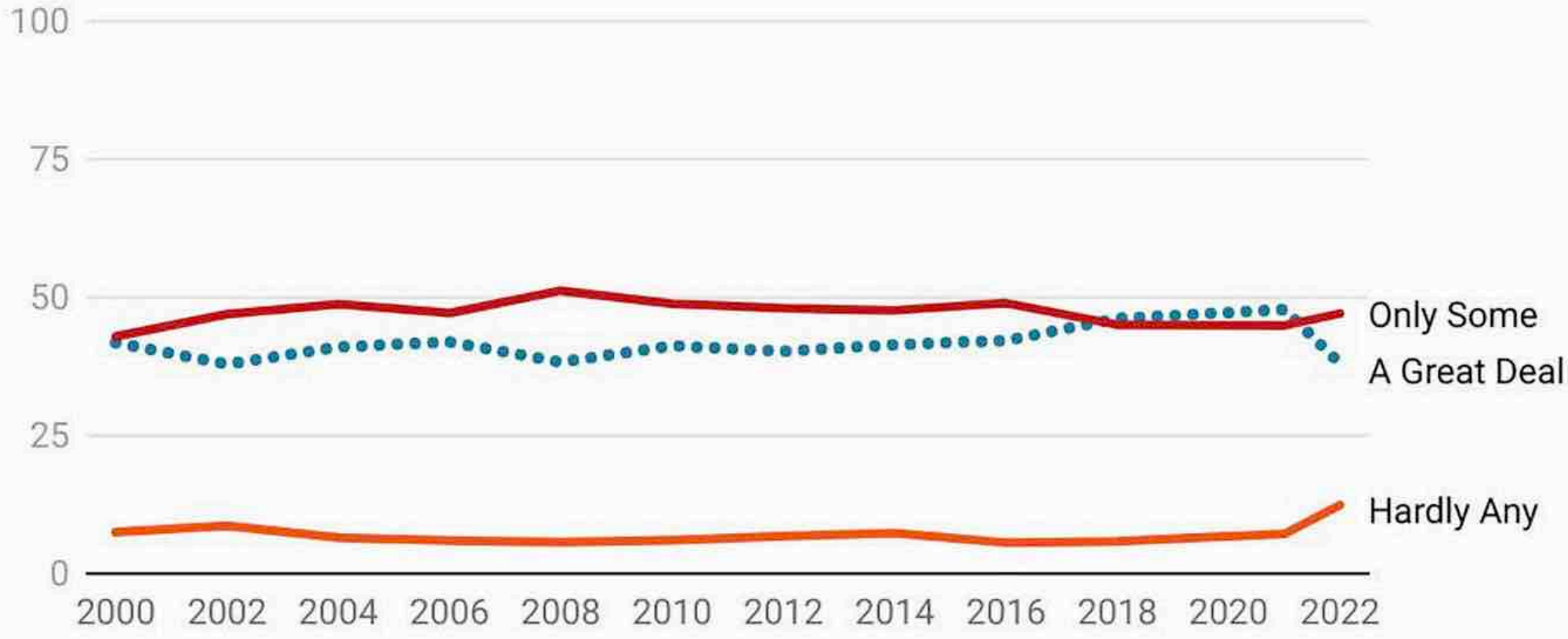


Note: Respondents who did not give an answer are not shown.
Source: Survey of U.S. adults conducted Sept. 25-Oct. 1, 2023.
"Americans' Trust in Scientists, Positive Views of Science Continue to Decline"

PEW RESEARCH CENTER

Overall Confidence in the Scientific Community

Percent of adults.



Question: "I am going to name some institutions [scientific community] in this country. As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?"

Source: General Social Survey (GSS), last conducted in 2022.

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

Trends in US public confidence in science and opportunities for progress

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Two big recommendations for scientists:

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

▸ Author information ▸ Article n

PMCID: PMC10945819 PMID: 384

Abstract

In recent years, many questions have been raised about whether public confidence in science is changing. To clarify recent trends in the public's confidence and factors that are associated with these feelings, an effort initiated by the National Academies' Strategic Council for

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 Weix

University of Electronic Science and

Highlights:

- "Narrative framing" is an influential mechanism for shaping public perceptions of risk.
- Conspiracy narratives are more effective than technological narratives in producing anxiety, and demand for change/policy intervention.

Introduction: Conspiracy na
public fear and defensive re
social governance.

ORIGINAL RESEARCH article

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

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Introduction: Conspiracy na
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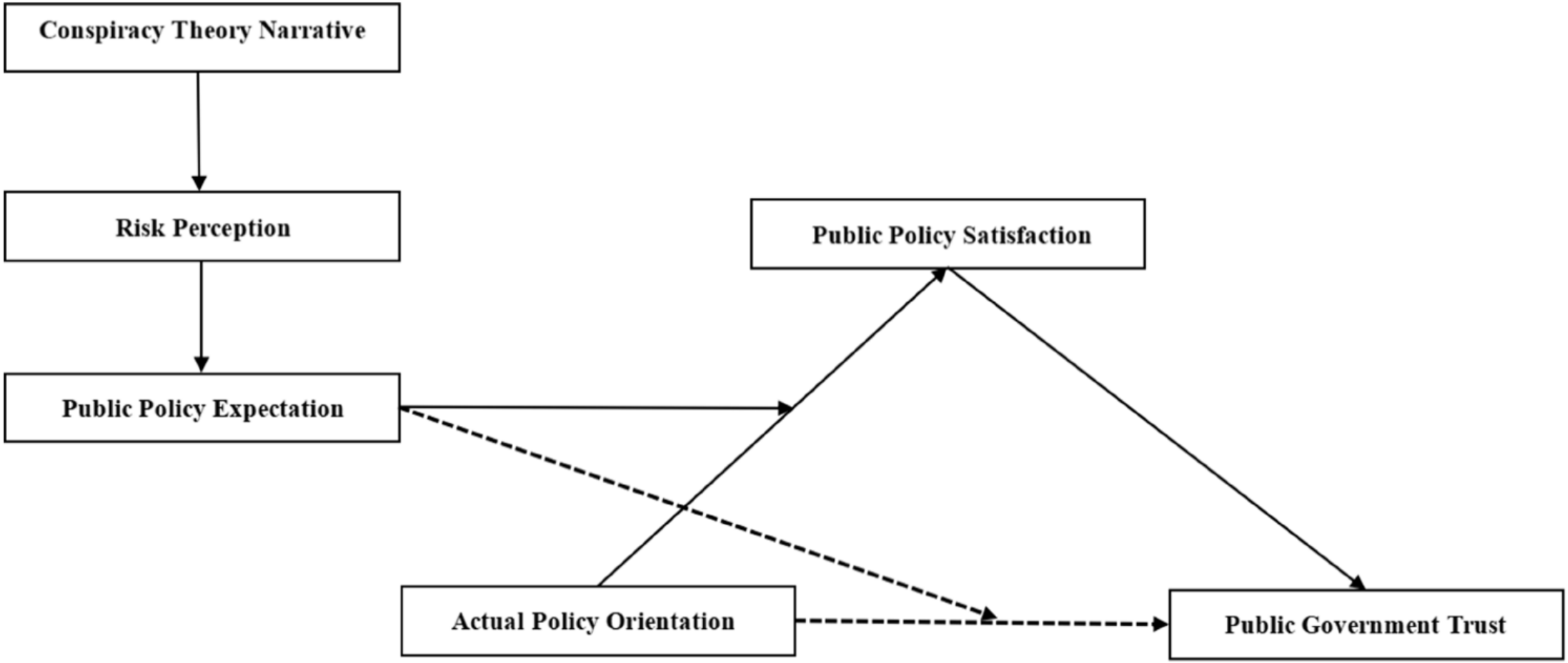
social governance.

Highlights:

- A narrative is a storyline that connects characters, events, and issues.
- A conspiracy narrative connects these things in a way that triggers existing bias, removes or minimizes uncertainties, and/or implies there is a hidden group in control of the situation


Conspiracy Theory Narrative
Risk Perception
Public Policy Expectation
Public Policy Satisfaction
Actual Policy Orientation
Public Government Trust

ORIGINAL RESEARCH article

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

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Introduction: Conspiracy na
public fear and defensive re
social governance.

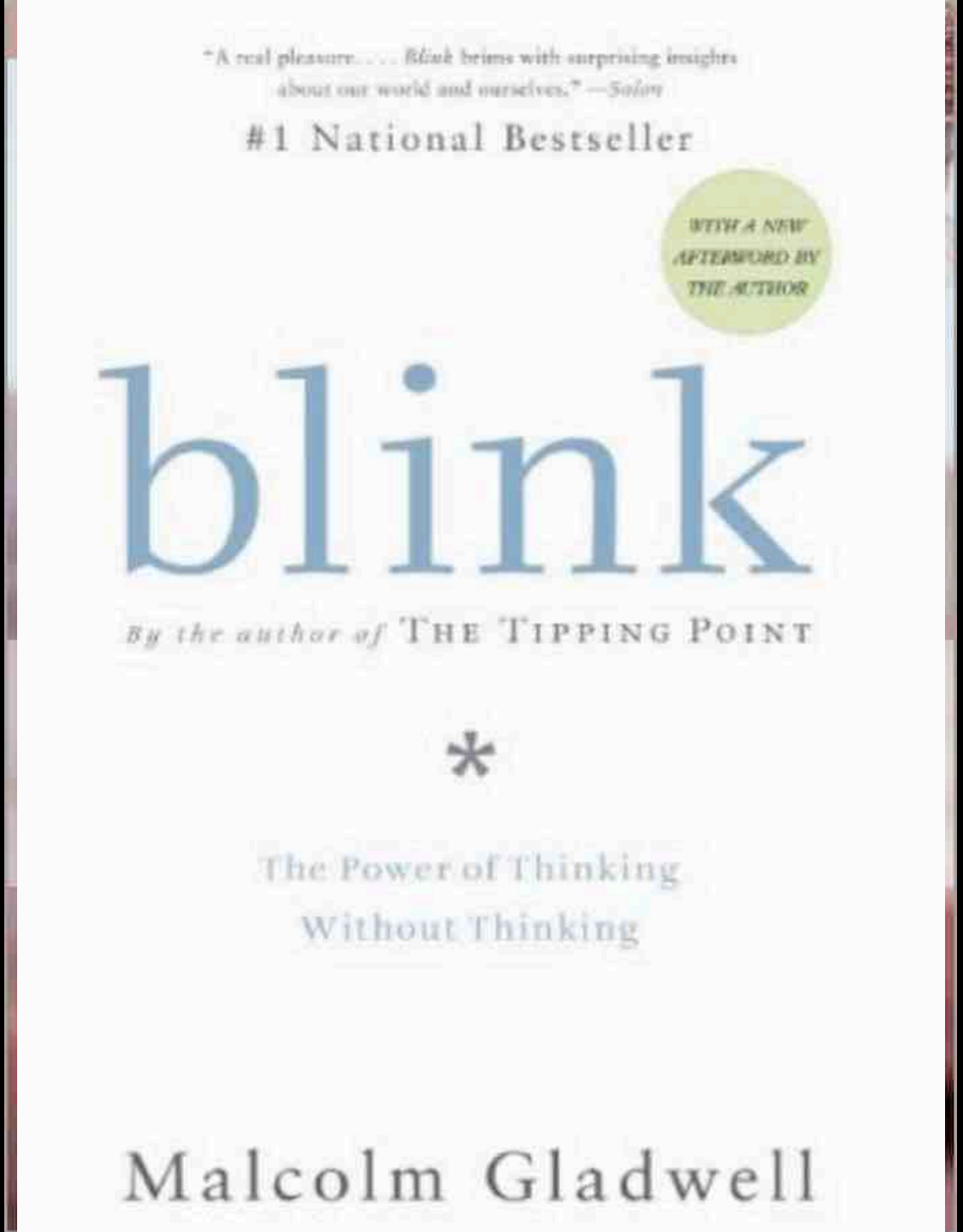
72 hours

Recommendations:

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

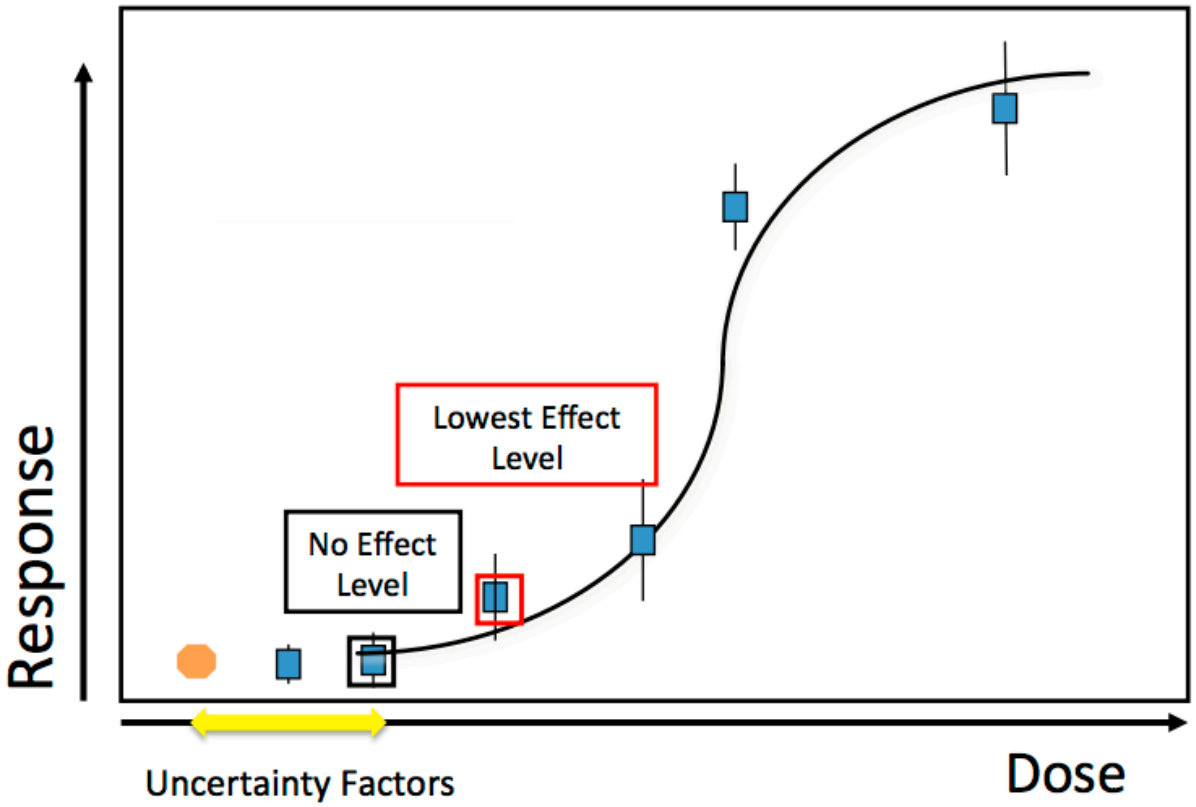
Risk Perception

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



- 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)

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



Risk is measured at the population level.
-Percent of population impacted-

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

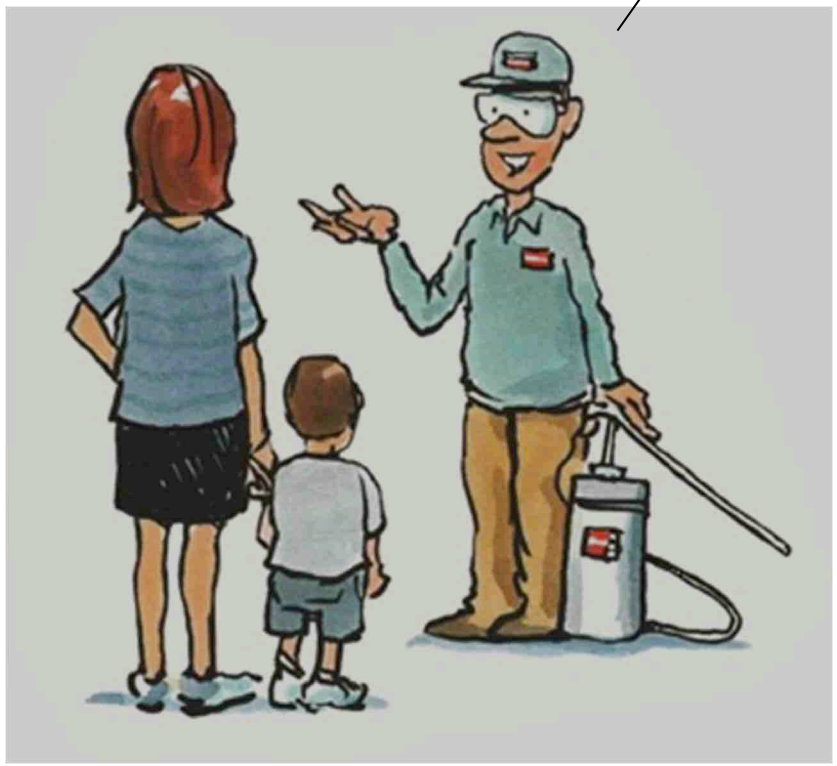
The word “safe” is unsafe.


You said it was safe!
You filled your swimming pool with what ?

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

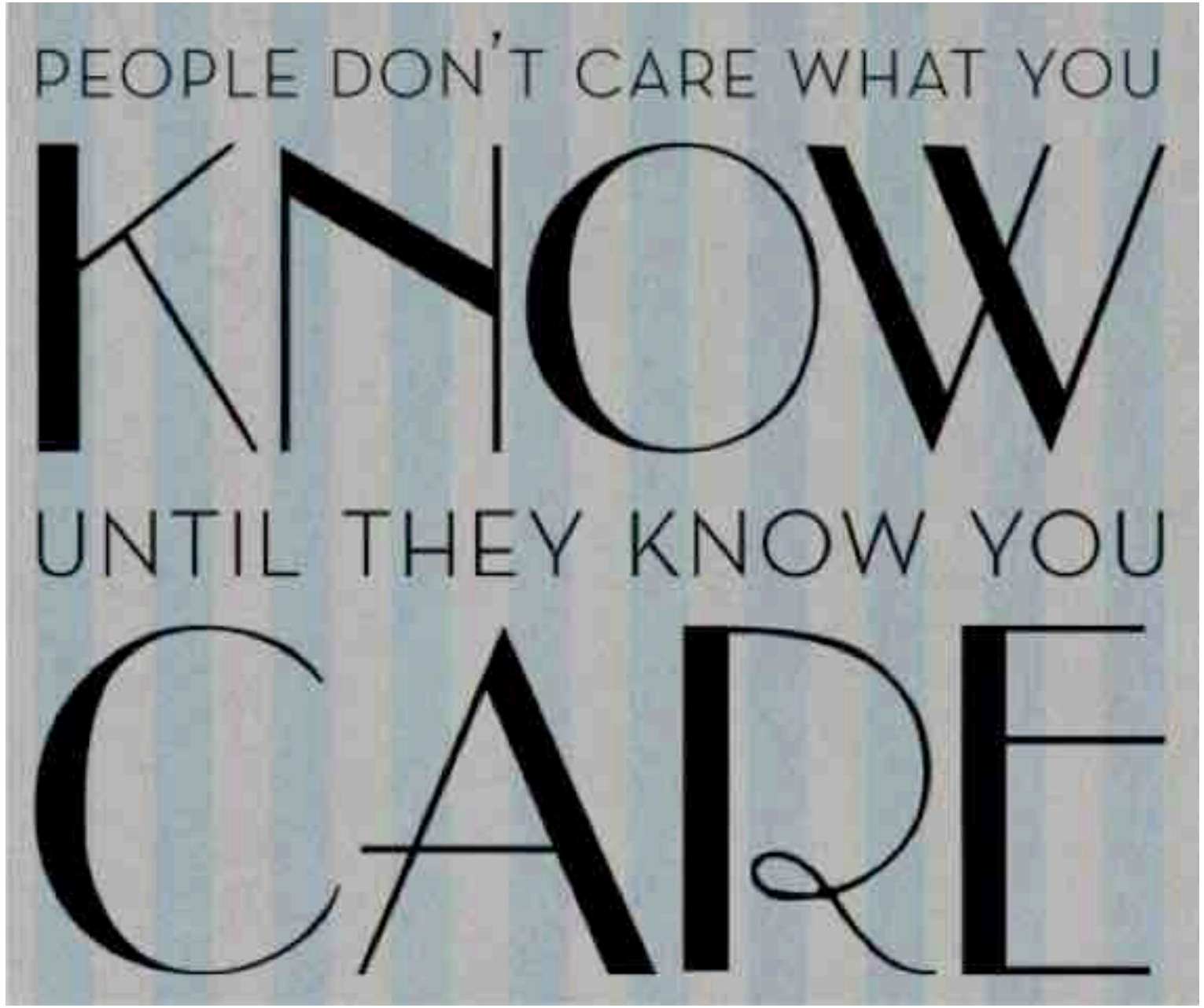
"LEAP" over the barriers.

- **L**isten
- **E**mpathize
- **A**pologize
- **P**roblem-Solve

The importance of listening cannot be over-emphasized. It's KEY!

Communication Barriers

- Values
- Experiences
- Personality
- Roles


PEOPLE DON'T CARE WHAT YOU
KNOW
UNTIL THEY KNOW YOU
CARE

Active listening shows you care.

It shows empathy and builds trust.

Empathy example:

- Feel: Acknowledge the person's feelings, name them
- Felt: Share how you felt about something similar
- Found: Share something you learned that influenced your thinking on the topic

Active listening shows you care.

It shows empathy and builds trust.

Active listening techniques:

- Open-ended questions
- Minimal encouragements
- Effective pauses
- Paraphrasing
- Refrain from responding until the problem-statement is clear

“LEAP” over the barriers.

- **L**isten
- **E**mpathize
- **A**pologize
- **P**roblem-Solve

Come to agreement on the question/issue

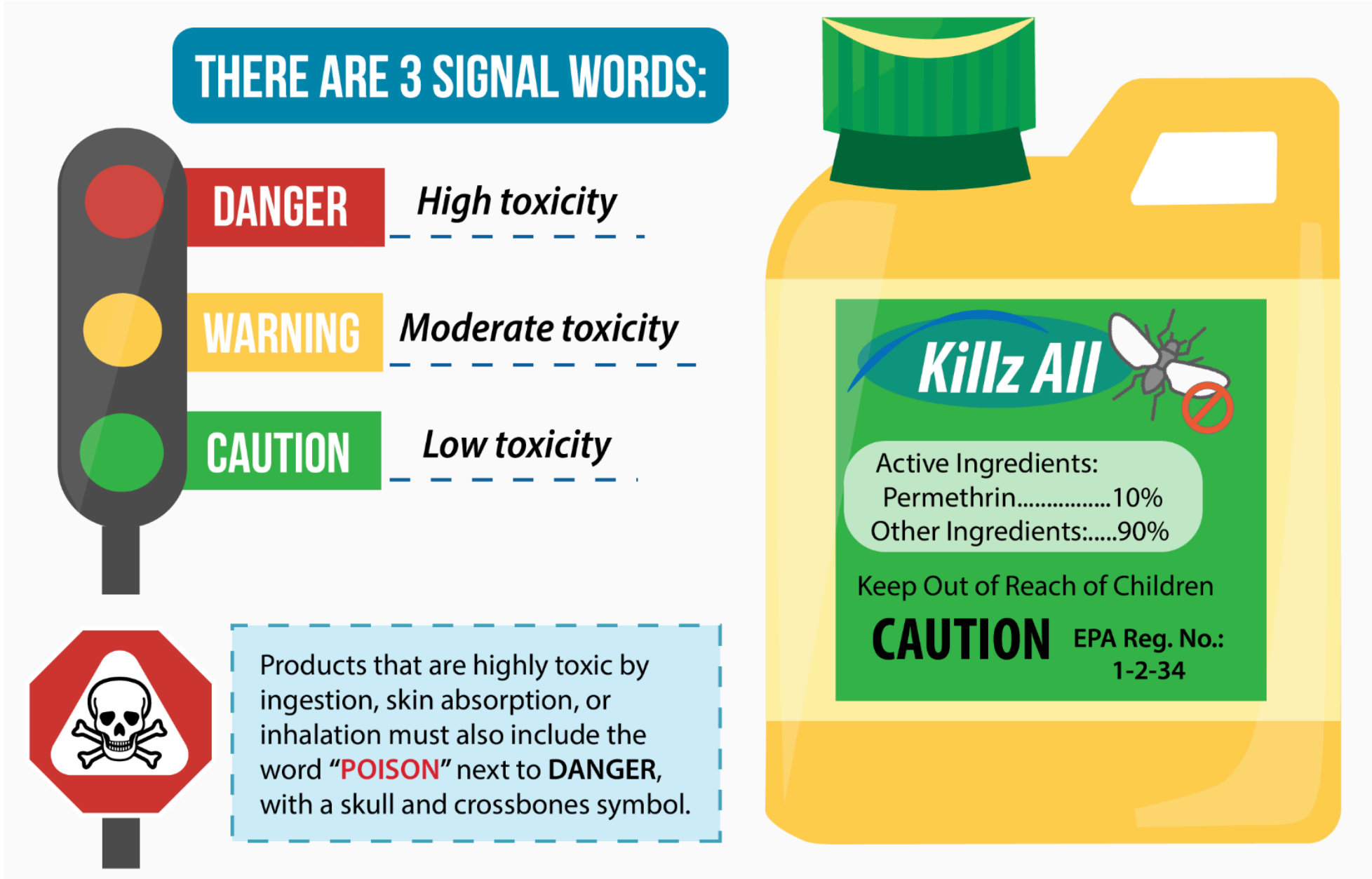
Step 1: Thank you for telling the story. It sounds like you experienced (this), and now you're seeking (that.) Is that right?

- If Yes, Step 2 starts in the next slide.
- If No, listen more.
  - Make a list of the questions/needs
  - Return to step 1.

Risk = Toxicity X 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



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

TOXICITY CLASSIFICATION - GLYPHOSATE

	High Toxicity	Moderate Toxicity	Low Toxicity	Very Low Toxicity
Acute Oral LD_{50}	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 LC_{50}	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 LD_{50}	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.
Modeled after the U.S. Environmental Protection Agency, Office of Pesticide Programs, Label Review Manual, Chapter 7: Precautionary Labeling. http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf

http://npic.orst.edu/factsheets/archive/glyphotech.html

Informed Risk Decision-Making

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

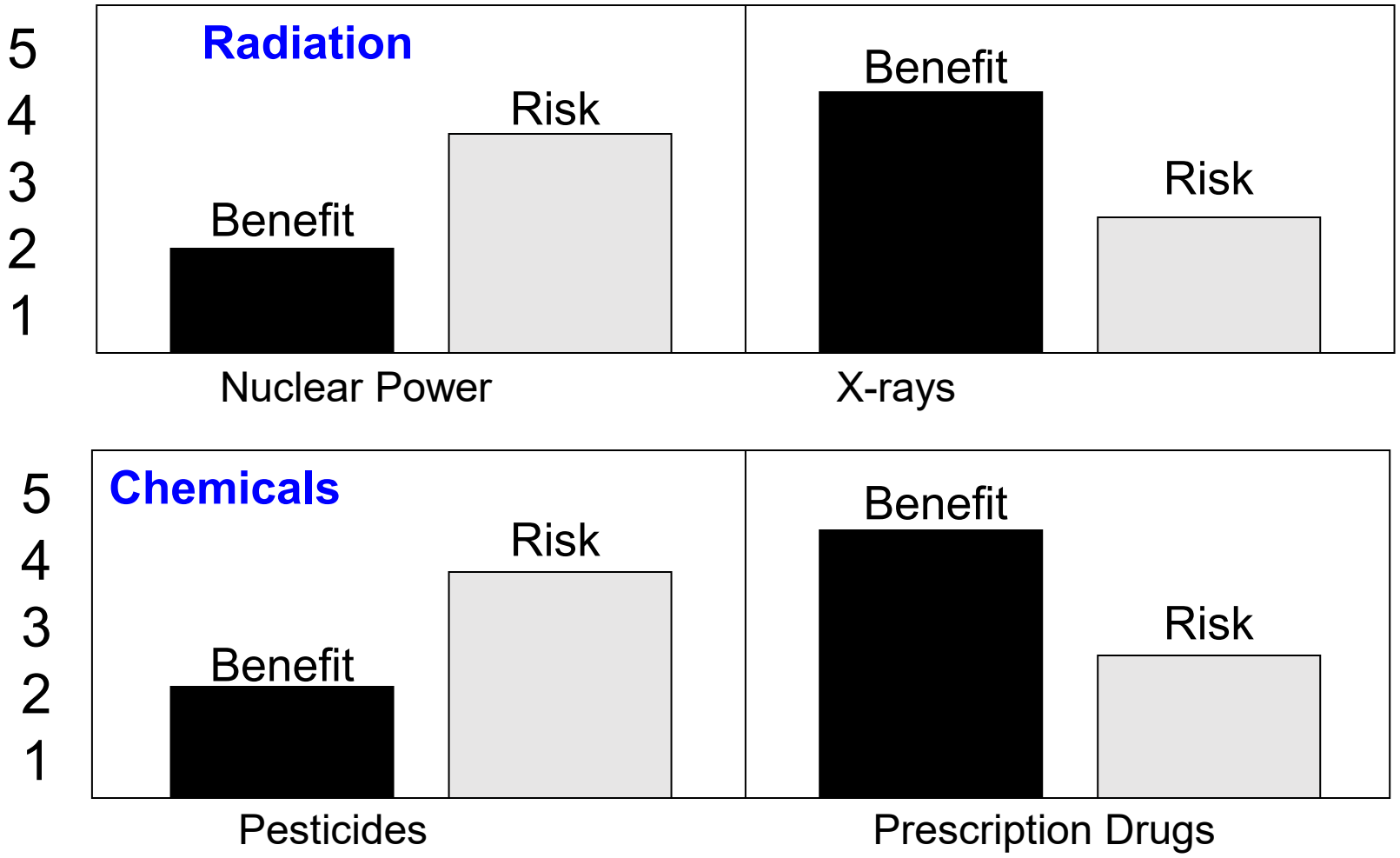


Figure 3. Mean perceived risk and perceived benefit for medical and nonmedical sources of exposure to radiation and chemicals. Each item was rated on a scale of perceived risk ranging from 1 (very low risk) to 7 (very high risk) and a scale of perceived benefit ranging from 1 (very low benefit) to 7 (very high benefit). Note that *medical sources of exposure have more favorable benefit/risk ratings* than do the nonmedical sources. 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.

Risk denial increases with perceived control

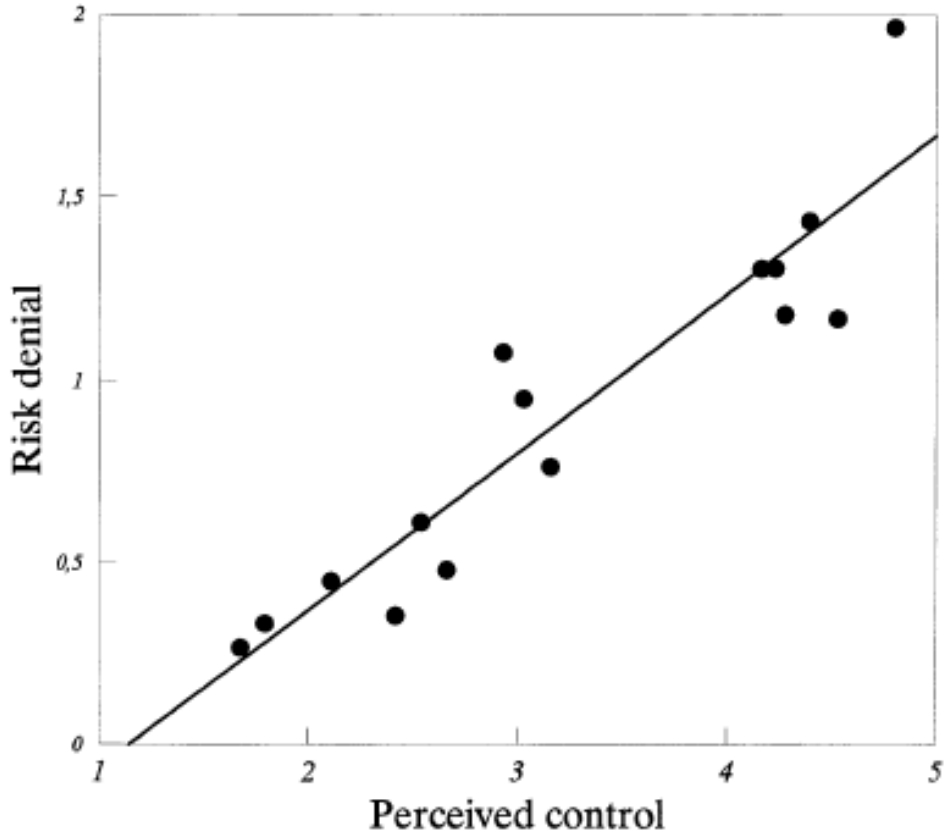
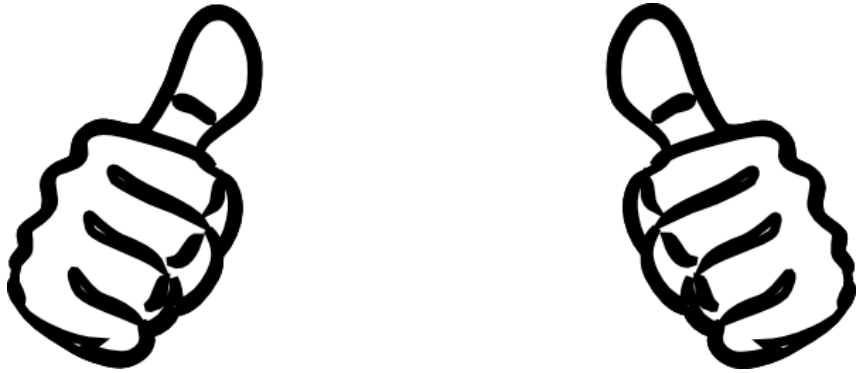


Fig. 2. Risk denial (general minus personal risk) plotted against perceived control over risks. Each point corresponds to one hazard; mean ratings are plotted.



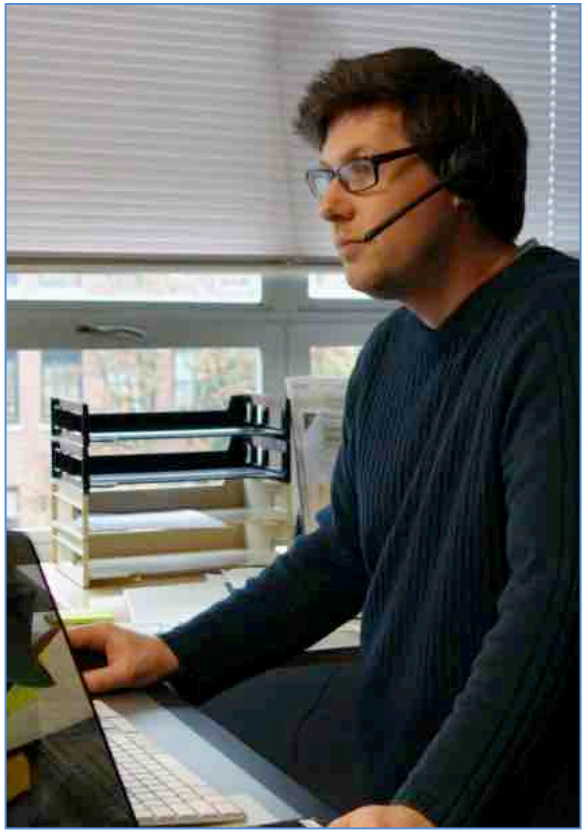
Sjoberg, L. Factors in Risk Perception. 2000. *Risk Analysis* 20:1 (pp1-11)

Ways to Minimize Exposure

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 accidently 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.
- Avoid any direct skin contact with treated areas, even after product dries.
- Use only pesticides labeled for use in outdoor residential lawns.
- Use caution mowing, edging and trimming afterwards; some pesticide residues may be irritating even after they have dried if the mower "kicks up" grass/dust containing pesticide.
- Always store pesticide products in such a manner that children will not have access.

"Disc WME"



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).

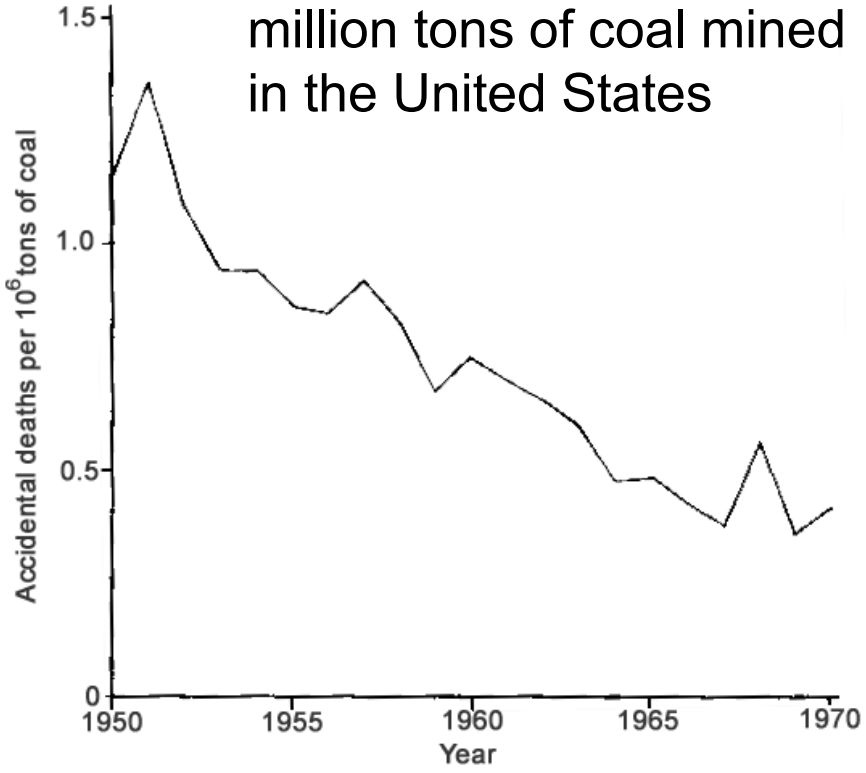
Defining risk is an exercise of power.

Paul Slovic, Decision Research and University of Oregon
November 13, 2014

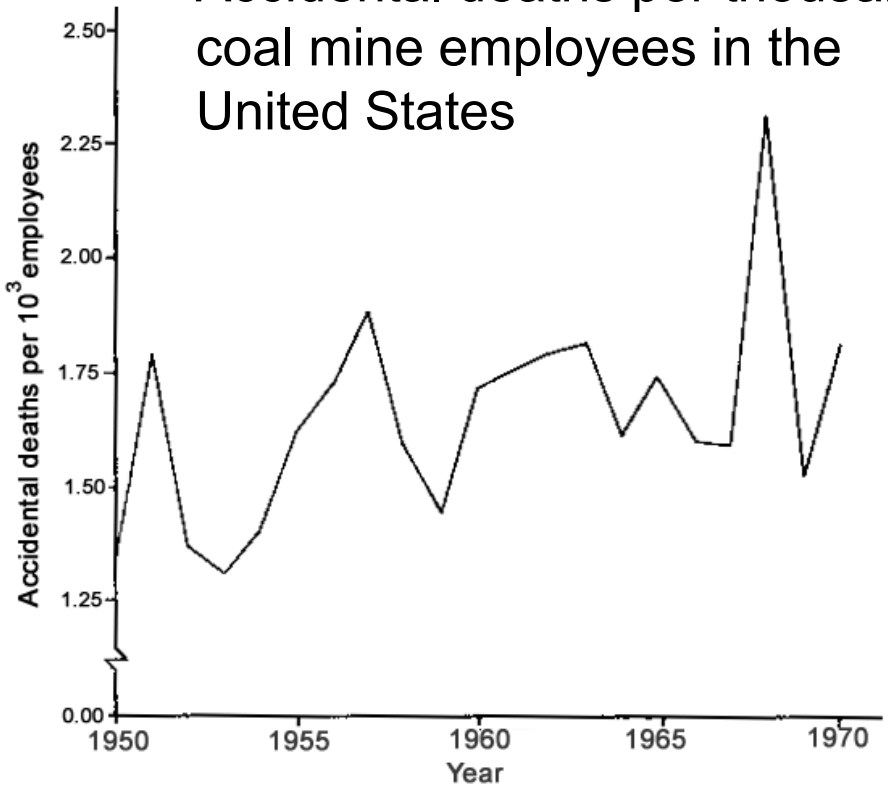
How is Risk Defined? Who Decides?

Is coal mining getting safer?

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



Accidental deaths per thousand coal mine employees in the United States



Defining risk is an act of power.

Counting *fatalities* gives equal weight to:

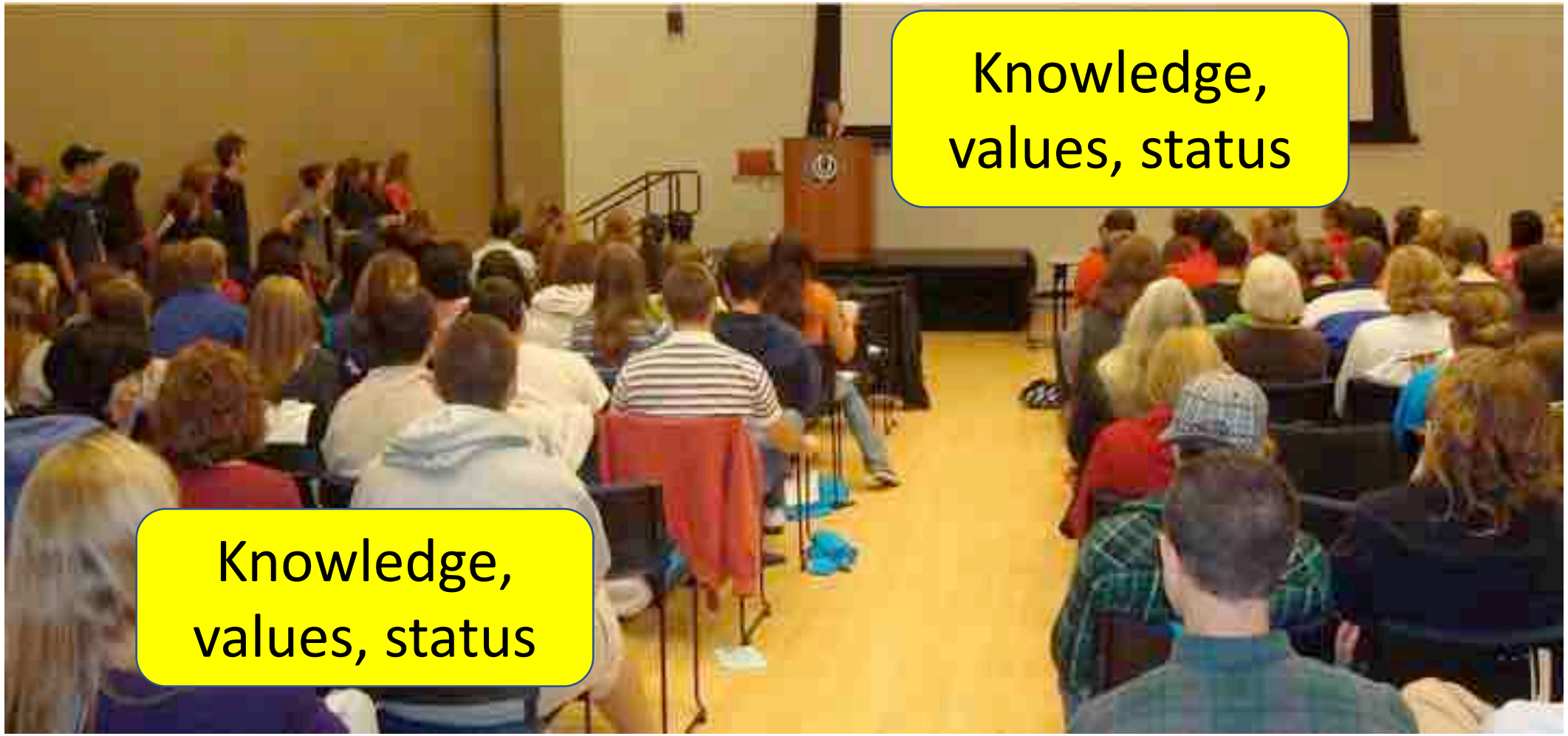
- Young and old
- Painful and painless deaths
- Voluntary and involuntary exposure(s)
- Fair (beneficial) and unfair (no benefit)

The “Deficit Model” is a Trap.

Here, have another fact sheet, video…

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

In reality, everyone has knowledge to share.



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?)

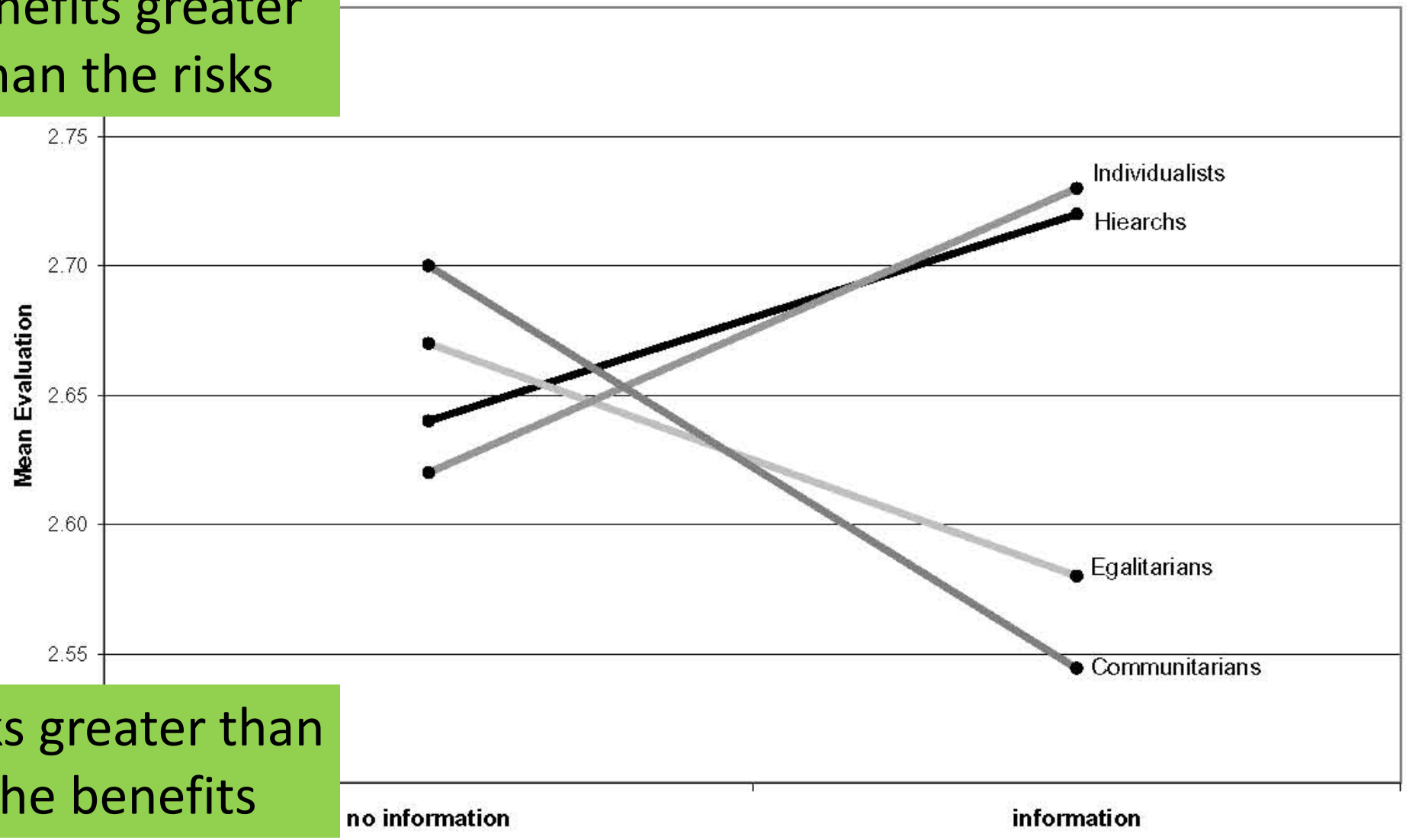
The government should stop telling people how to live their lives (Individualism)

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)

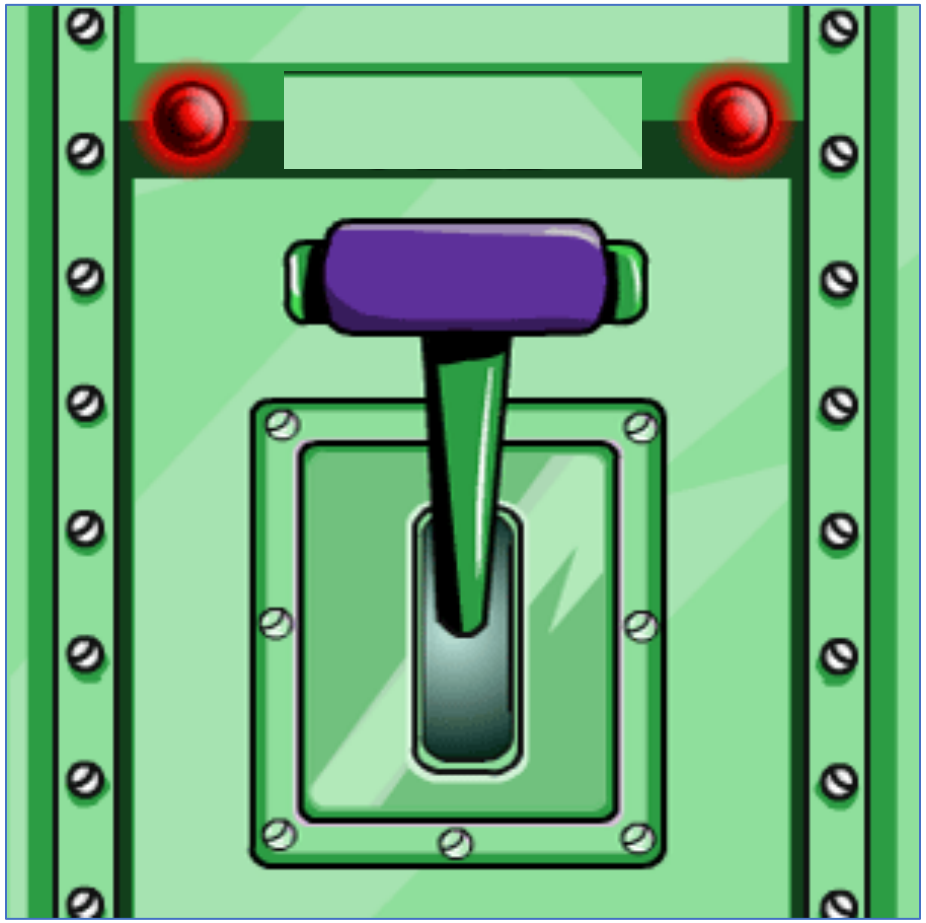
Benefits greater than the risks



Risks greater than the benefits

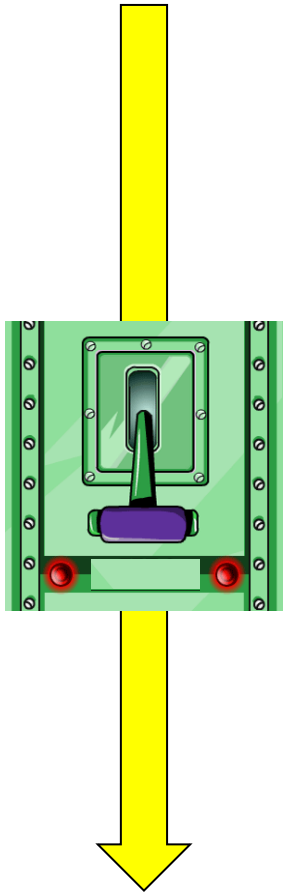
Figure 4. Impact of Information Across Condition by Dimension of Cultural Worldview

Increase perceived **benefit** and/or **control**…



Decrease perceived **risk**.

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



Voluntary ---------- Imposed

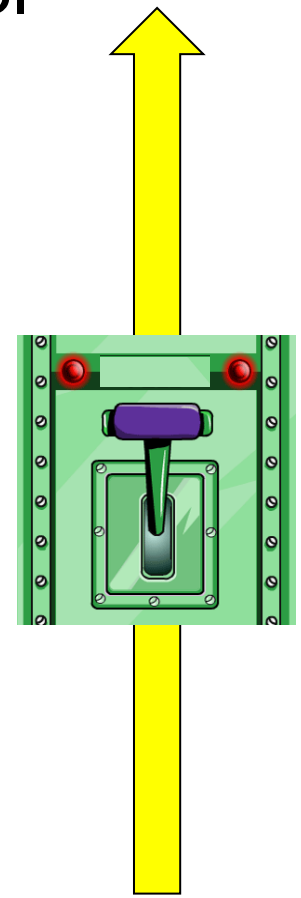
Beneficial ---------- Not beneficial

Natural ---------- Man-made

Affects only adults ---------- Affects children

Familiar ---------- Exotic

Trusted entity ---------- Untrusted entity



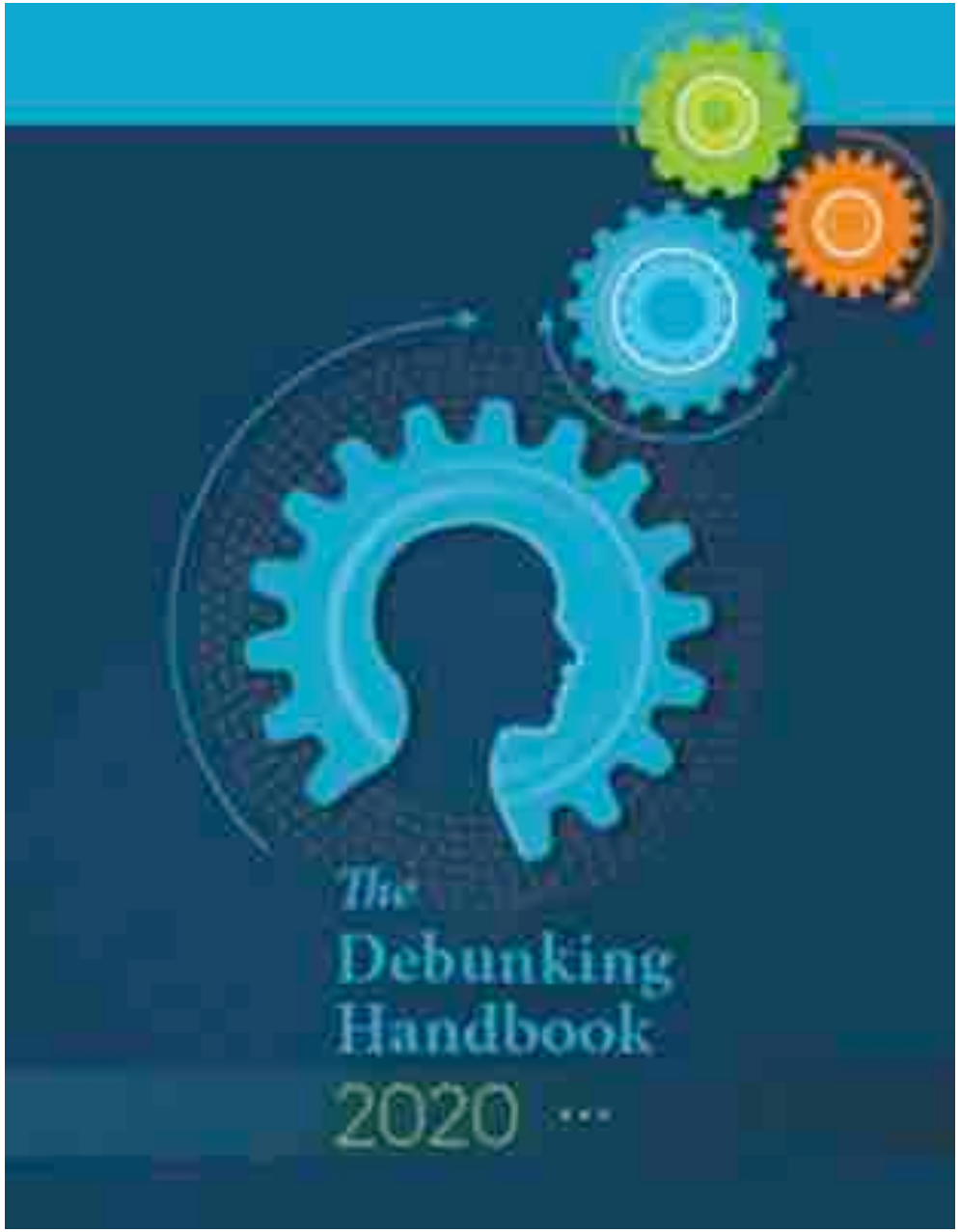
Lower risk perceived

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: _____

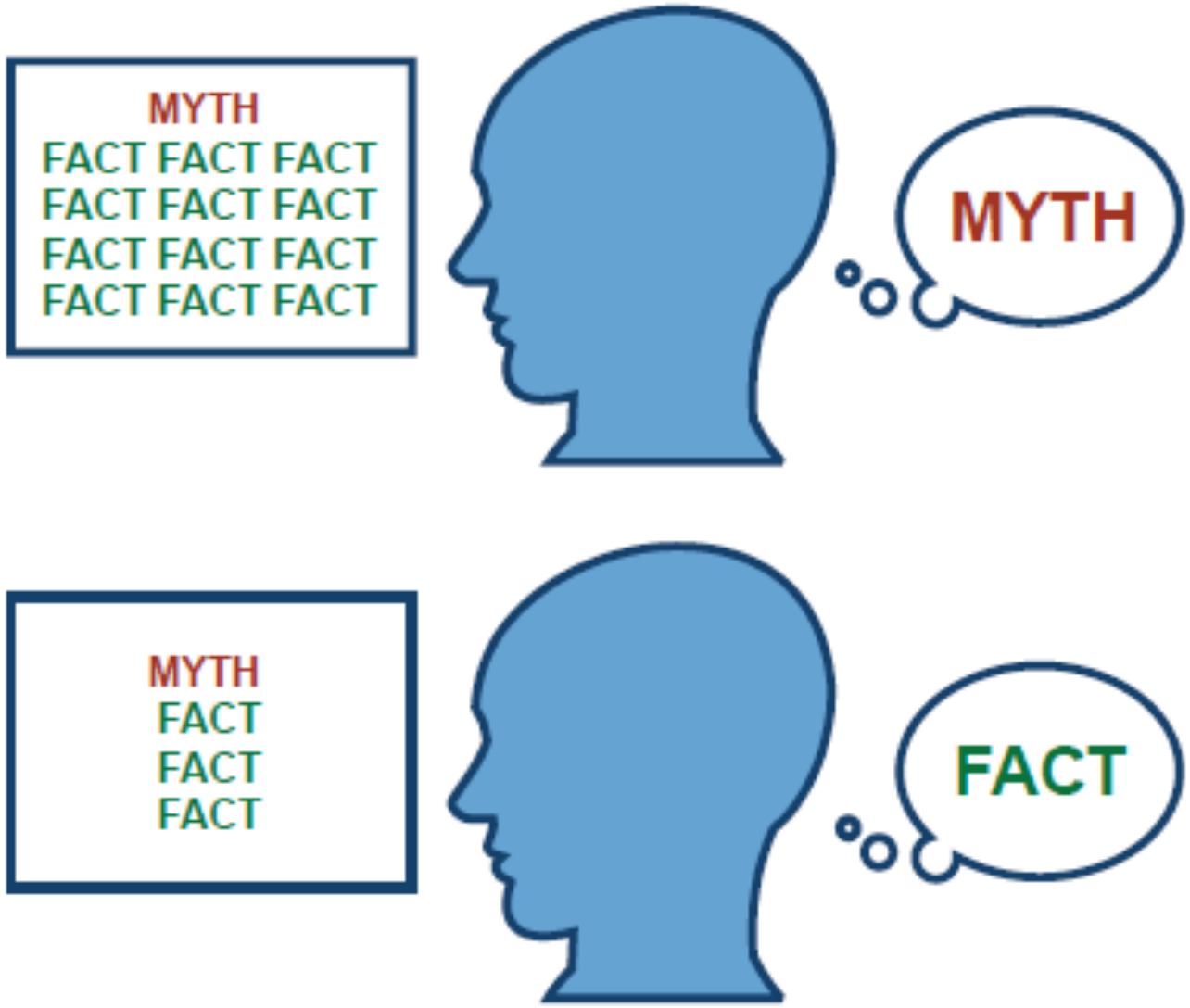


It's not just *what* people think that matters, but *how* they think.

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

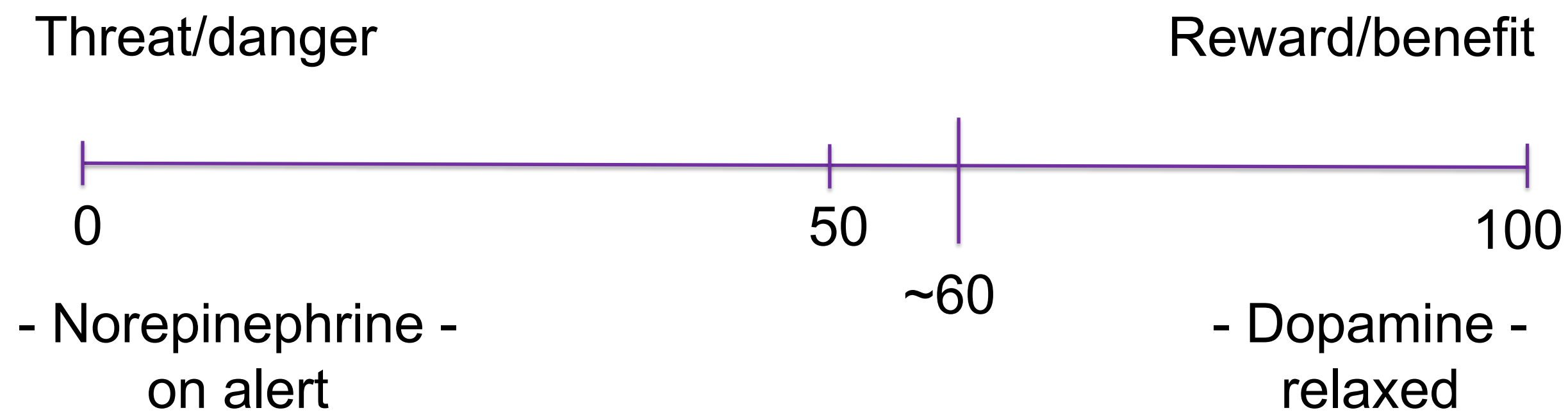
the DEBUNKING handbook

The overkill backfire effect



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]

Finding the Sweet Spot



If the focus is too much on ‘threat’, the brain (learning) shuts down.

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 pesticides 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: _____

"Extension AI" work is supported by funding from a cooperative agreement with USDA-NIFA and in partnership with the University of New Hampshire, New Technologies for Ag Extension, grant no. 2023-41595-41325 . This work includes the ExtensionBot tool that the foundation is working on in the Artificial Intelligence space. The Large Language and Embedding models used by ExtensionBot can also be utilized in other AI-based tools and services that we hope to develop and deploy in the coming months and years.

What is ExtensionBot?

ExtensionBot is a LLM Agnostic chatbot that is built and deployed by the Extension Foundation. We are working closely with Thia on the development and deployment of the technology. ExtensionBot is backed by an LLM (Large Language Model) that is trained exclusively on data provided by Cooperative Extension institutions and Ask Extension. Because ExtensionBot provides citations to Extension resources along with its responses, these responses can be verified in real-time. Our platform is built so that LLMs can quickly be retrained and replaced depending on performance and application.

Our larger goal is to build an LLM that is trained on Extension Resources from across the Cooperative Extension service. Each new institution or contributing member strengthens the LLM. In addition to asking institutions to create data dumps, we are asking they create a "data pipeline" for their data. This is an API endpoint that is updated on a regular basis so our LLM is consistently being updated.

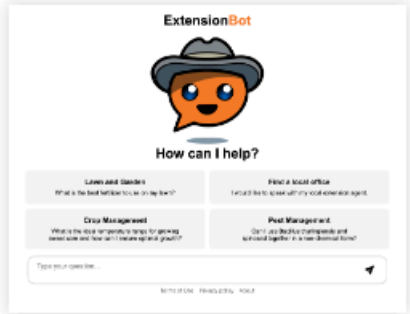
Try it out!

Experiment with ExtensionBot

FULL PAGE VERSION

WIDGET VERSION

DOCUMENTATION



Extension AI in the News

- AI in Agriculture (CAST, March 2025); You can read the summary here, or the full article HERE.
- Listen to a great use case of how Oklahoma State is using ExtensionBot.
- AI can help MSU Extension provide better help to users

- ExtensionBot Bridging AI and Agriculture

RISK COMMUNICATION

Is it Safe?

August 2025

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