

DANGEROUS AREA

**Scalding Water
Unpredictable Eruptions
Unstable Ground
Sporadic High Pollution
Sudden Temperature Changes
Broken Glass
Arsenic in the Water**

**We recommend that you
do not enter the water.**

Talking about Risk in a Hazard-Prone World

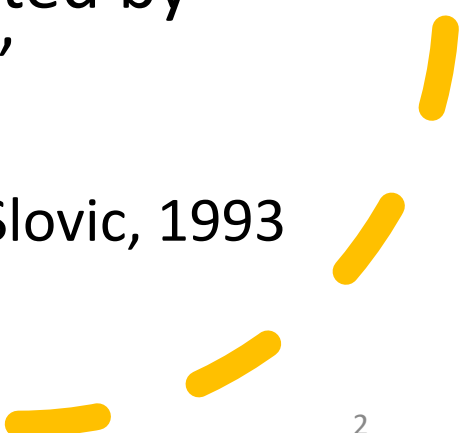
Katherine McComas|Cornell University

Alliance for Risk Assessment|Beyond Science and Decisions XVI|October 26, 2026



“During a 20-year period during which our society has grown healthier and safer on average and spent billions of dollars and immense effort to become so, the American public has become more-rather than less-concerned about risk. We have come to perceive ourselves as increasingly vulnerable to life’s hazards and to believe that our land, air, and water are more contaminated by toxic substances than ever before.”

- Paul Slovic, 1993



A large orange circle is positioned on the left side of the slide, partially cut off by the edge.

“...[R]ecognizing the need to create better risk-management processes are essential first steps toward improving the situation.”

- Paul Slovic, 1993

What is risk communication?

- An iterative process among scientists and non-scientists about risk assessment, risk characterization, risk management and risk policy.
 - Includes purposeful and unintentional messages about risk,
 - Is multi-directional,
 - Encompasses verbal and nonverbal cues, and
 - Occurs at personal, group, organizational, community, and societal levels.

Know the difference: Bad versus better risk communication

One-way *deficit* model

- Treats risk comm as the outcome of objective, expert risk assessments
- Considers lay perspectives subjective and irrational
- Seeks to align lay perspectives with those of the experts

Multiway *engagement* model

- Understands risk judgements are not limited to technical risk assessments
- Is responsive to social, cultural, and psychological factors
- Emphasizes engagement through dialogue and deliberation



Why communication is part of risk assessment

From the Red Book to *Science and Decisions*

The NRC “Red Book” (1983) separated risk assessment from risk management to protect the scientific integrity of assessment.

Understanding Risk (NRC, 1996) argued that risk characterization should come from an analytic-deliberative process. In that model, analysis and deliberation with interested and affected parties inform each other.

Science and Decisions (NRC, 2009) placed greater weight on planning, scoping, and problem formulation. It recommended designing assessments around the decisions they are meant to inform, with stakeholder involvement throughout.

Taken together, these reports describe communication as part of how assessment questions are framed, not only how conclusions are conveyed.

Communication across the risk analysis process

At each stage, choices about what is communicated, and to whom, affect how eventual conclusions are received.



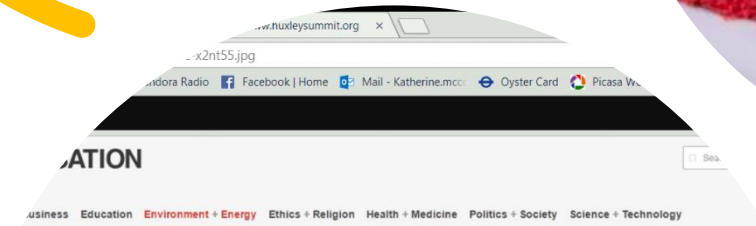
How people think about risk

- Why do scientific experts and members of the public sometimes disagree about risks?
- Why do some risks or risk events elicit strong public concern while other risks do not?
- How can we explain and predict how people will respond to risks?

Are Artificial Sweeteners Safe?

Health concerns have been mounting for decades. Here's what the research suggests.

Share full article



Consumers want in GM food labeling is simpler to think



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Disclosure statement

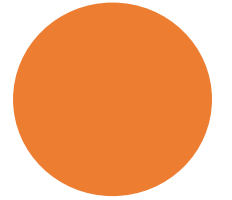
Katherine McComas is a National Science Foundation Fellow in Agriculture, and Dr.

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John

Take risk perceptions

- Risk perceptions involve individuals' subjective evaluations of risk.
- They can be informed by “objective” risk but also include other qualitative factors (see, e.g., Slovic, 1987).



Factors influencing risk perceptions

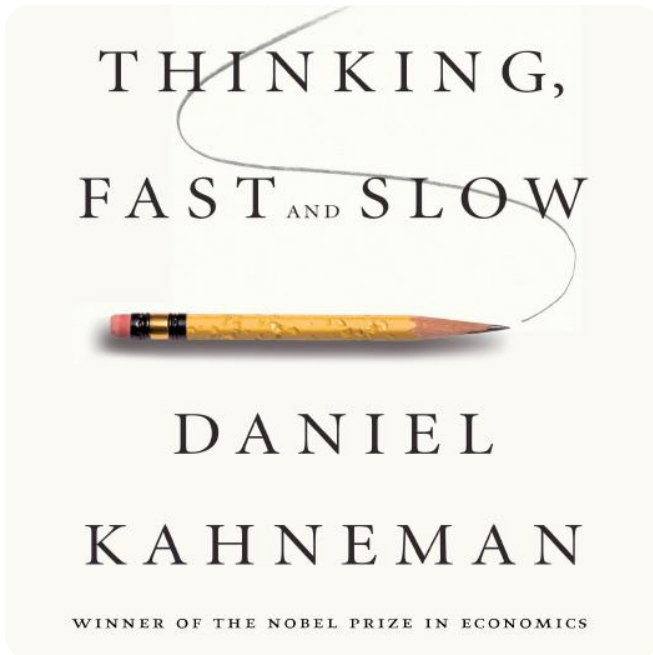
- Observable
- Knowledge of exposure
- Has immediate or delayed effects
- Known to science
- Controllable
- Dreaded (“gut reaction”)

- Equity
- Risk to future generations
- Increasing/decreasing
- Voluntariness
- Easily reduced

(Slovic, 1987)

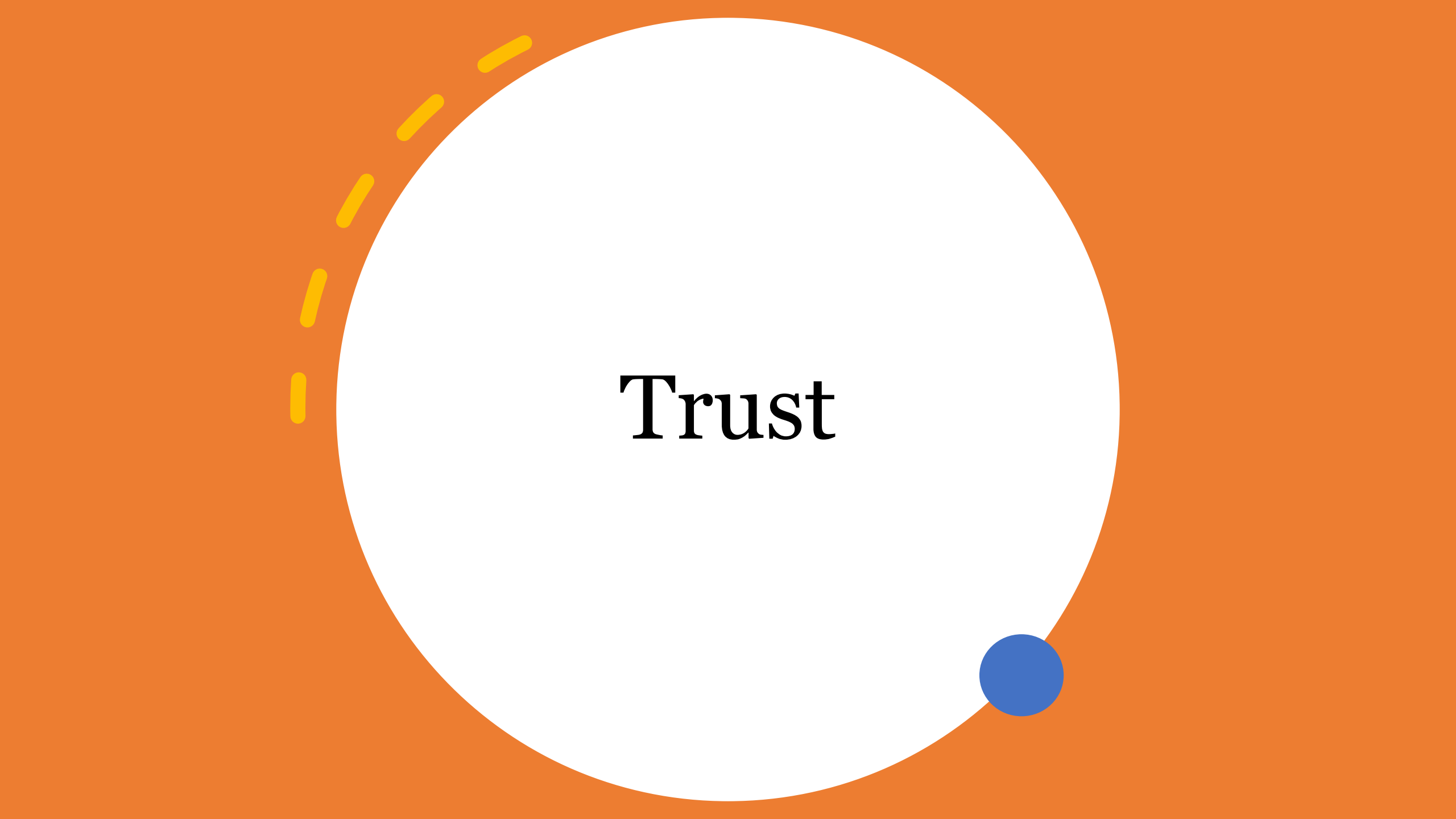
Why do risk perceptions matter?

- Understanding how people perceive risk may help communicators predict their concern and identify risk communication strategies.
 - If risk perceptions are unnecessarily high, emphasizing actions people can take to reduce or control their exposure to a risk can help.
 - If they are low, strategies can help recalibrate concern.



Heuristics and biases in risk judgments

- People often judge risks with intuitive rules of thumb rather than formal probabilistic reasoning (Tversky & Kahneman, 1974).
- These processes affect experts as well as lay audiences, particularly outside their domains of expertise.
- Some examples...
 - **Availability:** events that are easily recalled, such as recent, vivid, or widely reported ones, are judged more likely.
 - **Affect:** quick positive or negative feelings about a hazard shape perceived risks and benefits, often in opposite directions (Slovic et al., 2004).
 - **Motivated reasoning:** information is processed in ways that protect existing beliefs and group identities (Kunda, 1990; Kahan, 2012).



Trust

Factor in trust

- People will seek information from sources they trust.
- Expertise is important, yet so is caring, openness, timeliness, and respectfulness.
- People tend to trust sources they think share their values.

(see, e.g., Siegrist, Gutscher, & Earle, 2005, p. 147)



Asymmetry principle: Trust is easier lost than regained

- Negative (trust-destroying) events more visible/noticeable than positive (trust-building) events
- Negative (trust-destroying) events carry more weight than positive events
- Sources of bad (trust-destroying) news tend to be viewed as more credible than sources of good news
- Distrust tends to perpetrate distrust
 - We avoid contacts and experiences needed to overcome distrust
 - Initial distrust tends to color interpretation of events, reinforcing prior beliefs

(Slovic, 1993)

People pay attention to fairness

Does your communication build and reinforce trust?





What's new in a hazard-prone world

Trust in a polarized environment

- Trust in scientists remains moderately high in many countries (Cologna et al., 2025). In the United States, however, it has become more divided along partisan lines since 2020 (Pew Research Center).
- According to British philosopher Baroness Onora O'Neill, the goal is not simply to increase trust but to earn and demonstrate trustworthiness. What have we done to deserve trust?
- Implication for assessors: being transparent about assumptions, data selection, and judgment calls supports credibility in ways that conclusions alone cannot.

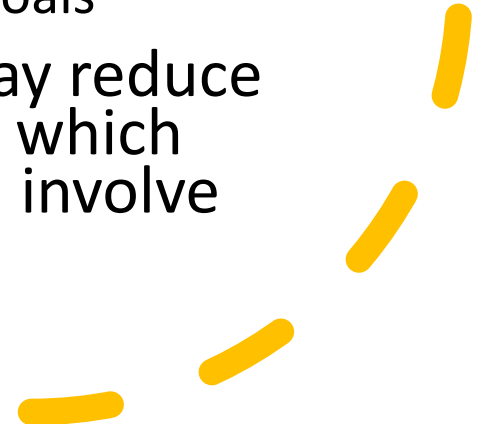


Communicating uncertainty

- Every risk assessment contains uncertainty, yet communicators often worry that acknowledging it will undermine credibility.
- Experiments suggest that numerical uncertainty (ranges, intervals) has little effect on trust in the source or the finding; vague verbal expressions may reduce trust slightly (van der Bles et al., 2019, 2020).
- People interpret verbal probability terms such as “likely” or “possible” very differently; pairing words with numbers improves consistency (Budescu et al., 2009).
- Distinguishing types of uncertainty helps: variability, data limitations, model uncertainty, and disagreement about interpreting the evidence (Fischhoff & Davis, 2014).
- So does explaining what is being done to reduce uncertainty and whether what remains matters for the decision.

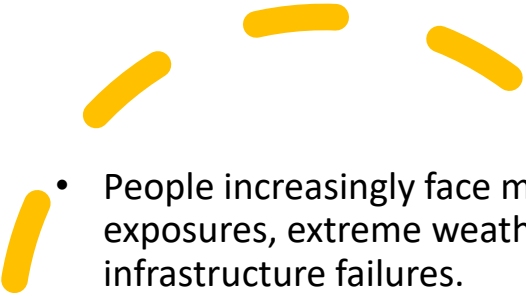
When risk assessments disagree

- Expert bodies sometimes reach different conclusions about the same agent.
- Audiences may attribute expert disagreement to complexity and uncertainty, incompetence, or bias and interests (Dieckmann et al., 2017), especially among audiences already distrustful of a source.
- Disagreement often reflects explainable differences in:
 - the question asked (hazard identification versus risk under expected exposures)
 - the evidence considered and its weighting
 - default assumptions and protection goals
- Making these differences visible may reduce perceptions of bad faith and clarify which differences are scientific and which involve values or policy.



Changing information environment

- Risk information moves through fragmented channels (social media, podcasts, online communities, interpersonal networks), where scientific and regulatory sources are one voice among many.
- Misinformation travels the same channels and often draws on familiar perception factors: dread, involuntariness, and institutional distrust.
- Corrections help but are often partial and short-lived; prebunking (inoculation) prepares audiences to recognize manipulation techniques in advance (Roozenbeek & van der Linden, 2022).
- Generative AI raises new questions of provenance and authority: it can produce plausible but inaccurate summaries of technical findings and is becoming a channel for seeking risk information.
- Implication: assessments and supporting documents may be read, excerpted, and summarized by audiences and tools assessors do not anticipate.

- 
- People increasingly face multiple, overlapping hazards: chemical exposures, extreme weather, infectious disease, and infrastructure failures.
 - Compound and cascading events challenge single-hazard approaches to both assessment and communication (Zscheischler et al., 2018).
 - *Science and Decisions* recommended greater attention to cumulative risk and to vulnerability, including nonchemical stressors and underlying health conditions (NRC, 2009).
 - Communities bearing disproportionate exposure may evaluate single-chemical assessments against their lived experience of cumulative burden. This gap shapes trust and perceived fairness.
 - Repeated exposure to risk messages across many hazards may contribute to fatigue and desensitization, which complicates efforts to communicate any single risk.



Hazard-prone world



Practical lessons for risk assessors

How audiences understand assessment outputs

- **Hazard versus risk:** hazard classifications are frequently read as statements about risk at typical exposures.
- **Reference values:** reference doses and similar benchmarks are estimates with acknowledged uncertainty. Audiences often treat them as bright lines between “safe” and “unsafe.”
- **Probabilities and numeracy:** many adults have difficulty with probabilities, small numbers, and relative risk. Absolute risks and natural frequencies are generally understood more accurately (Gigerenzer & Hoffrage, 1995; Peters, 2020).
- **“No evidence of harm”** is often heard as “evidence of no harm.”
- Anticipating these interpretations during drafting is more effective than correcting them afterward.



“Pink Slime”
vs
Lean Finely Textured Beef

Choose message elements wisely

- Graphics
- Visuals
- Statistics vs. numbers
- Comparisons
- Labels
- Frames
- Narratives/stories
- Efficacy information
- Ordering of information

...All will influence responses to risk communication.

Test messages to avoid unintended consequences

- “[P]oor risk communications can create threats larger than those posed by the risks that they describe. We should no more release an unproven communication on people than an unproven drug” (Morgan et al., 2002, p. 4).

The Effectiveness of Gateway Communications in Anti-Marijuana Campaigns

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Successful anti-marijuana messages can be hypothesized to have two types of effects, namely persuasion effects, that is, a change in people's beliefs about using marijuana, and priming effects, that is, variables such as attitude anti-drug advertisements for belief that marijuana is a gateway to other drugs.

'Just Say No' to the Gateway Theory of Pot

An interactive look at which drugs people start using right after they first use marijuana—and what that really means



Nick Adams/Routledge



Takeaways

Key takeaways

Risk communication is part of the risk analysis process, beginning with problem formulation, not a step that follows the assessment.

Risk perceptions reflect qualitative judgments, heuristics, and values, not only misunderstanding of technical information.

Trust depends on perceived fairness, openness, and shared values as well as expertise, and it is easier to lose than to rebuild.

Transparency about uncertainty and about the reasons assessments differ generally supports credibility rather than undermining it.

Communication approaches, like assessments, benefit from empirical testing and evaluation.



Thank you

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For further reading and training:

Risk Communication Research Group:
risk.comm.cornell.edu

New 3-course certificate (with Dr. Dominic Balog-Way):
Strategic Risk Communication (eCornell)

