Risk perception

Britt-Marie Drottz Sjöberg
brittds@svt.ntnu.no

ESRA Annual Meeting, Norway

June 6, 2012

Contents

RISK PERCEPTION

Background & theoretical development

Definitions & concepts

Examples

Summary

Background and theory; Experience of Risk

- Why do we experience some risks as small, and others as large?
- Why do we tolerate certain risks, but not others?
- What risks do we do something about (risk mitigation)?
- What risks do we ”accept” or ”tolerate” without discussion or protest?

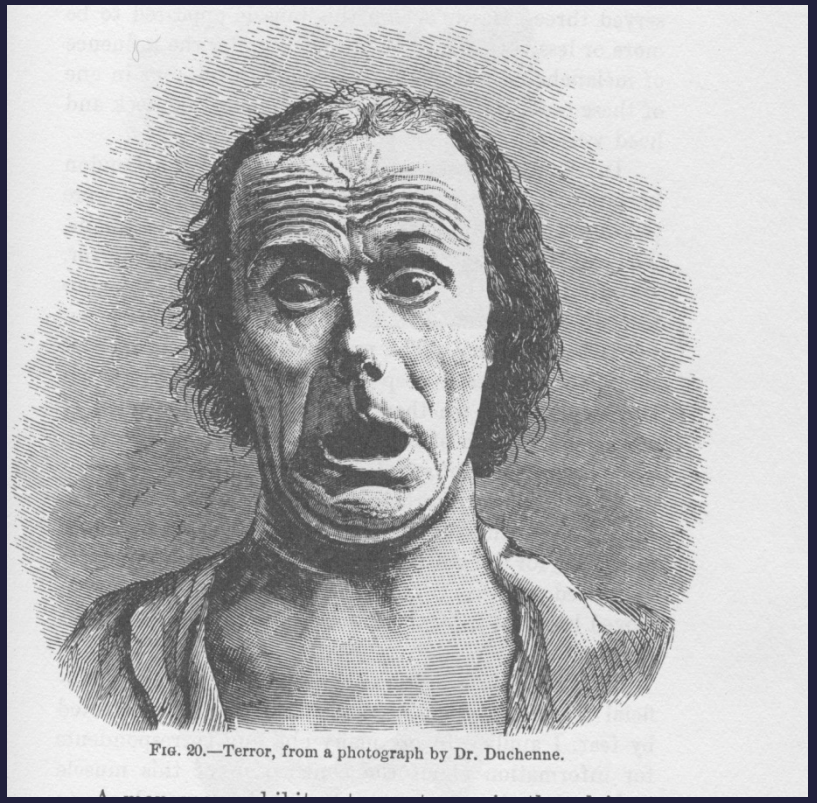
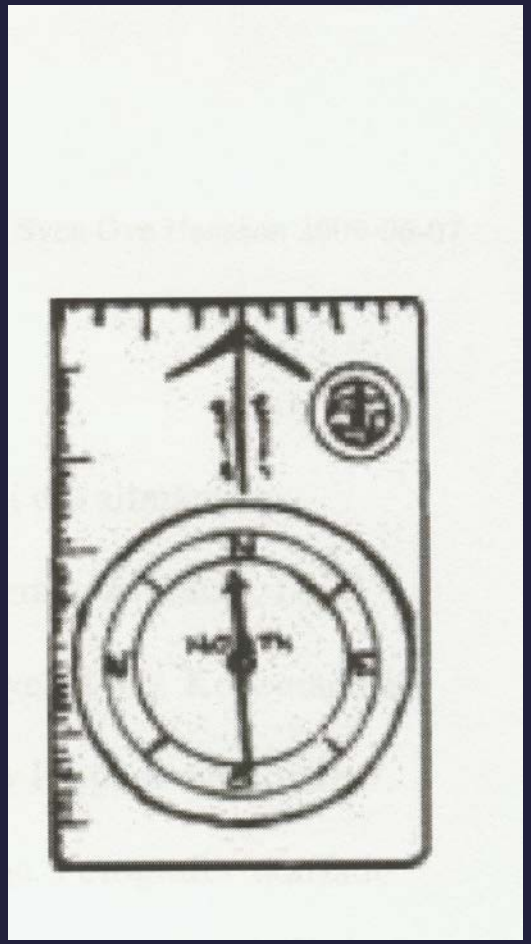


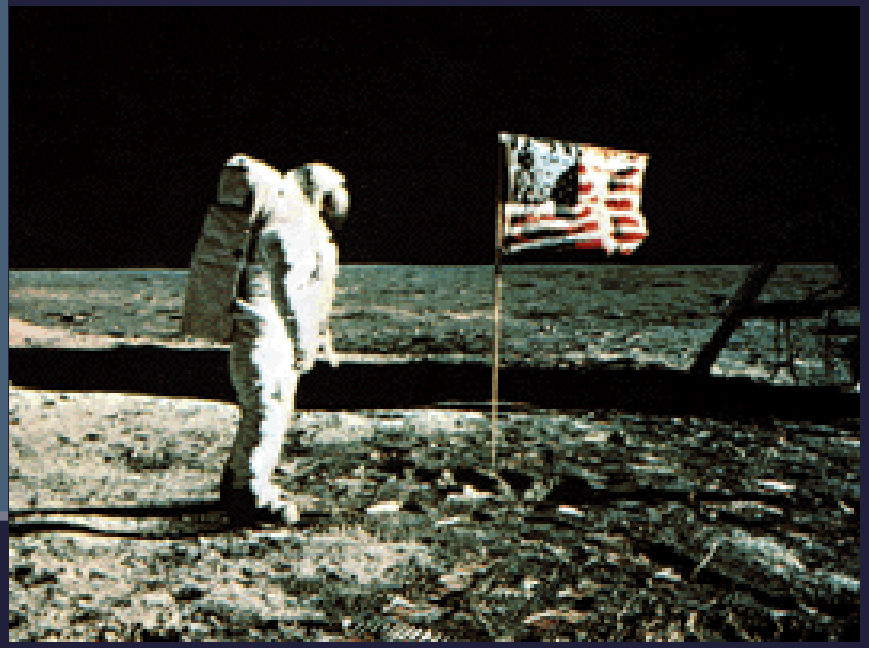
Fig. 20.—Terror, from a photograph by Dr. Duchenne.

Historic trends

- Development of risk analysis
- Rachel Carson's book"Silent spring" 1962
- Social change processes 1960-70
- "Computerization"
- Large industrial accidents, e.g. Seveso, TMI, etc.
- Demands of information
- Demands of influence

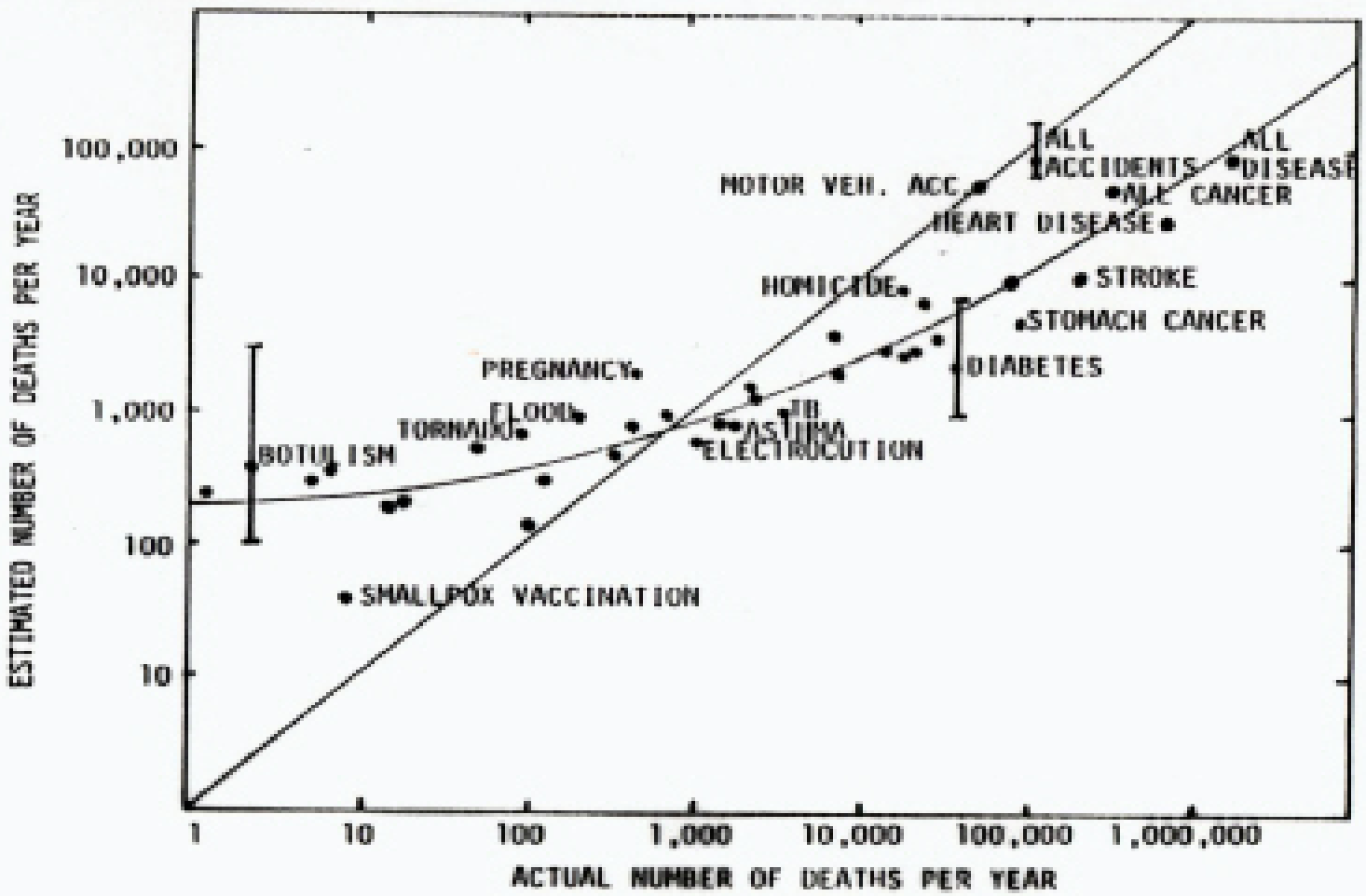


Acceptable risk?



- Chauncey Starr (Science, 1969)
  - ”Social benefit versus technological risk”
  - ”Revealed preferences”
- Voluntariness (up to 1000 times)
- Death from disease yardstick
- Social acceptance is directly influenced by public awareness of the benefits

Data Slovic, Fischhoff & Lichtenstein (1982). I *Judgement under Uncertainty: Heuristics and Biases.*



Relation mellan bedömd frekvens and faktiskt antal dödsfall per år för 41 dödsorsaker.

The psychometric paradigm

- Dread
- Novelty
- Number of affected

Groups of factors that influence perception of risk

- **Type of hazard, industry, or situation**
  - Naturalness; Potential effects; Time of onset; Detectability; Previous history, etc.
- **Related to social situation**
  - Benefits; Justice; Alternatives; Type of media coverage; Identity of victims, etc.
- **Related to methodology or study design**
  - Risk to whom? Framing effects, etc.
- **Related to individuals' characteristics**
  - Gender; Age; Knowledge, other resources

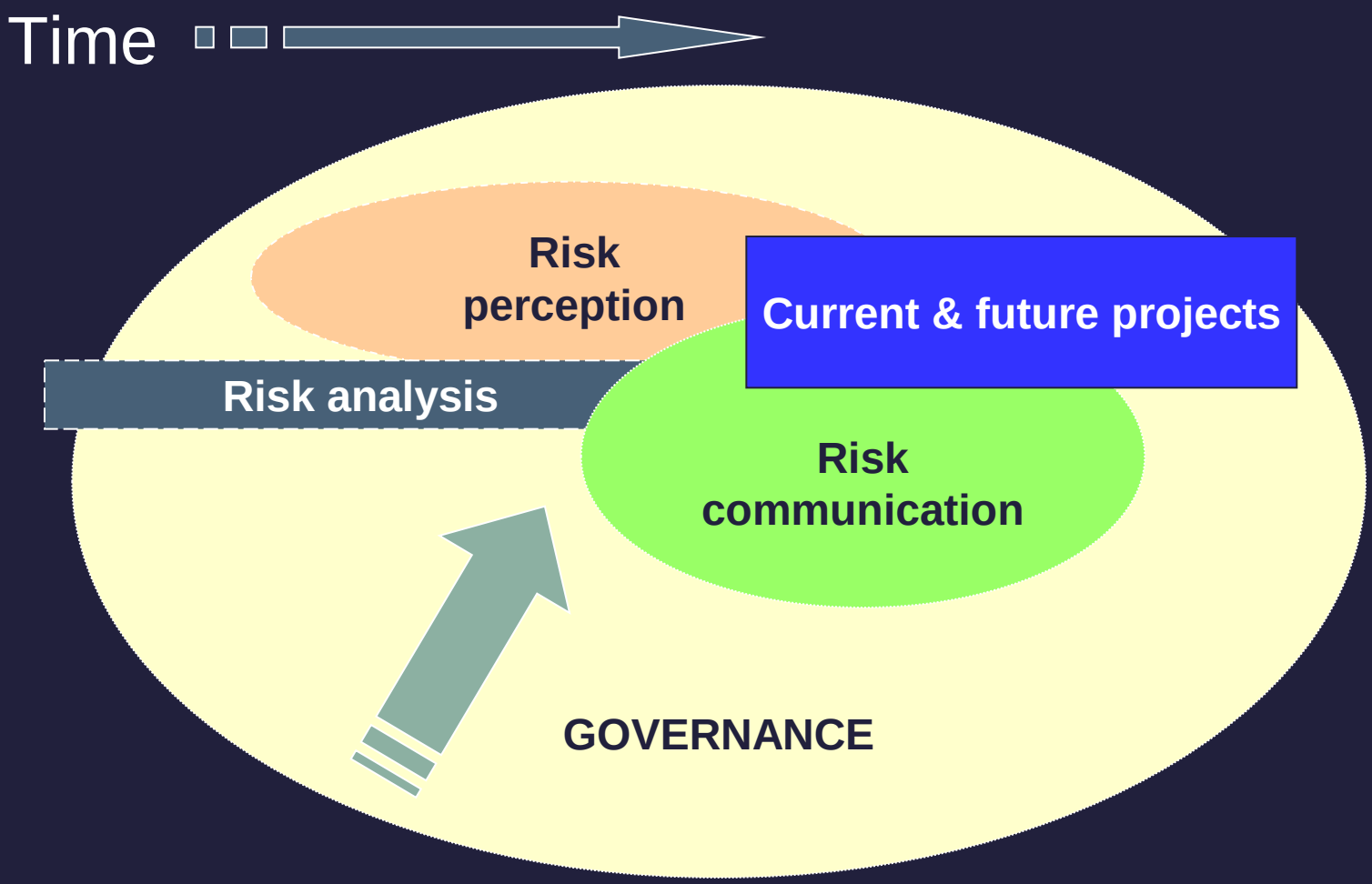
Risk
as perceived risk = Opplevd risiko

- Defined on the basis of **expressed, subjective experience** in situations where the outcome is uncertain
- Has an emotional component
- Degree of perceived risk can be measured and related to existing data, e.g. statistics
- **Risk aversion** refers to the emotional reaction of avoidance
- **Risk denial** refers to incongruent behaviour when a known hazard is grossly underestimated

Risk & emotion; Affect & cognition

- Common study contexts
  - Often related to judgments and decision-making
  - Heuristics, biases & framing
  - Risk-benefit relationships
  - Cognitive style
- General issues
  - What is emotion and cognition?
  - What comes first: emotion or cognition?
  - What is the nature of the relationship and the interactions?

Development and contents of risk research



Definitions and concepts

- Definitions: 2 main types of ”risk”
- Risk as a theoretical concept
- Perceived risk

Many terms – many meanings

- Risk (estimated – perceived)
- Chance
- Norwegian ‘Sikkerhet’
  - Safety
  - Security
  - Certainty
- Norwegian ‘Usikkerhet’
  - Uncertainty
- Norwegian ‘Trygghet’
  - Safety
  - Security
  - Confidence
- Etc.

Risk as a theoretical entity

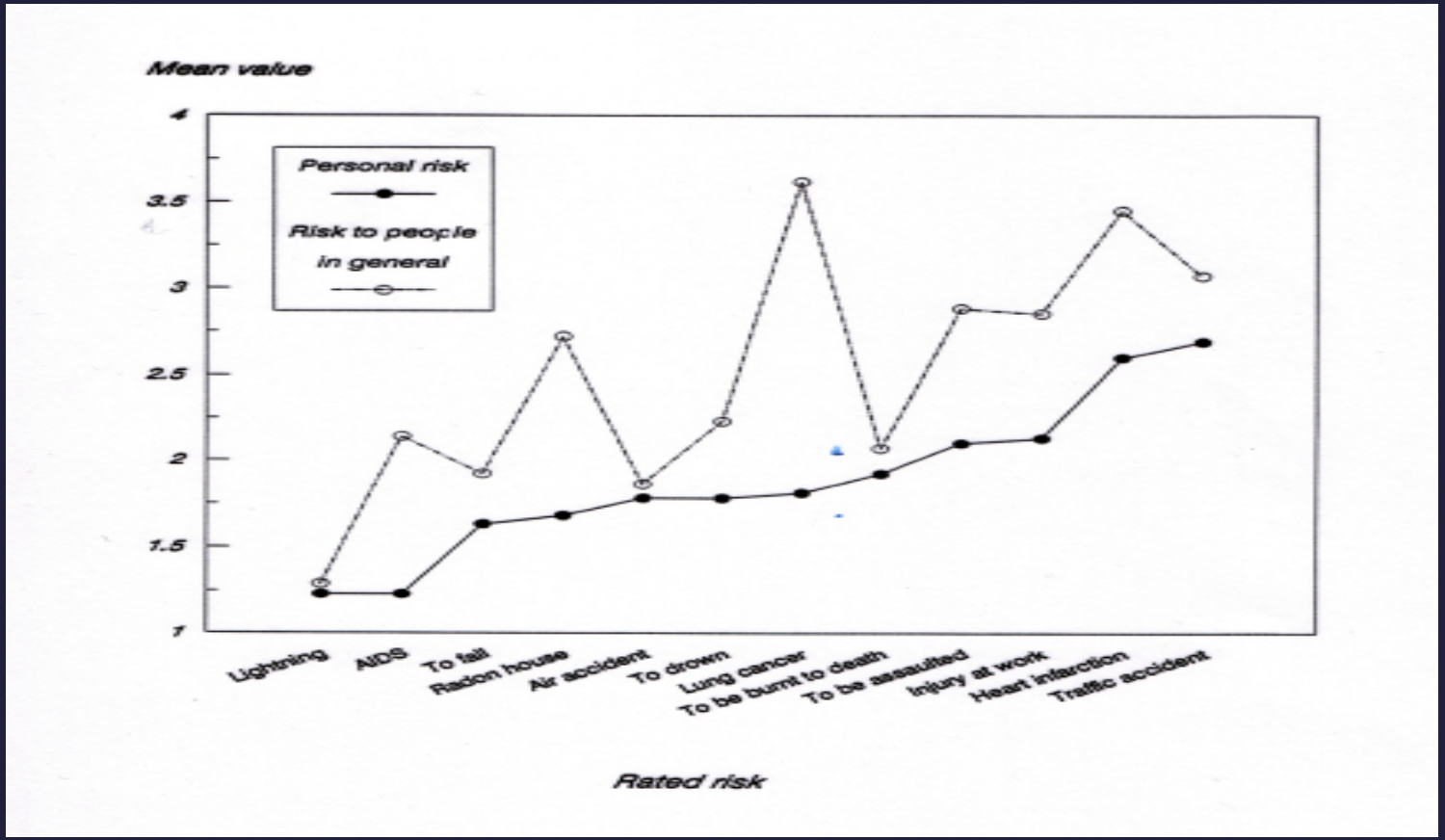
- **Risk** always involves uncertainty with respect to outcome (cf. **Chance**)
- Risk can be estimated (and) or experienced
- **Risk vs (certainty)** → cost (negative) / preference (positive)
- **Risk in decision-making and game theory**
  - Riskless choices (related to preferences; choices between positive outcomes)
  - Risky choices (decisions or choices based on probabilities)

Risk = known probabilities
Uncertainty = unknown probabilities

Visible & Invisible Dangers

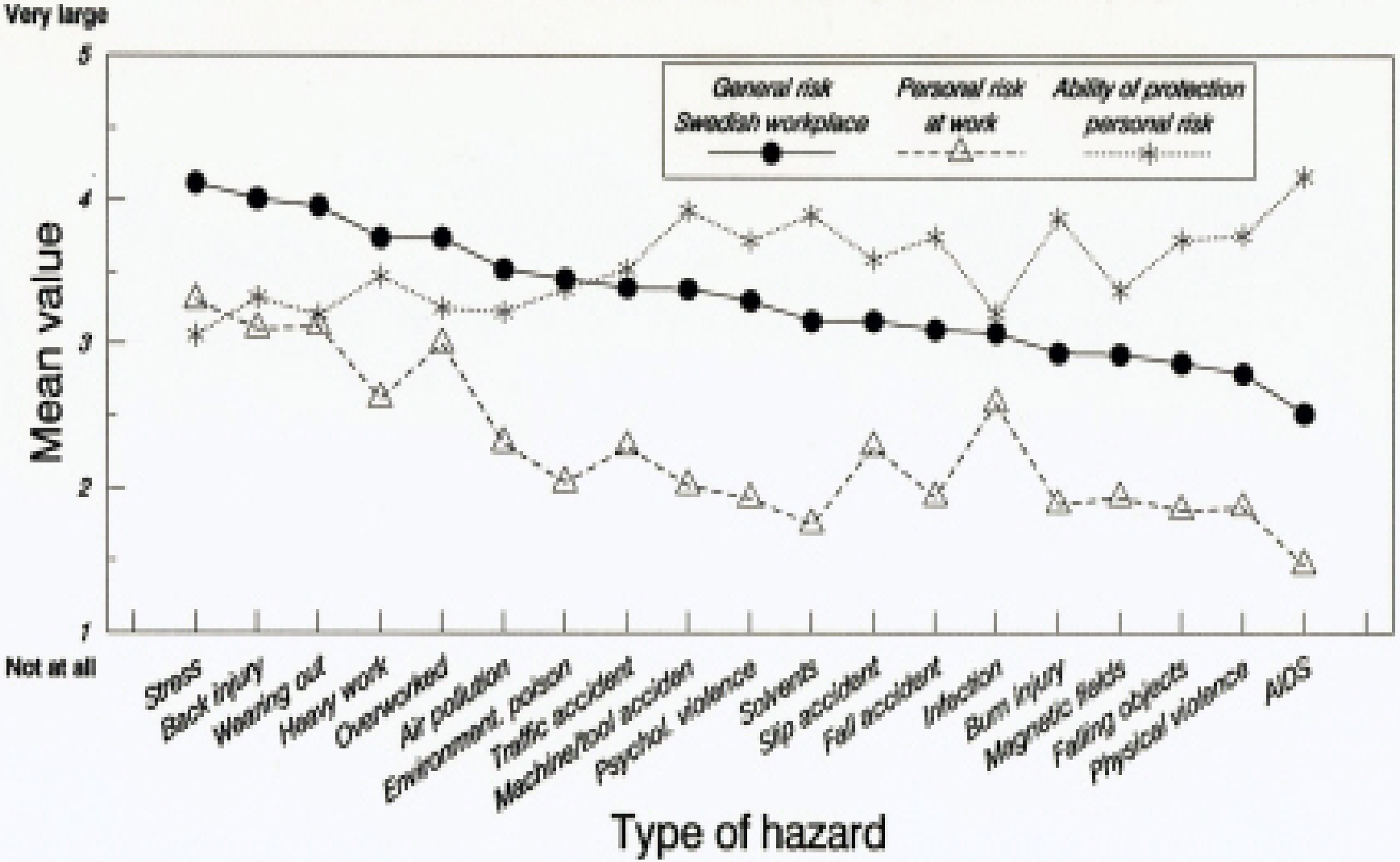
- Independent means to detect danger (e.g. by sight, smell, etc.) enhance personal control, and lessen perception of risk
- Dependence on others requires trust (e. g. information from experts, media, etc.)

Personal risk & risk to others



RATINGS OF RISK TO PEOPLE GENERALLY, RISK TO ONE-SELF, AND ABILITY TO PROTECT ONESELF

Several types of hazards, sample general Swe.pop



Perception of control and non-control (4 samples)

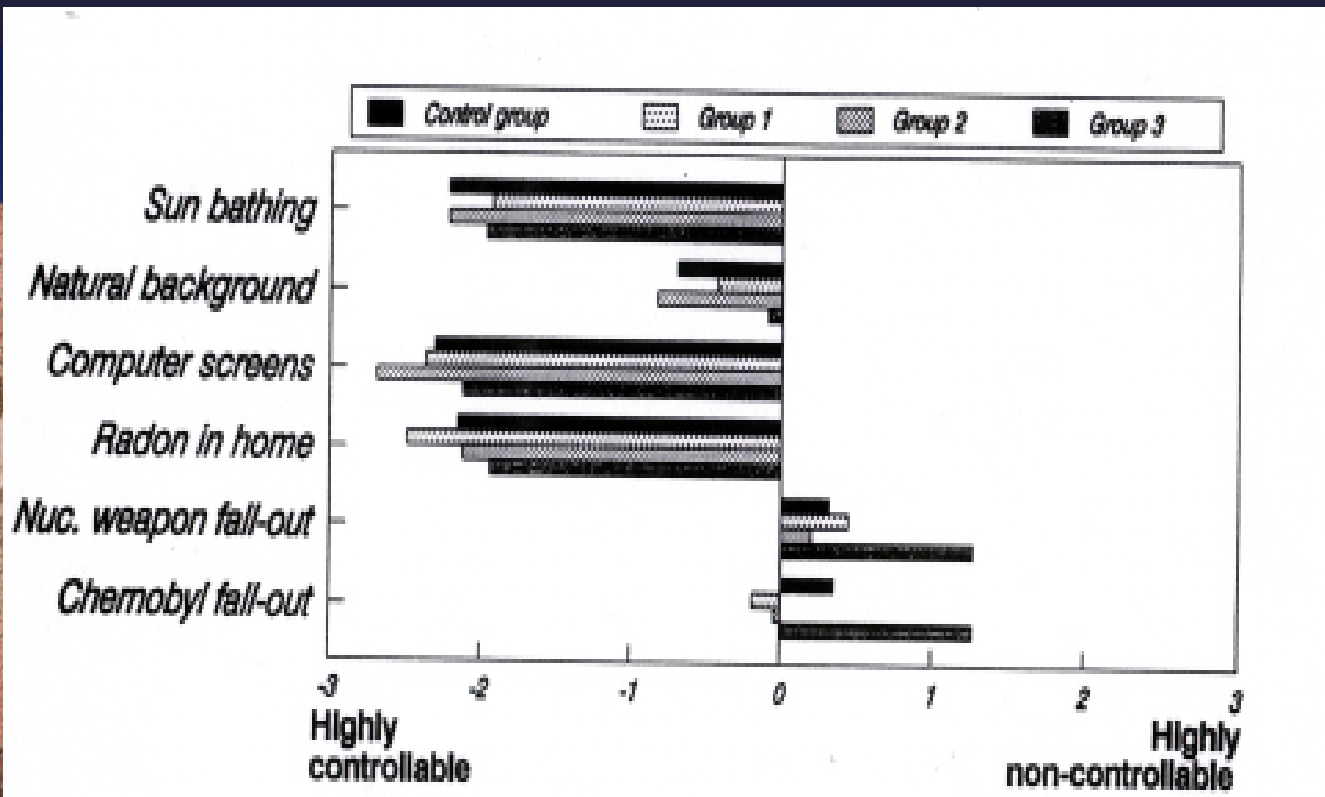


Figure 8. Mean values of the difference between rated personal risk and ability to protect one-self regarding six sources of radiation; People living in areas differently affected by radioactive fall-out from the Chernobyl accident and a control group.

Trust & Mediated Information

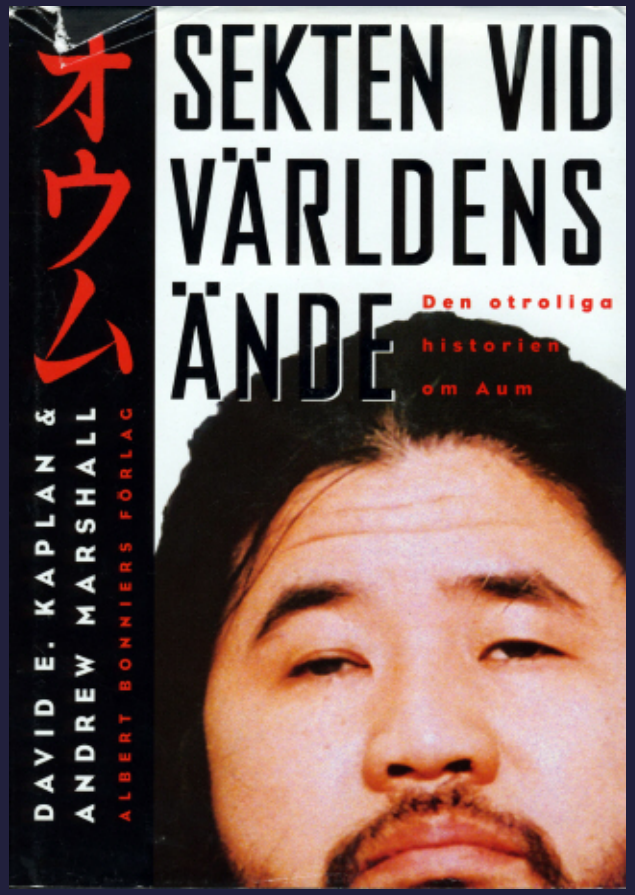
- Different kinds of trust, e. g. ”**social trust**” (trust in others, e.g. authorities) and ”**epistemic trust**” (trust or distrust in Science or type of technology that form the basis for risk management)
- Perceived risk is often more strongly related to **epistemic trust**

Trust: for better or worst

- Trust:

  Is necessary for normal functioning in society, however

- Trust can be exploited by charismatic persons to influence others to do non-acceptable deeds (e.g. Aum)



Non-intentional & intentional events

- We react more strongly to events with quick onset and large potential consequences, especially if human error is involved
- If the same event or effect was intentionally triggered we react much stronger than otherwise

Nature & natural; ”Tampering with Nature”

- Acts of God vs Man-made hazards
- Nature is usually perceived as benign
- Different perceptions of what is natural
- To ”interfere with nature” is risky

TO WHAT EXTENT ARE THE FOLLOWING EXAMPLES NATURAL OR NON-NATURAL?
RANKED by overall mean value:

Rank	Men			Women		
	Yes	?	No	Yes	?	No
1. Primeval forests	93	4	0.5	90	5	1
2. Corn-field	90	6	2	91	4	1
3. Human intelligence	85	11	1	85	9	0.8
4. Earthquake	86	6	6	79	10	7
5. Illnesses	78	13	7	68	16	11
6. Technical development	70	19	8	51	35	10
7. Insulin	47	34	16	47	32	17
8. Uranium	50	23	25	37	33	24
**********						
13. Radioactivity	35	23	40	18	23	54
14. HIV-virus	23	28	46	18	29	48
15. Human violence	24	24	49	14	19	64
16. Breeding of new dog stock	0.8	19	78	3	16	78
17. Production of new fruit by genetic change	3	19	77	1	10	86
18. Irradiation of vegetables for durability	2	13	84	0.5	8	90

Risk Ratings: Experts and the Public

Type 1. Rather good agreement, experts and public
* everyday events
* frequent media information
* personal experience # Well known

Type 2. Experts warn – low public interest
* long-term health effects
* life-styles
* personal responsibility # Private

Type 3. Experts judge risks as small – the public perceives them as large
* non-frequent events
* risk estimates based on theoretical analysis,
* modelling or extrapolation

Uncertainty; LPHC-events

Ratings by

nuclear experts (▲)
engineers (♦)
and the public (▄)

of 21 risk dimensions
of nuclear waste

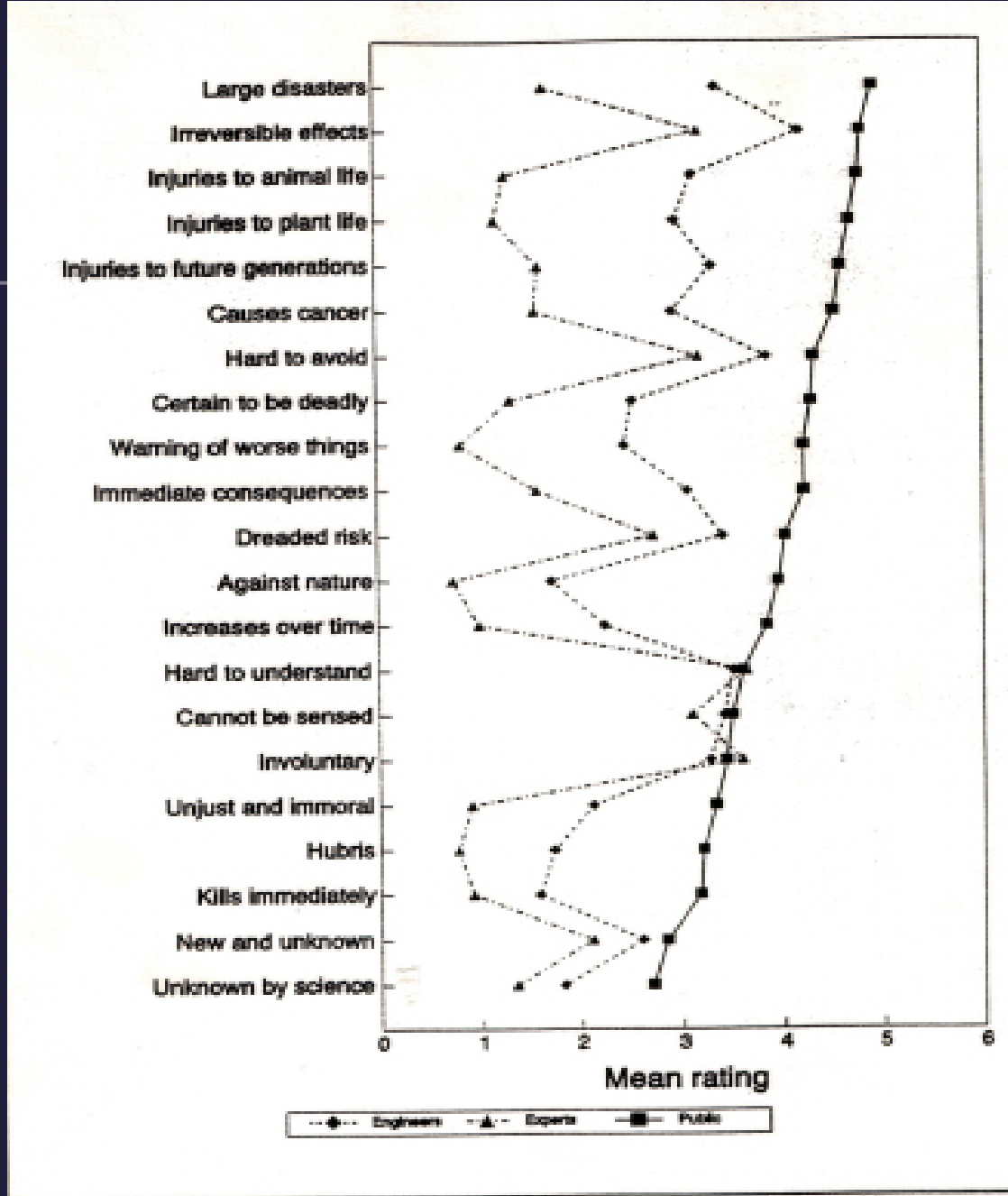


Figure 16. The 21 risk dimensions of nuclear waste judged by experts and the public.

Demand for risk reduction & risk

◊ **Perceptions of risk**

CORRELATIONS BETWEEN RISK RATINGS

	Conse-quences	Proba-bility	Risk level
		"people generally"	
Risk level	-0.067	0.966	-
Demand of risk reduction	0.813	0.093	0.169
		"personal risk"	
Risk level	-0.198	0.758	-
Demand of risk reduction	0.953	0.178	0.207

Almost there… Questions?

Overall summary

- Perceptions of risk involve many explanatory factors
- It can be measured and predicted based on more than 40 years of research in the area
- Often a difference between personal risk or risk to others
- The most affected react the strongest

Overall summary

- Personal knowledge and increased perceived control lower risk perception and worry
- We react stronger to man-made and intentional effects
- Invisible dangers are especially challenging to communicate and they require trust
- Demands for risk reduction are related to consequences (not risk level or estimate)