Differences in Expert and Lay Judgments of Radiological Risk

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In this presentation we will demonstrate that:

- Experts and the public frequently disagree when it comes to radiological risk assessment.
- Experts differ in their perceptions.
- Gaps can be bridged by socio-centric communication based on a participatory approach.

Expert and public generally differ in their perceptions of risk

- Related to nanotechnology:
  - Laypeople's risk assessment were higher than expert's.
  - Laypeople showed less trust in authorities than experts did.
  - The groups perceived similar levels of benefits.

(Siegrrist et. al, 2007)

- Related to biotechnology:
  - Laypeople perceived food and medical applications as more harmful and less useful than experts.

(Savadori et. al, 2004)

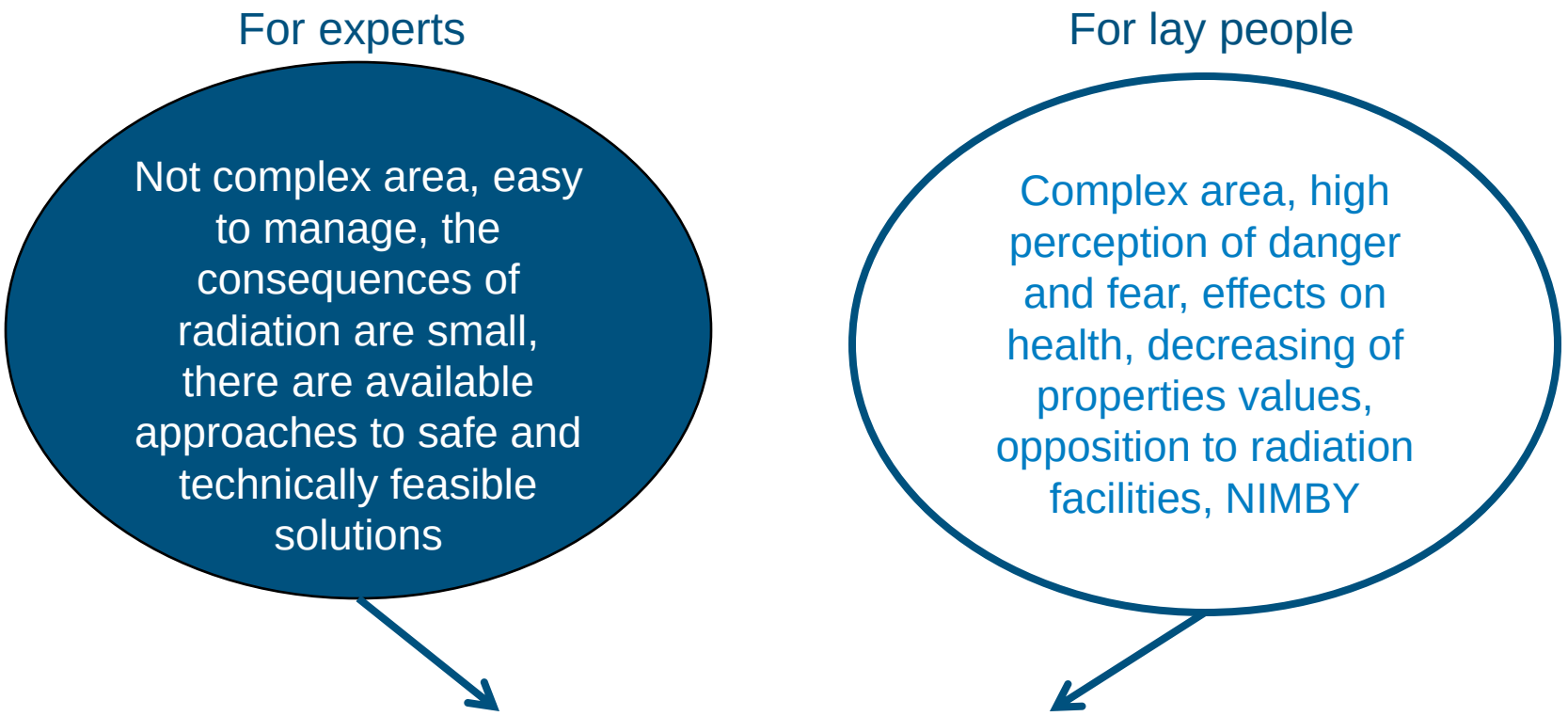
- Related to nuclear waste:

(the believes related to RP of other group):

They thought the other group saw larger risks than they in fact did.

(Sjöberg et. al, 2000)

Belief about differences in perception
nuclear waste disposal, LILW



No understanding for different views between 2 groups:
no effective and real communication!

Source: Železnik, 2009

Lack of the previous research

- Very small groups of risk assessment experts were studied.
- The experts were not topical experts in the various fields that were investigated.
- The research is based on the assumption that experts know more about the hazards of nuclear or radiological technology.
- It was assumed that experts speak with one voice.
- No empirical studies available related to emerging nuclear technologies and its risks related to the accidents.

Our study investigated:

- 5 radiological risks: an accident in a nuclear installation (also the Fukushima), natural radiation, medical X-rays and nuclear waste.
- Perceptions of professionally exposed at Belgian nuclear research installation (n=332)
  - Only people that enter the controlled zone were included (they receive special radiation-protection training, …)
- A special group related to received exposure >0.5mSv/y (n=49) was studied

All this was compared to

representative Belgian population (n=1020)

The result:
The experts and the public disagree

Proved statistically significant * differences in risk perceptions

Risk	General population (mean)	Professionally exposed (mean)
Medical X-rays	2.60	2.83
Nuclear waste	3.11	1.74
Natural radioactivity	2.54	2.27
Nuclear accident	2.95	2.00
The Fukushima	3.30	2.29

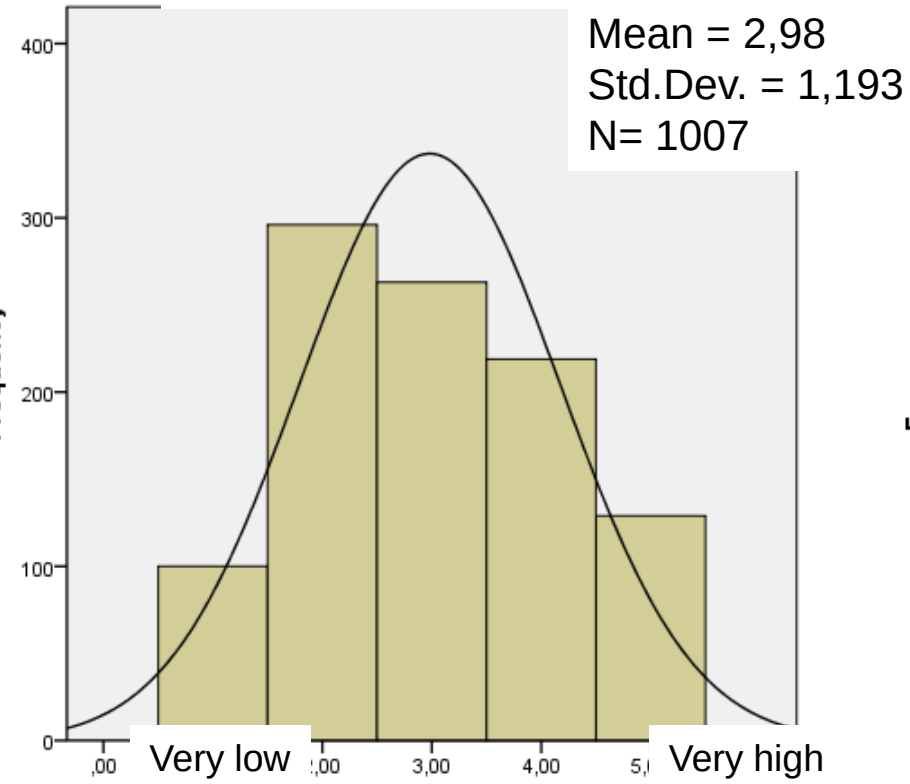
Scale:
1= Very low
5 = Very high

*The independent group t-test

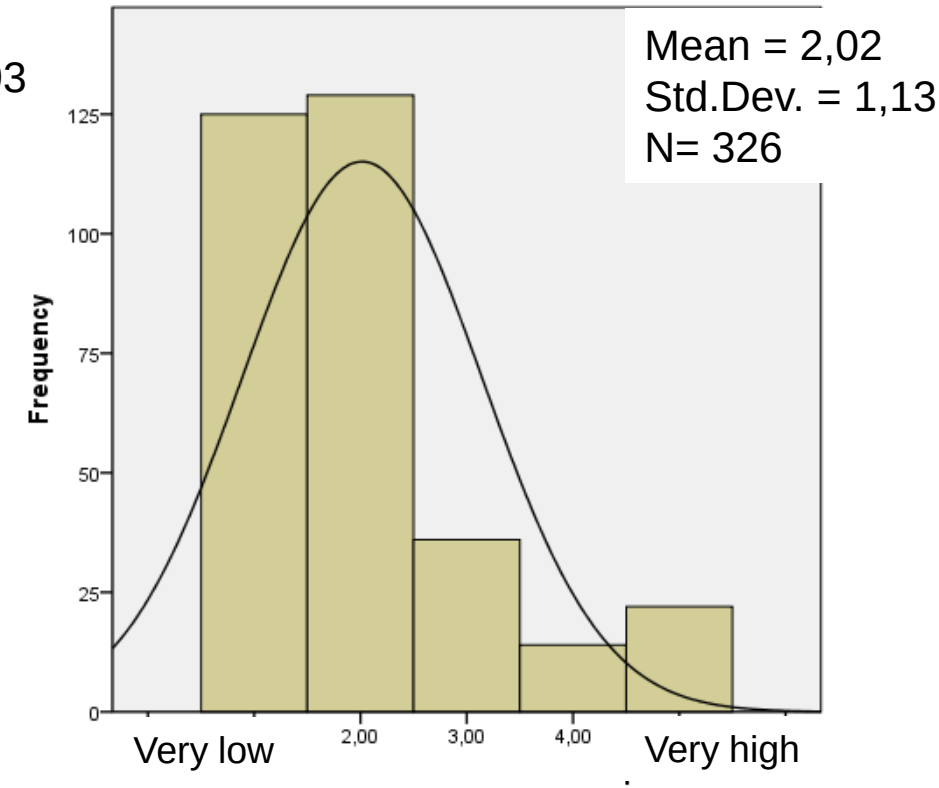
The result:
Confirmed differences in a risk perception of an accident

"How high or how low is the risks of an accident in a nuclear installation for an ordinary citizen of Belgium?"

General population



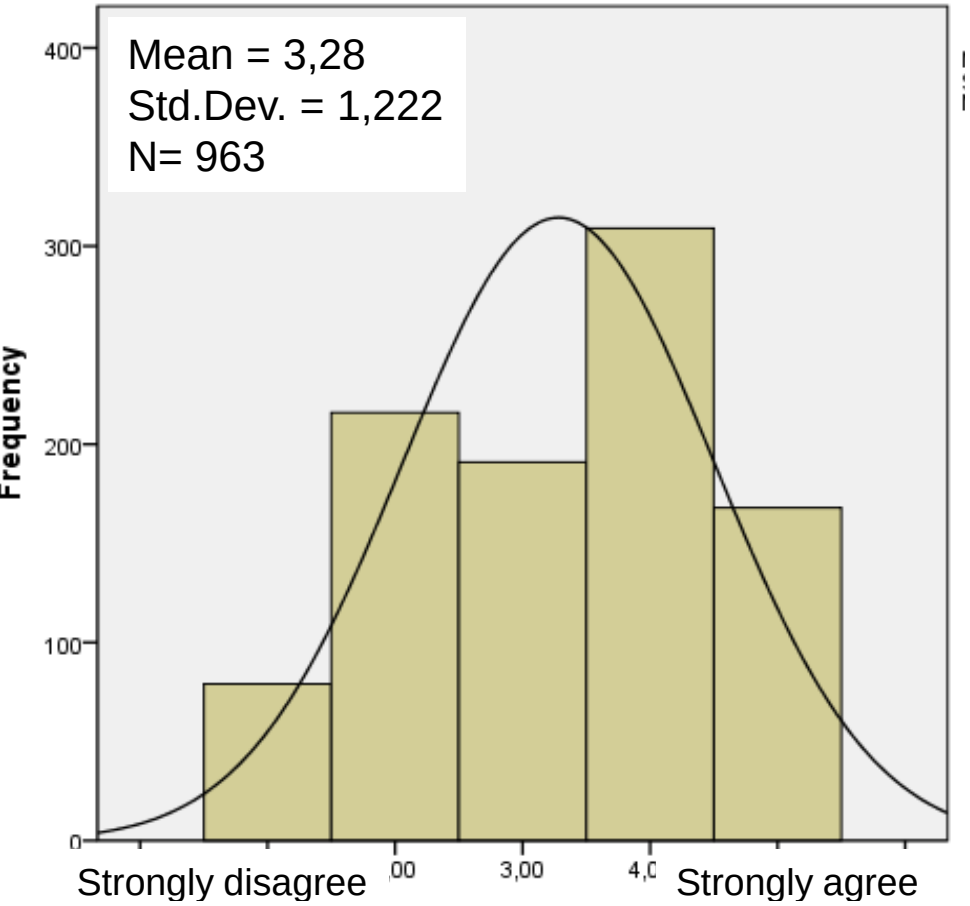
Professionally exposed



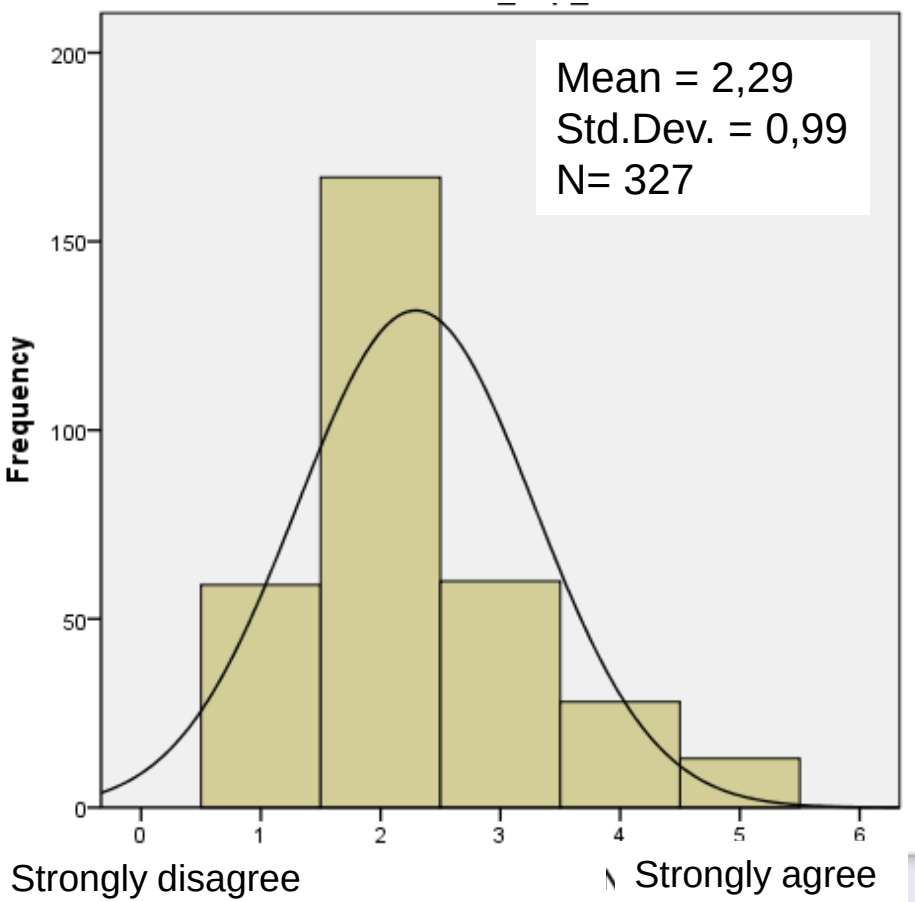
The result
Confirmed differences in risk perception of Fukushima

"What happened in Japan
makes me more worried about the dangers from BE nuclear installations"

General population



Professionally exposed



The result:
Experts don't speak with one voice

Comparison of

Professionally exposed vs.

group of those who received doses > 0.5mSv/y

The result:
Experts don't speak with one voice

Comparison of

Professionally exposed vs.

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- People with taking more radiological risk have
  - significantly lower risk perception of an accident in a nuclear installation and nuclear waste
  - are after the Fukushima nuclear accident significantly less concerned related to dangers from BE nuclear installations.

Radiological risk perception among professionally exposed influenced* by:

*Linear regression model with Factor for waste and accident; Principal Axis Factoring and Oblimin rotation; sig <0.03

Influential factors are control and familiarity

Radiological risk perception among professionally exposed influenced* by:

- I feel well protected against risks from nuclear installations -

*Linear regression model with Factor for waste and accident; Principal Axis Factoring and Oblimin rotation; sig <0.03

Influential factors are control and familiarity

Radiological risk perception among professionally exposed influenced* by:

- I feel well protected against risks from nuclear installations -
- There is sufficient control by authorities on the safety in nuclear installations in Belgium. -

*Linear regression model with Factor for waste and accident; Principal Axis Factoring and Oblimin rotation; sig <0.03

Influential factors are control and familiarity

Radiological risk perception among professionally exposed influenced* by:

- I feel well protected against risks from nuclear installations -
- There is sufficient control by authorities on the safety in nuclear installations in Belgium. -
- Number of years of experience in nuclear applications / radiation. -

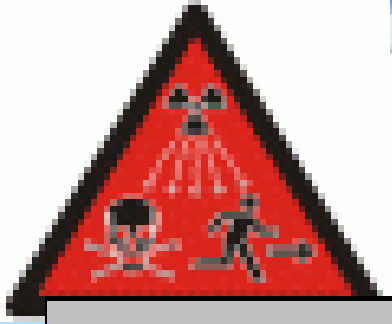
*Linear regression model with Factor for waste and accident; Principal Axis Factoring and Oblimin rotation; sig <0.03

Influential factors are control and familiarity

Radiological risk perception among professionally exposed influenced* by:

- I feel well protected against risks from nuclear installations -
- There is sufficient control by authorities on the safety in nuclear installations in Belgium. -
- Number of years of experience in nuclear applications / radiation. -
- How often are you in average professionally exposed to radiation? -

*Linear regression model with Factor for waste and accident; Principal Axis Factoring and Oblimin rotation; sig <0.03

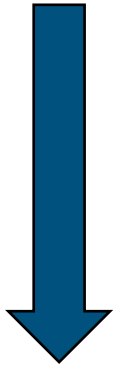


What influences radiation risks perception?

Risk characteristics	Explanation of influence	Explanatory scale	Possible communication approach
Personal control	Increases risk tolerance	controllable – not controllable	Practical and emotional involvement in risk governance.
Institutional control	Depends upon confidence in institutional performance	trust, confidence in institution	Building social and institutional trust in risk management.
Voluntariness	Increases risk tolerance	voluntary - involuntary	Stakeholder process
Familiarity	Increases risk tolerance	familiar – not familiar	Communication campaign makes it familiar
Dread / fear	Decreases risk tolerance	fear – no fear	Since feeling of helplessness triggers fear give the instruction what to do …

Slovic, 2000; Renn, 2008; Sjöberg ,2000 …

Gaps between
Expert and Lay Judgments of Radiological Risk



Can be bridged

Socio-centric communication based on a participatory approach

Opportunity for mutual learning

Knowledge Deficit Model

Experts', industries, authorities views:

- The general public should be 'educated' by 'explaining them the facts' and by assisting people to 'better understand' nuclear technology.
- "Let's educate emotional and radio-phobic people."

Emotional Deficit Model

Citizens' views:

- "We miss the recognition by industry, research and authorities of being a competent stakeholder."
- "We miss empathy."

One risk many views

- Experts often disagree, because contemporary risk issues are often ambiguous and value laden and experts can be biased due to conflicts of interest.

- People can add an important perspectives, as they have a broader conception of risk that comprises moral values.

Socio-centric risk communication is the win-win approach

Why participatory approach in risk communication?

- Scientific (factual) level of knowledge has only a limited effect.
- Mutual learning about mental model of ionizing radiation.
- Increases controllability, familiarity …
- Develops a trust between stakeholders.
- Stimulates systematic information processing.
- Shared problem ownership.

Conclusions

- Experts and the public disagree when it comes to radiological risk assessment.
- Experts differ in their perceptions and don't speak with one voice.
- Gaps can be bridged by socio-centric communication based on a participatory approach.