

Vulnerability Analysis and Risk Management for Water-Related Hazards

PART II: “Socio-economic valuation of risk perception”

Rubina Canesi
DICEA
rubina.canesi@unipd.it

Cristiano Franceschinis
TESAF
cristiano.franceschinis@unipd.it

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Content of “The sociological component of risk valuation”

1. What is risk perception and why it is important for risk management
2. Which factors influence risk perception
3. How to measure risk perception within a population
4. How can sociological and psychological theories help us understanding individuals' risk behaviour

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Risk perception

- Risk perception refers to the “*subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences*” (Sjoberg et al., 2004).
- Risk perception depends on people's judgments and evaluations of hazards they (or their facilities, or environments) are or might be exposed to.
- Such perceptions steer decisions about the acceptability of risks and are a **core influence on behaviors** (including values attached to protection management options) before, during and after a disaster.



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How to measure the seriousness of a risk for a society?

- Risk is not a physical thing: is it really possibly to perceive it?
- **Objective risk** as used in engineering approaches:
 - estimated from historical observation of frequencies and consequences
 - assuming that history + risk modelling allows us to predict the future
- **Subjective risk** (risk perception) as analyzed by social scientists:
 - risk concerns thoughts, beliefs and constructs
 - level of perceived risk is a subjective risk judgment



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Risk perception and objective risk



There may be a gap between subjective & objective views of risk...

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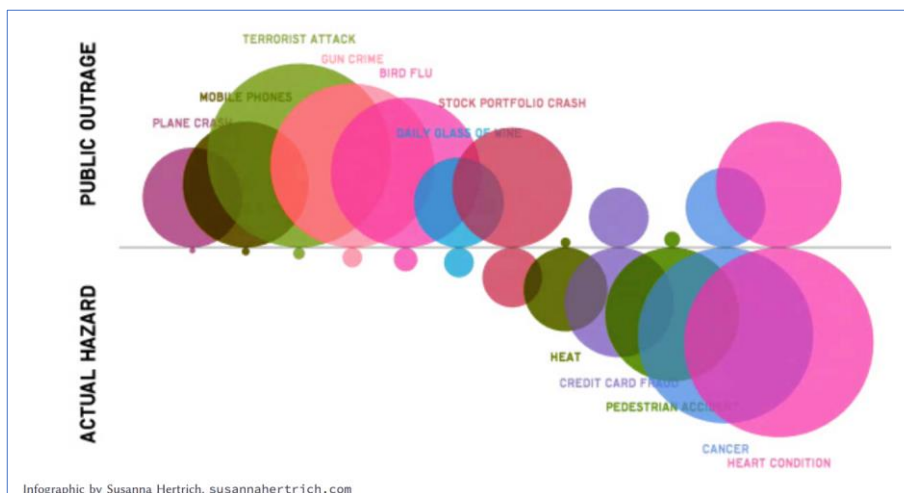
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Risk perception and actual hazards



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Risk perception and risk management

- Risk perception plays an important role in hazard risk management.
- In cases in which people have poor or no perception of a particular risk, their reaction might be inappropriate or even harmful (e.g. building houses in flood-prone areas).
- In other cases, in which the perception of risk is framed by historical and social events, risk awareness and perception are high, and people and institutions show enhanced preparedness in order to reduce potential harms.
- Literature shows that **risk perception largely influences** risk management and therefore determines **whether risk management is successful**.
- Information about risk perception in a population provides a **useful perspective for developing risk management strategies that are tailored to the local needs** of stakeholders

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Schools of thought on risk perception

Psychological approach

The psychometric paradigm: risk can be understood as a function of general properties of the risk object

Key researcher: P. Slovic

Cultural theory

Risk seen as the joint product of knowledge of the future and consent about the most desired prospects

Key researcher: M. Douglas

Social amplification of risk framework

Concerns about hazards are amplified or attenuated by social, institutional, and cultural processes

Key researcher: R. Kasperson

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The psychological approach to risk perception

- One of the earliest and most influential models in risk perception is the psychometric paradigm (Slovic, 1987).
- It is a psychological framework developed to study and explain how people perceive and evaluate risks. It also aims at understanding why people's judgments about risk often differ from scientific or statistical assessments.
- The core idea of the psychometric paradigm is that people's perceptions of risk are influenced by a variety of subjective factors, which go beyond the actual probability and severity of the risk. These factors include emotions, personal experiences, cultural values, and social influences, and can vary widely between different individuals or groups.

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The psychological approach to risk perception

- One of the earliest and most influential models in risk perception is the psychometric paradigm (Slovic, 1987). It uses psychometric scaling and multivariate techniques to explain people's reactions to hazards.
- **Risk perceptions depends on several factors:**
 - Immediacy of effect
 - Knowledge about risk by scientist
 - Knowledge about risk by exposed person
 - Control over risk
 - Newness
 - Catastrophic potential
 - Severity of consequences

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The psychometric paradigm of risk perception

- The above factors can be combined in two main dimensions: **dread** and **unknown**.
- **High dread risk**
 - Perceived lack of control, catastrophic potential, involuntary, fatal consequences are high
- **High unknown risk**
 - The hazard is not observable, effects are delayed, little scientific knowledge on the risk, unknown by those people who are exposed



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The psychometric paradigm of risk perception

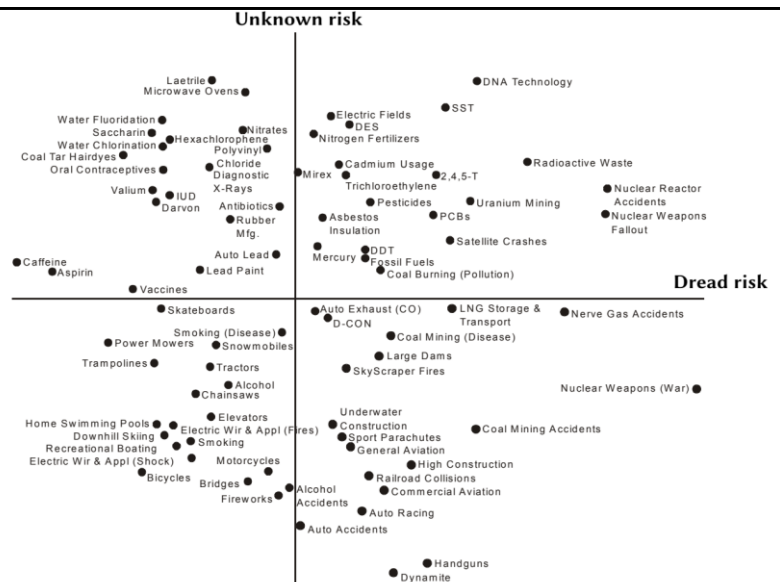
- **Risk perceptions are correlated with these two dimensions**, especially the dread dimension.
- **Hazards that are rated more highly** on the dread and unknown dimensions are perceived as **riskier and less acceptable** than those rated lower on these dimensions
- The higher the risk is judged on these two dimensions, the higher its perceived risk and the more people want to see its current **risks reduced and regulated**.



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Representation of
risk perception in the
two dimensions
(Slovic et al., 1987)



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How to measure the two dimensions within a population?

- Psychometric scales

Dimensions	Items	Average Score Each Item	Average Score for Each Domain
Dread risk perception	I am afraid of being infected	3.86±1.12	4.11±0.82
	I am afraid the people I care about will be infected	4.20±0.94	
	The pandemic is terrible	4.26±0.82	
Unknown risk perception	Not enough is known about the pandemic	4.16±0.84	3.68±0.83
	It is difficult to predict whether a person is infected or not	3.68±1.12	
	Infections that have occurred may not be accurately detected	3.22±1.18	

(Shen et al., 2022)

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Other psychological elements of risk perception: trust

- Typically, citizens have to rely on getting risk information from institutions and organizations that manage risks and communicate risks to the public.
- There is evidence that the public's **perceptions of risk** are related to whether they view these **sources of risk information and policy as credible and trustworthy**.
- The **effect of trust** and credibility on risk perceptions can also **vary depending on the agency, authority, or institution involved**.
- Trust tends to be highest for research institutes, environmental groups, and consumer groups. Government agencies and political organizations are trusted less, and industry is the least trusted source of information about risks.

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Other psychological elements of risk perception

- **Availability heuristic**: people perceive events as **more likely to occur if they are easier to bring to mind or imagine**. According to the availability heuristic, risks that people have personally experienced, that are more vivid, and that receive more media coverage are judged as more prevalent relative to equally probable risks that are less available.
- **Optimism bias**: people tend to judge themselves as **less vulnerable to risks than others**. For example, if people hear news reports of others getting into car accidents, but they themselves have never gotten in one, they will perceive their personal risk as lower than others' risk.
- People have a strong tendency to **avoid risks that kill many people at once**, compared with risks that cause the same number of fatalities over a longer period of time.
- Research has shown that people tend to **overestimate small probabilities and underestimate large ones**.

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Cultural Theory

- Theory which attempts to explain **societal conflict** concerning risks
 - Risk is a social construct where individuals assess the same dangers but come to different opinions of risk based on underlying cultural biases
- **Main concepts:**
 - Cannot account for how people perceive and understand risks without also considering the social contexts: **risk perception does not occur in a social vacuum**
 - What we perceive as dangerous, and how much risk we accept, is a function of **cultural adherence and social learning**

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Cultural theory

- Hypothesis: two dimensions have a large impact on our risk perception:
 1. **group**: it refers to the strength of an individual's **social integration** within a community. It measures how strongly people feel **connected** to or dependent on a particular social group.
 2. **grid**: refers to the level of **social regulation** in an individual's life, or how much **control society exerts** over individual behaviors and choices.

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Cultural theory: group dimension

Two different types of individuals:

Low group:

- distinct and separated individuals
- less of a sense of unity and connection

High group:

- strong sense of belonging and loyalty to their group
- placing group values and decisions above individual preferences



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Cultural theory: grid dimension

Low grid:

- less social constraint on behaviour
- they are less dependent on one another

High grid:

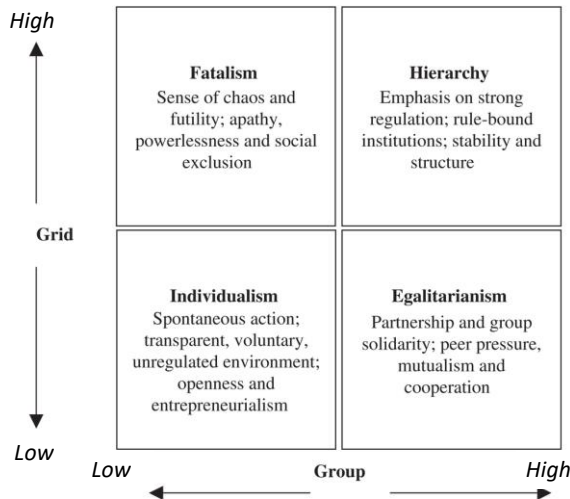
- distinct roles and positions within the group
- individuals have limited choices, and their roles and behaviours are tightly regulated



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Group-grid cultural theory



These four “ways of life” can (and often do) exist within the same nation, institution, or social group

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“Ways of life” and risk perception

For each of the four types, cultural theory offers clear hypotheses about modes of risk perception.

- People with **hierarchic orientations** are assumed to **accept risks** as long as decisions about those risks are **justified by governmental authorities or experts**.
- **Egalitarians** are assumed to **oppose risks that will inflict irreversible dangers on many people** or on future generations. They **distrust risks that are forced on them** by the decisions of a small elite of experts or governmental authorities.
- **Fatalists** try not to know and not to worry about risks that they believe they **can do nothing about**.
- **Individualists** fear mostly risks that could limit their freedom.

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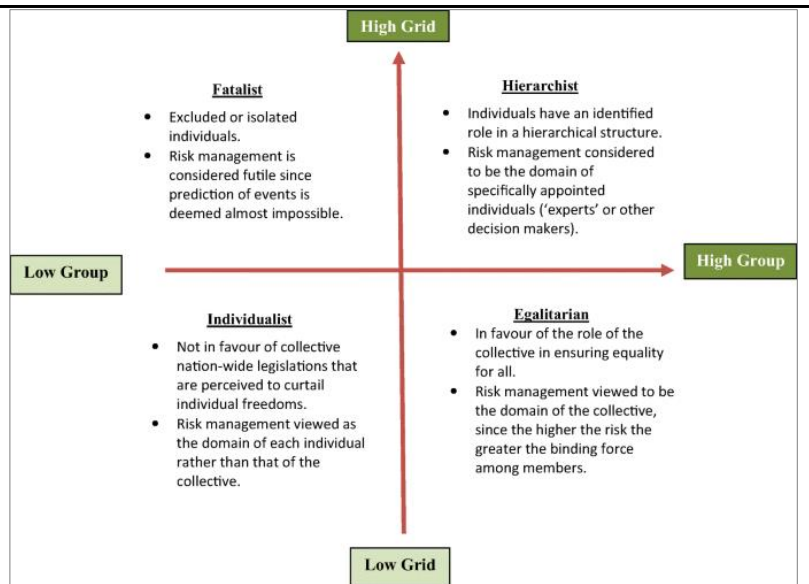
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“Ways of life” and views of risk management



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Cultural Theory and risk communication

- Effective communication is a cornerstone of hazard risk management. Messages that resonate with one cultural type may fail with another, leading to misunderstandings or resistance.
- Cultural Theory helps risk managers communicate in a way that align with the values of each group:
 - For **hierarchists**, messages might emphasize the importance of following **established guidelines and rules**, as well as the authority of the agencies involved.
 - For **individualists**, messages could highlight **personal responsibility** and emphasize how managing risk can lead to individual benefits and freedom.
 - For **egalitarians**, communication may focus on **community solidarity**, protecting vulnerable groups, and collective responsibility.
 - For **fatalists**, risk communication can be more challenging, but messages might focus on pragmatic, **low-effort ways to protect themselves**, or be framed in ways that minimize feelings of powerlessness.

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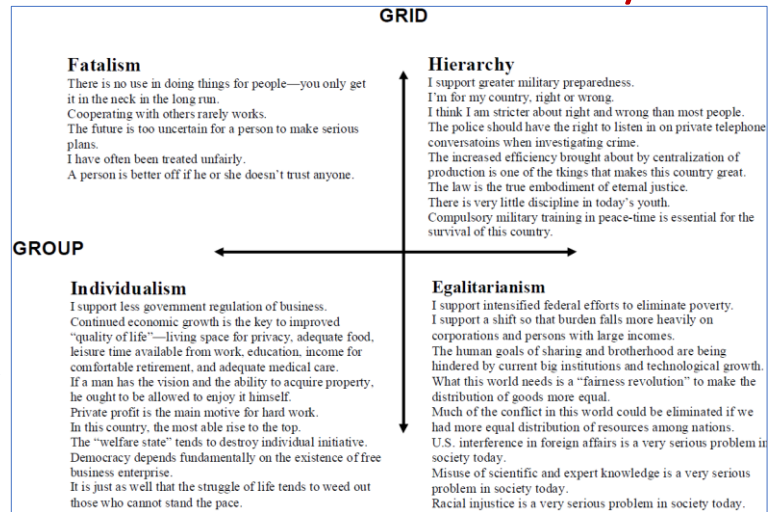


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How to measure the traits of the Cultural Theory?

1. Observation of people behavior in real settings
2. Focus groups or social experiment (at small scale)
3. Survey methods 



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Social amplification of risk

- Combines research in psychology, sociology, anthropology, and communications theory
- It is an established theoretical tool for understanding how risks are perceived, interpreted, and amplified or attenuated as they are communicated throughout a society
- Risk perception has to be understood as a communication process along a chain from the sender to the receiver, with different stations in between that may amplify or attenuate risks.
- Such stations can be social (e.g., news media), individual (e.g., attention filter), or institutional (e.g., political and social actions).

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Social amplification of risk

- Attempts to explain some social processes underlying risk perception and response:
 1. **risk amplification**: some hazards that experts rank as low risk become a focus of public concern (e.g. terrorist threats to western societies, mad cow disease)
 2. **risk attenuation**: other hazards that experts rank as more serious receive less public attention (e.g. radon exposure, smoking, car accidents)
- In cases of the first type minor incidents are magnified by press coverage and public reaction, while in cases of the second type a major development goes almost unreported.

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