

# Risk perception

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# Context



- ▷ Society spends more and more time and money to make life safer and healthier
- ▷ The public becomes increasingly concerned about risks
- ▷ People believe that things are getting worse rather than better
- ▷ Firms and scientists criticize the public for its “irrational” fears

# What is risk perception?

- ▷ Risk is not a physical thing: is it really possible 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** as analyzed by social scientists:
  - risk concerns thoughts, beliefs and constructs
  - level of perceived risk is a subjective risk judgment

*Subjective (dictionary): modified or affected by personal views, experience, or background*



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

# What is risk perception?

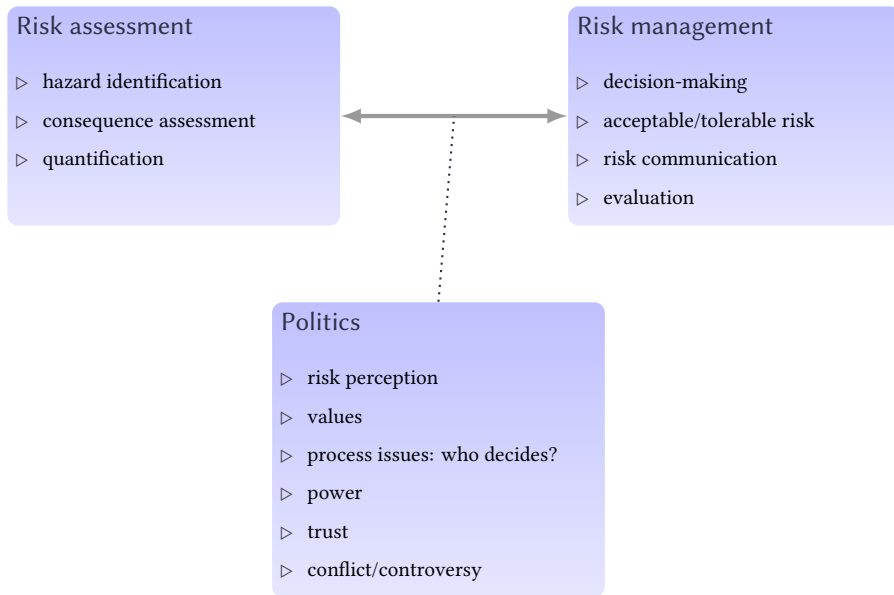
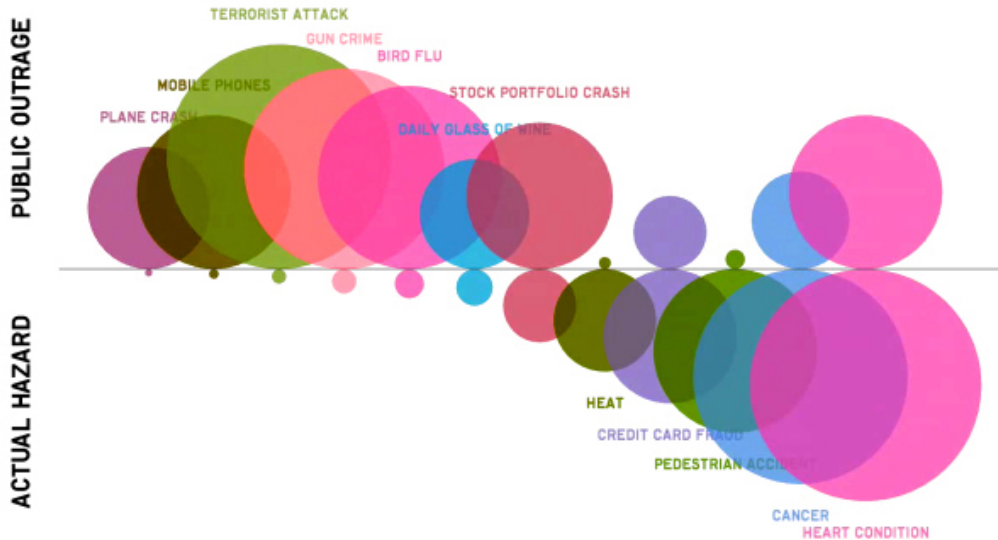


Figure adapted from P. Slovic

# Risk perception and actual hazards



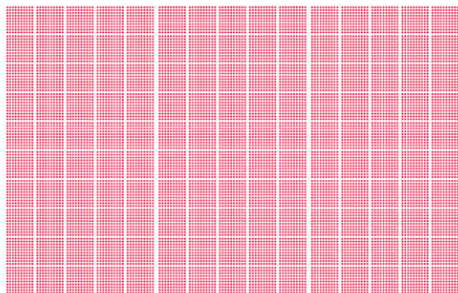
# Risk perception and actual hazards

## COMPARISON OF FATALITIES

CLIMATE CHANGE VERSUS TERRORISM (YEAR 2000)



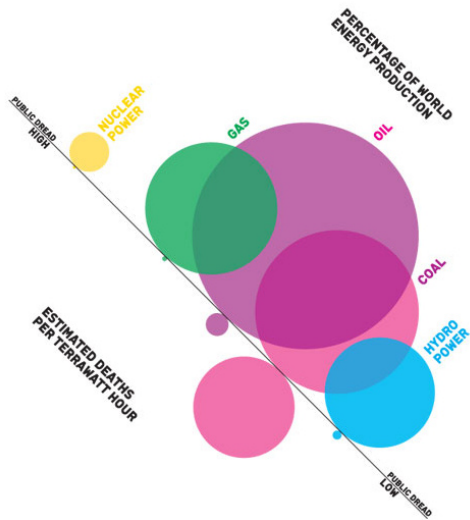
423 DEATHS CAUSED BY TERRORIST ATTACKS WORLDWIDE



150.000 DEATHS CAUSED BY CLIMATE CHANGE WORLDWIDE

Comparison of fatalities in the year 2000, caused by a heatwave and terrorist activities worldwide. Based on statistics published by Reuters and the US state department.

# World energy: public dread and actual deaths



Public dread and actual deaths caused by most common sources of energy.

Based on a long term study by IAEA.



# Impact of risk perception

Why it's important to understand the mechanisms underlying risk perception

- ▷ Strong impact on societal acceptance/tolerance of various hazardous activities
- ▷ Big influence on individuals' "safety behaviours" when exposed to a hazard
- ▷ Phenomenon called *risk homeostasis*: people tend to act so that the level of risk to which they feel exposed is roughly constant
  - Example: car drivers tend to keep the perceived level of risk at a constant level
  - Impact of technological safety measures (ABS, better lighting, smoother roads) is limited because drivers compensate by increasing their speed



# Impact of risk perception

Why it's important to understand the mechanisms underlying risk perception

- ▷ Work of safety professionals in industry and regulatory bodies serves two purposes:
  - ensure that work is safe
  - reassure stakeholders that the activity is safe (help people *feel* safe)
- ▷ The distinction is important because it's not easy to assess the safety of work in a direct manner
  - safety is the absence of negative outcomes, and (luckily) those negative outcomes are very rare
- ▷ We want to avoid a big gap between these two types of activity
  - safety of work (contributing to the desired outcome)
  - safety work (justifying your professional legitimacy)

# 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

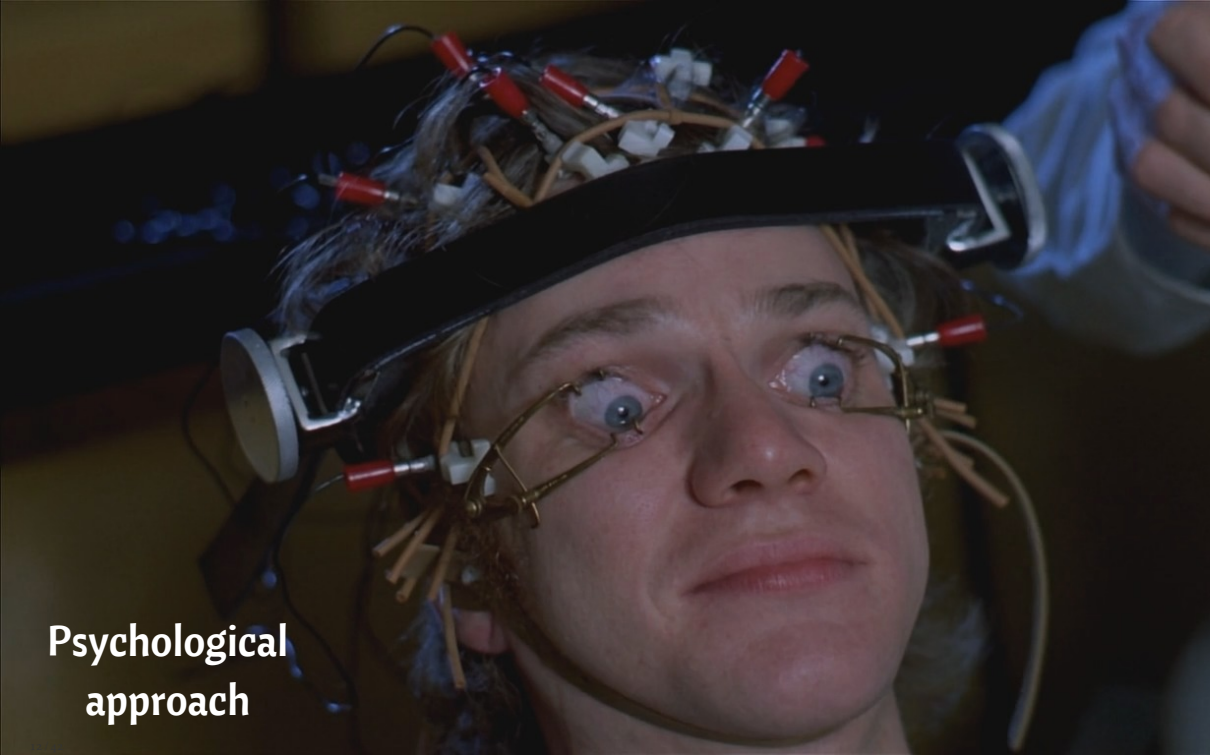
Risk seen as the joint product of knowledge of the future and consent about the most desired prospects

Key researcher: M. Douglas

## Social amplification of risk framework

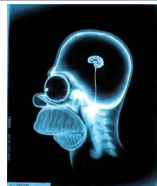
Concerns about hazards are amplified or attenuated by social, institutional, and cultural processes

Key researcher: R. Kasperson



**Psychological  
approach**

# Risk perception is a cognitive process



- ▷ Study by Slovic, Fischhoff and Lichtenstein (1982) concerning seat belt usage (very low in USA at the time)
- ▷ People remained untouched by the news that a fatal accident occurs once in every 3.5 million car trips
- ▷ However, they said they would buckle up when the odds are reexpressed to show that their **lifetime chance** of dying in a car crash was 1%
- ▷ Suggests that people's risk judgments are related to **cognitive processes**
  - information processing: how one is able to understand and manipulate the information provided...

## Poor perception of probabilities

- ▷ If you tell investors that, on average, they will lose all their money only every 30 years, they are more likely to invest than if you tell them they have a 3.3% chance of losing a certain amount each year
- ▷ Most people rate themselves as being a better driver than the average driver
- ▷ The vast majority rate the probability for themselves to experience negative events to be lower than that for the average citizen [McKenna 1993]
- ▷ Phenomena of *unrealistic optimism* and *illusion of control*:
  - rare, striking events tend to be overestimated
  - frequency of common events tend to be underestimated

# Psychometric paradigm and lay people's risk judgments

- ▷ An expert's judgment on a risk will be determined by estimation of probability and severity (e.g. level of annual mortality)
- ▷ Lay people's judgments impacted by multiple factors:
  - catastrophic potential
  - equity (do those receiving benefits bear their share of risks?)
  - effects on future generations
  - controllability and involuntariness
- ▷ Psychometric paradigm [Sjöberg 1996]:
  - risk can be understood as a function of general properties of the risk object
  - some of these risk characteristics are perceived similarly (voluntariness is correlated with controllability, catastrophic potential with inequity, observability with knowledge about the risk, immediacy with novelty)
  - produce "cognitive maps" of risk perception in which several characteristics are combined into "factors"

*Vocabulary: lay person = non-expert*

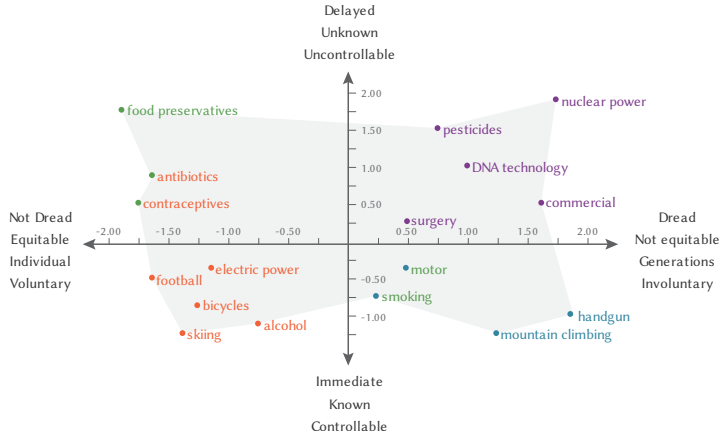
## Main factors affecting risk perception

These factors combine several characteristics of a risk that tend to be perceived in the same manner by lay people into one “label”:

- ▷ **“Dread risk”**: perceived lack of control, catastrophic potential, inequitable distribution of risks and benefits, involuntary
- ▷ **“Unknown risk”**: not observable, effects are delayed, little scientific knowledge on the risk, unknown by those people exposed, new risk
- ▷ **“People affected risk”**: personally affected, general public affected and future generations affected



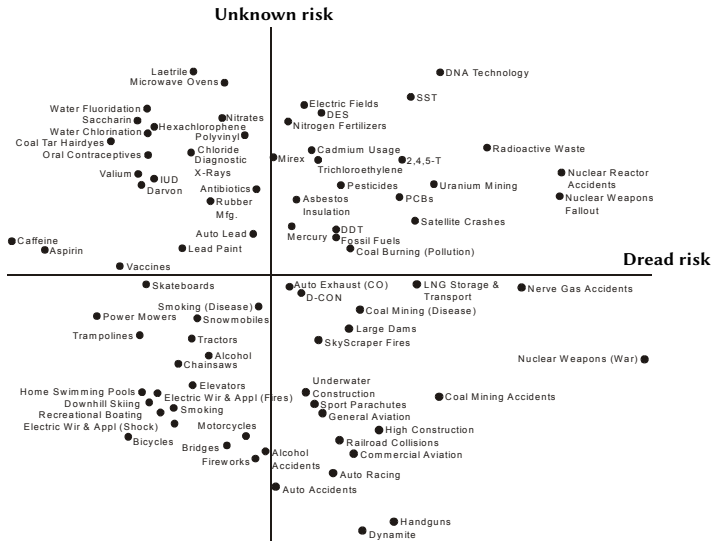
# Social fears of different risk situations



Lay people's perception of riskiness is highly correlated to the factor **dread**.

The higher the risk topic is judged on this factor, the higher its perceived risk and the more people want to see its current risks reduced and regulated.

# Social fears of different risk situations



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The higher the risk topic is judged on this factor, the higher its perceived risk and the more people want to see its current level reduced and regulated.

# Impact of trust



- ▷ Trust is of crucial importance for the understanding of risk perception
- ▷ Trust is especially important
  - when individuals have little **personal control** over a risk
  - when a risk is considered dreaded or involuntary
  - for highly complex/technical risks (sociologist A. Giddens uses the term “faceless commitment”, in which faith is sustained in the workings of knowledge of which the lay person is largely ignorant)
- ▷ Building public trust can be difficult and, once lost, **difficult to regain**
  - events that destroy trust carry greater significance for people than those that enhance it [Bier 2001]
  - perceived vested interests can quickly erode public trust [Frewer 2004]

## Impact of trust: illustration at Fukushima Daiichi



- ▷ March 2011: earthquake and tsunami send the Fukushima Daiichi nuclear power plant into meltdown
- ▷ Emergency is poorly managed by the operator Tepco and by the public authorities
- ▷ Surrounding areas are evacuated by the authorities
- ▷ September 2015: resettlement authorized in some areas, but few former residents wish to return, due to lack of trust in the authorities

→ article in *The Economist*:

[economist.com/asia/2015/10/22/back-to-the-nuclear-zone](http://economist.com/asia/2015/10/22/back-to-the-nuclear-zone)

# Factors affecting trust

- ▷ Factors influencing trust in an institution:
  - competence and **expertise** (the knowledge and capability to manage the risk in question)
  - a history of being open and honest and **acting in the public interest**
  - sharing the same **values** as the individual
  
- ▷ Importance of *procedural fairness* in situations where there is disagreement over what constitutes a fair outcome

## Trust is asymmetric

- ▷ It is far easier to destroy trust than to create it!
- ▷ Negative (trust-destroying) events outweigh positive events
- ▷ Negative events are more sharply defined (accidents, lies) than positive ones
- ▷ Positive events are often fuzzy or indistinct
  - example: how many positive events are represented by the safe operation of a nuclear power plant for one day?
- ▷ Sources of bad news are more credible than sources of good news
- ▷ Risk is easier to demonstrate than absence of risk

# Impact of control

- ▷ People tolerate substantially more risk when they engage in voluntary behaviour
- ▷ Related to a sense of **controllability**: less risk is perceived in situations that are under personal control
- ▷ Phenomenon of **illusion of control**
  - the risk of winning the lottery is perceived to be higher if we pick the numbers ourselves [Langer 1975]
  - a person who sees themselves as being in control (driving the car vs being a passenger) perceives the risk to be smaller [McKenna 1993]



A grid of 20 petri dishes arranged in 4 rows and 5 columns, each containing a different microbial culture. The cultures exhibit a wide variety of colors, including yellow, white, black, green, and brown, and different growth patterns such as spots, streaks, and confluent growth. A semi-transparent white banner with the text "Cultural theory" is centered over the middle of the dishes.

**Cultural theory**



# Cultural theory on risk

- ▷ Theory which attempts to explain societal conflict concerning risks
  - main developers: anthropologist Mary Douglas & political scientist Aaron Wildavsky
  - risk as defined by these authors: “a joint product about knowledge of the future and consent about the most desired prospects”
- ▷ 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**
- ▷ Societies and institutions think *through us* much more than the other way around

## Group-grid cultural theory

- ▷ Hypothesis: two dimensions of social order have a large impact on our worldviews (or our “cultural biases”):
  - **group**: whether an individual is member of bonded social units and how absorbing the group’s activities are on the individual
  - **grid**: degree to which a social context is regulated and restrictive in regard to individuals’ behaviour
  
- ▷ Note: most social scientists define the term *culture* in a different way, based on more explicit social categories (country of residence, company you work for, income, gender...)

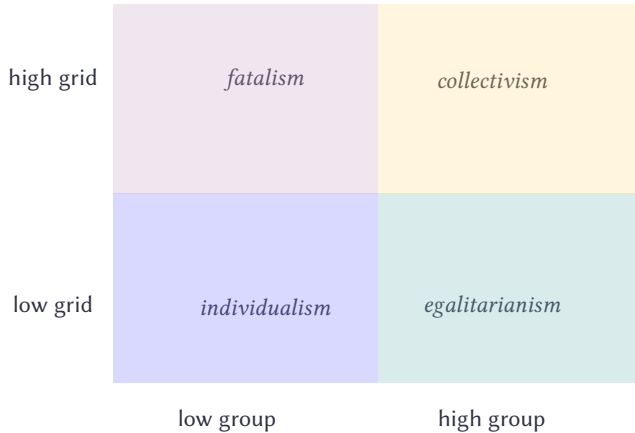
# Group-grid cultural theory: group dimension

- ▷ The group dimension:
  - to what extent is an individual a member of bonded social units
  - how absorbing are the group's activities on the individual
- ▷ **High group:**
  - distinct and separated individuals, perhaps with common reason to be together
  - less of a sense of unity and connection
- ▷ **Low group:**
  - people have a connected sense of identity, relating more deeply and personally to one another
  - they spend more time together and have stable relationships

## Group-grid cultural theory: grid dimension

- ▷ The grid dimension: degree to which a social context is regulated and restrictive in regard to the individuals' behaviour
  
- ▷ **High grid:**
  - people are relatively homogeneous in their abilities, work and activity and can easily interchange roles
  - they are less dependent on one another
  
- ▷ **Low grid:**
  - distinct roles and positions within the group with specialization and different accountability
  - different degrees of entitlement, depending on position
  - there may be a different balance of exchange between and across individuals
  - makes it advantageous to share and organize together

# Group-grid cultural theory



*These four worldviews can (and often do) exist within the same nation, institution, or social group*

## Fatalist culture

- ▷ Sense of chaos and futility
- ▷ Apathy, powerlessness and social exclusion
- ▷ Limited bonding between people, who are quite different
- ▷ Those who *have* feel little obligation towards the *have nots*
- ▷ Individuals are left to their own fates, which may be positive or negative for them
  - may become apathetic, neither helping others nor themselves
  - those who succeed feel they have done so on their own merits and effectively need those who are less successful as a contrast that proves this point
- ▷ Also known as: Isolate

# Collectivist culture

- ▷ Emphasizes strong regulation, institutions with rules, stability and structure
- ▷ People are strongly connected yet are very different
- ▷ Leads to the development of institutions, hierarchies and laws that both regulate individual action and provide for weaker social members
- ▷ Other sub-cultures may survive within overall collectivist hierarchies
  - example: there may be egalitarian or individualist groups who, whilst generally obeying national laws, will have differing internal rules
- ▷ Also known as: Positional, Hierarchical

# Individualistic culture

- ▷ Emphasizes **spontaneous action**, an unregulated environment with openness and entrepreneurialism
- ▷ People are relatively similar yet have little obligation to one another
- ▷ People enjoy their differences more than their similarities and seek to **avoid central authority**
- ▷ Self-regulation is a critical principle: if one person takes advantage of others then power differences arise and a fatalistic culture would develop



## Egalitarian culture

- ▷ Emphasizes partnership and **group solidarity**, peer pressure and cooperation
- ▷ Less central rule than in collectivism, but this requires individuals to voluntarily help others
- ▷ The rule is thus less about law and more about values. External laws may be seen as necessary only when there is weakness of character, which is prized highly
- ▷ The fact that people are essentially similar is very helpful to this culture: the similarity leads people to agree and adopt similar values
- ▷ An ideal utopia which can survive in smaller groups but infrequent in large ones
  - if one person breaks values, requires all others to turn on this person, correcting or ejecting them
- ▷ Also known as: Enclave, Communitarian, Sectarianism

# Cultural theory and risk perception

- ▷ **Social trust:** the process by which individuals assign to other persons, groups, agencies and institutions the responsibility to work on certain tasks
  - allows us to interact with other parties despite uncertainty and a lack of full understanding of others
  
- ▷ Hypothesis: people's attitude with respect to risks and their level of social trust in institutions which generate or regulate risks is largely based on value similarity
  - people tend to trust people and institutions that they see as interpreting the world in the same way as they do
  
- ▷ Note: empirical studies of risk perception show a variable degree of success of this hypothesis
  - significant in some US studies, lower in some EU studies



**Social amplification  
of risk framework**

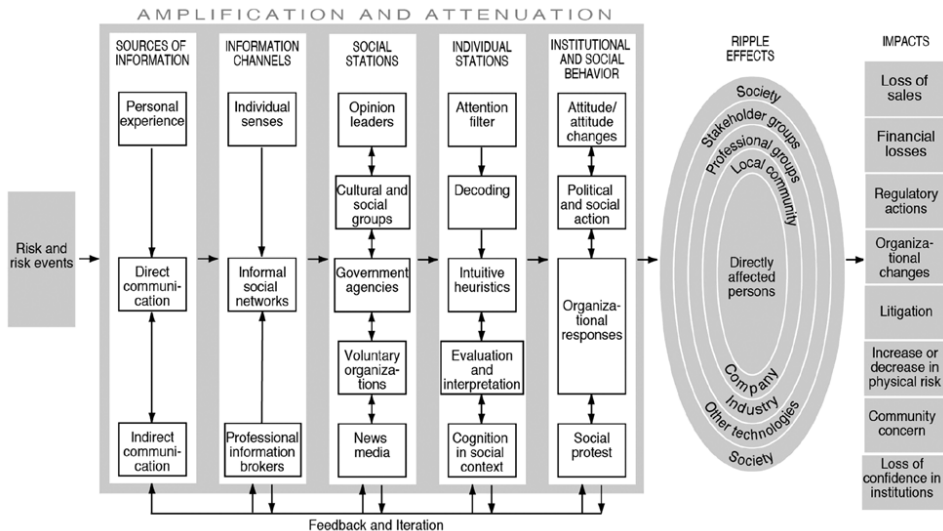
# Social amplification of risk

- ▷ Combines research in psychology, sociology, anthropology, and communications theory
- ▷ Outlines how communications of risk events pass from the sender through intermediate stations to a receiver and in the process serve to amplify or attenuate perceptions of risk
- ▷ All links in the communication chain (individuals, groups, media) contain **filters** through which information is sorted and understood

# Social amplification of risk

- ▷ Attempts to explain some social processes underlying risk perception and response:
  - **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)
  - **risk attenuation:** other hazards that experts rank as more serious receive less public attention (*e.g.* radon exposure, smoking, car accidents)
- ▷ Metaphor of amplification from communication theory: changes in risk perception and response based on psychological, social, institutional, and cultural processes
  - social amplification is most likely to flourish when the risks are serious and the situation is fraught with uncertainties

# Social amplification of risk

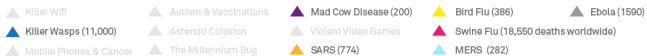
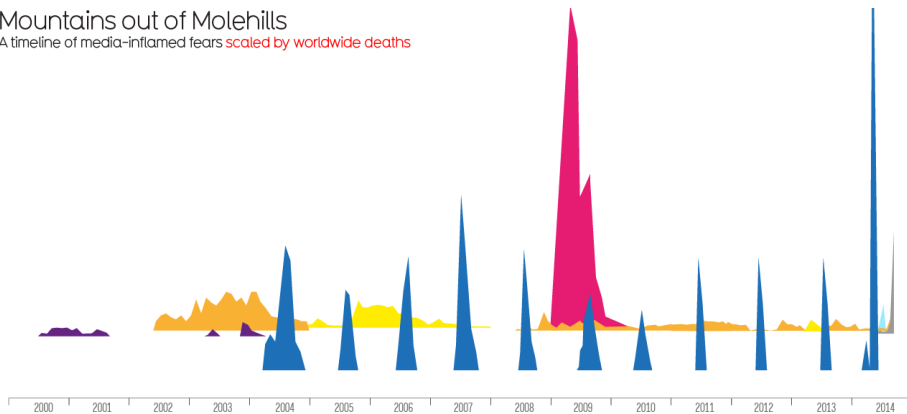


Source: *A Perspective on the Social Amplification of Risk*, R. Kasperson, The Bridge, 2012

# Amplifying role of the media

## Mountains out of Molehills

A timeline of media-inflamed fears **scaled by worldwide deaths**



source: World Health Organisation  
design & concept: David McCandless, Aug 2014  
informationisbeautiful.net

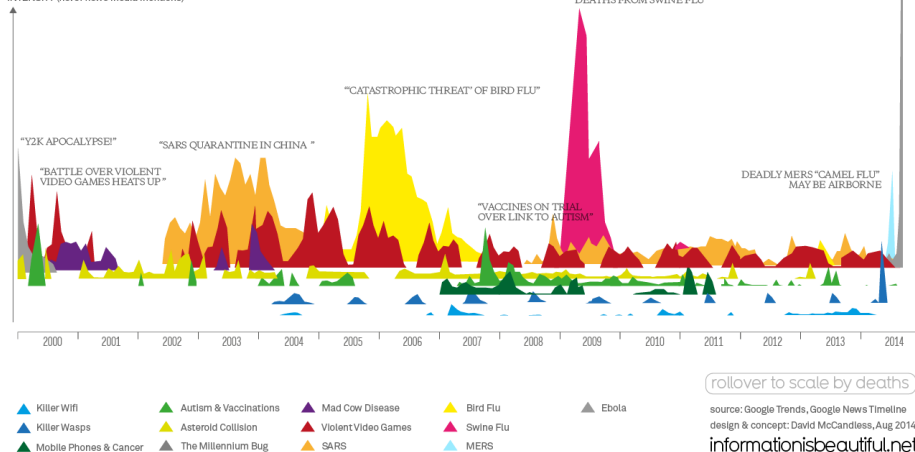
Source: *Mountains out of Molehills*, [informationisbeautiful.net/visualizations/mountains-out-of-molehills](http://informationisbeautiful.net/visualizations/mountains-out-of-molehills)

# Amplifying role of the media

## Mountains out of Molehills

A timeline of media-inflamed fears

INTENSITY (no. of news media mentions)



Source: *Mountains out of Molehills*, [informationisbeautiful.net/visualizations/mountains-out-of-molehills](http://informationisbeautiful.net/visualizations/mountains-out-of-molehills)



## Image credits

- ▷ Eyes on slide 11, *A Clockwork Orange*, Stanley Kubrick, 1971
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- ▷ Amplifier on slide 34, James Davies via [flic.kr/p/ouGLyP](https://flic.kr/p/ouGLyP), CC BY-NC-SA licence

**THANKS!**

## Further reading

- ▷ World Economic Forum's annual *Global Risks Perception Survey*, available from [weforum.org](http://weforum.org)
- ▷ *Taking account of societal concerns about risk: Framing the problem*, UK Health and Safety Executive (2002), available from [hse.gov.uk/research/rrpdf/rr035.pdf](http://hse.gov.uk/research/rrpdf/rr035.pdf)
- ▷ *Review of the Public Perception of Risk, and Stakeholder Engagement*, UK Health and Safety Executive (2005), available from [hse.gov.uk/research/hsl\\_pdf/2005/hsl0516.pdf](http://hse.gov.uk/research/hsl_pdf/2005/hsl0516.pdf)
- ▷ The Cultural Cognition project at Yale Law School analyzes how cultural values shape public risk perceptions and related policy beliefs > [culturalcognition.net](http://culturalcognition.net)

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