



# Risk Perception: Science, Public Debate and Policy Making

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## Risk perception and GM foods: a decision theoretic approach

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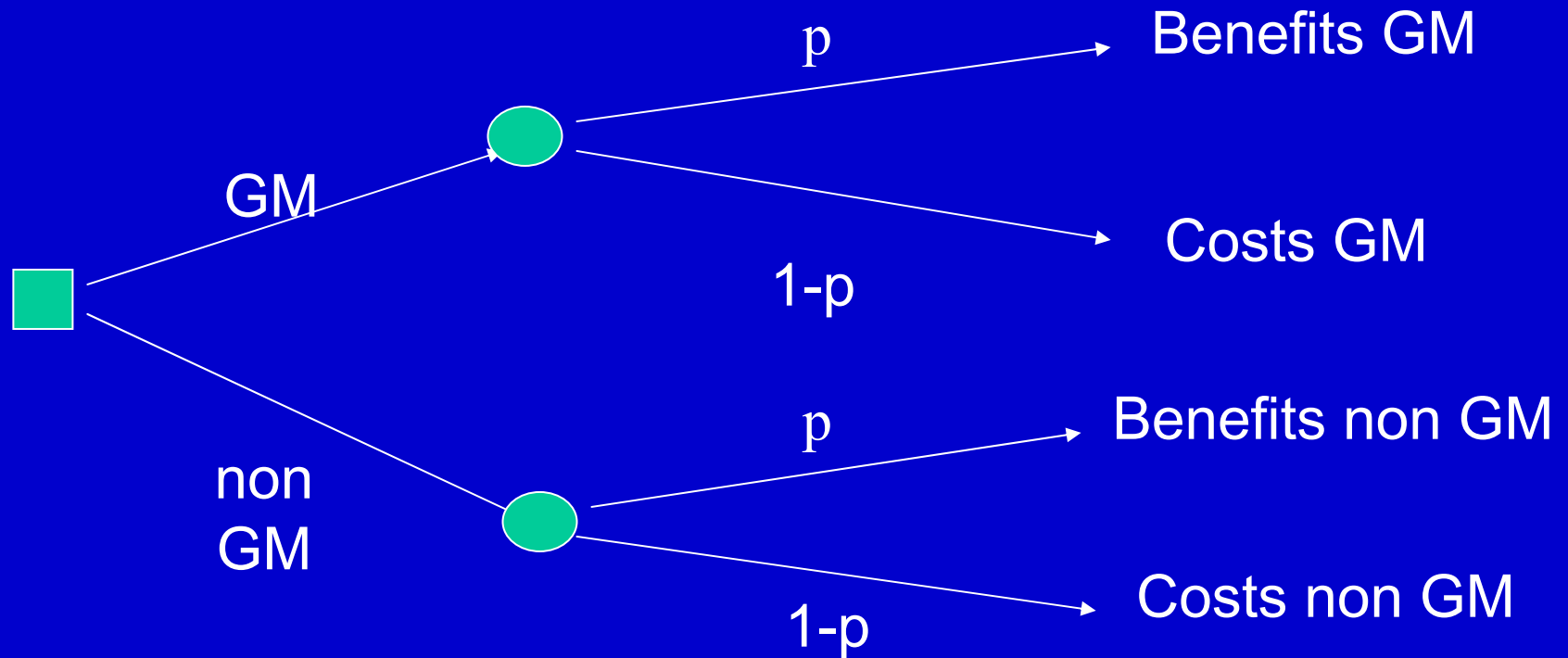


# Contemplating the future

- The future - good or bad fortune.
- In ancient times it was in the lap of the Gods
- The modern era of the 'enlightenment', brought new ways of thinking about the future.
- If an event is outside our control (a volcanic eruption a la Krakatoa) then this it is a 'danger'
- But, if we think we (or someone else) has a choice in the matter, an opportunity to maximise the chance of good fortune and to minimise bad fortune, then we confront a risk.
- In this sense risk brings the future into the present, because what is decided today, we assume, will have a bearing on the future



# GM foods: a decision analytic (rationale choice) perspective:



Utility of GM branch =  $p \cdot B_{GM} + 1-p \cdot nonGM$

Utility of nonGM =  $p \cdot B_{nonGM} + 1-p \cdot C_{nonGM}$

And the rational choice is to select the branch with greatest utility



# The limits of rational choice

- Rational choice specifies a logical process but not the contents, thus;
  - Who defines the probabilities?
  - Who defines the risks?
  - And who defines the benefits?
- It is these issues of *who* defines and *what* are the costs and benefits, risks and probabilities that are central to the disputes over agri-food biotechnologies



# Contrasting beliefs

	Pro GM	Critics of GM	Public
Benefits	Profits & Progress Efficient agriculture Less pesticide use 3 <sup>rd</sup> World hunger	Could be benefits for food production Could be benefits for 3 <sup>rd</sup> World	Maybe some 3 <sup>rd</sup> World benefits but- What are the personal benefits?
Costs	R and D costs Liability	Irreversible impacts on environment Multinationals dominate sector	Possible danger to health Unnatural
Risks	Comparatively small risks If non-zero can be managed 2001/18/EC	Known and unknowable risks to health and the environment Need more research Precaution	Other health scares suggest that risk is possible Effectiveness of regulation? Playing God?



# What lies behind these beliefs?

- Pro GM:
  - Economic and technological progress
  - Science is the arbiter of risk
  - The quantification of risk
  - Risk as a currency for public policy
- Critics of GM:
  - Doubts about technology equals progress
  - Wider definition of risk reflecting how ‘societies think’
  - In different culture/communities differing world views about the moral order (humankind, nature and society) lead to the identification of differing risks and also different thresholds of risk acceptability.
  - Risks may be scientific but also other dimensions - moral, democratic and even unknown
- The public
  - Some take the pro position, others that of the critics

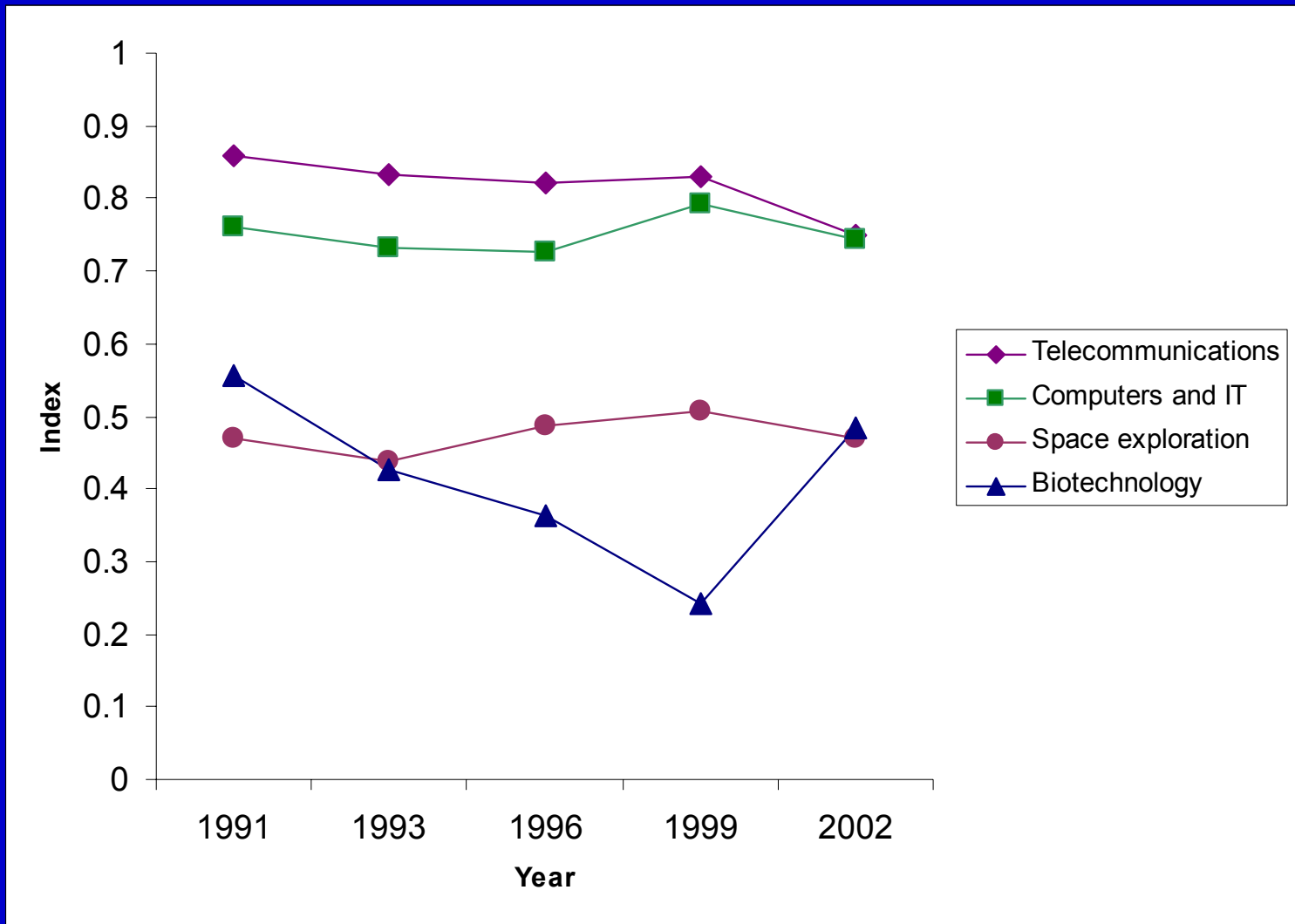


# A closer look at the European public's views of GM foods

- The Eurobarometer surveys, developed on the basis of qualitative studies
- Contrasting public views
- Relatively positive general attitudes but more cautious specific (personal) beliefs



# European optimism about biotechnology: 1991-2002





# Risk and benefits of GM food

- “GM food will bring benefits to me and to other consumers” – agree or disagree (benefit or not)
- “I think it is safe for me to eat GM food” – agree or disagree (safety or risk)
- 4 groups of risk and benefit perceptions
  - Benefit and no risk - relaxed
  - Benefit and risk – trade-off
  - No benefit and risk - sceptical
  - No benefit and no risk - uninterested



# Risk and benefit perceptions 2002

## Risk and benefit group

%

**Relaxed (benefit and no risk)**

28

**Trade off (benefit and risk)**

10

**Sceptical (no benefit and risk)**

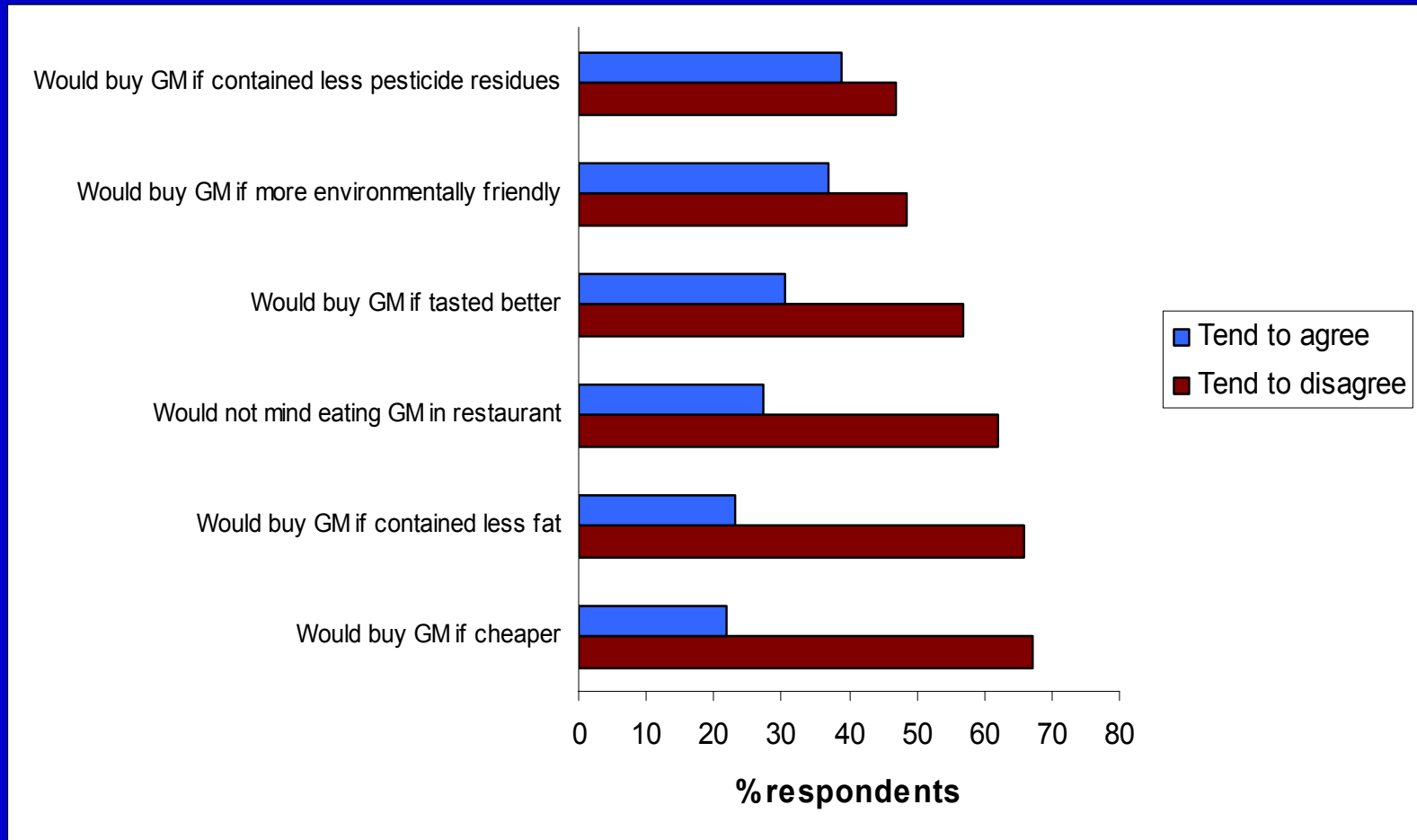
54

**Uninterested (no benefit and no risk)**

8

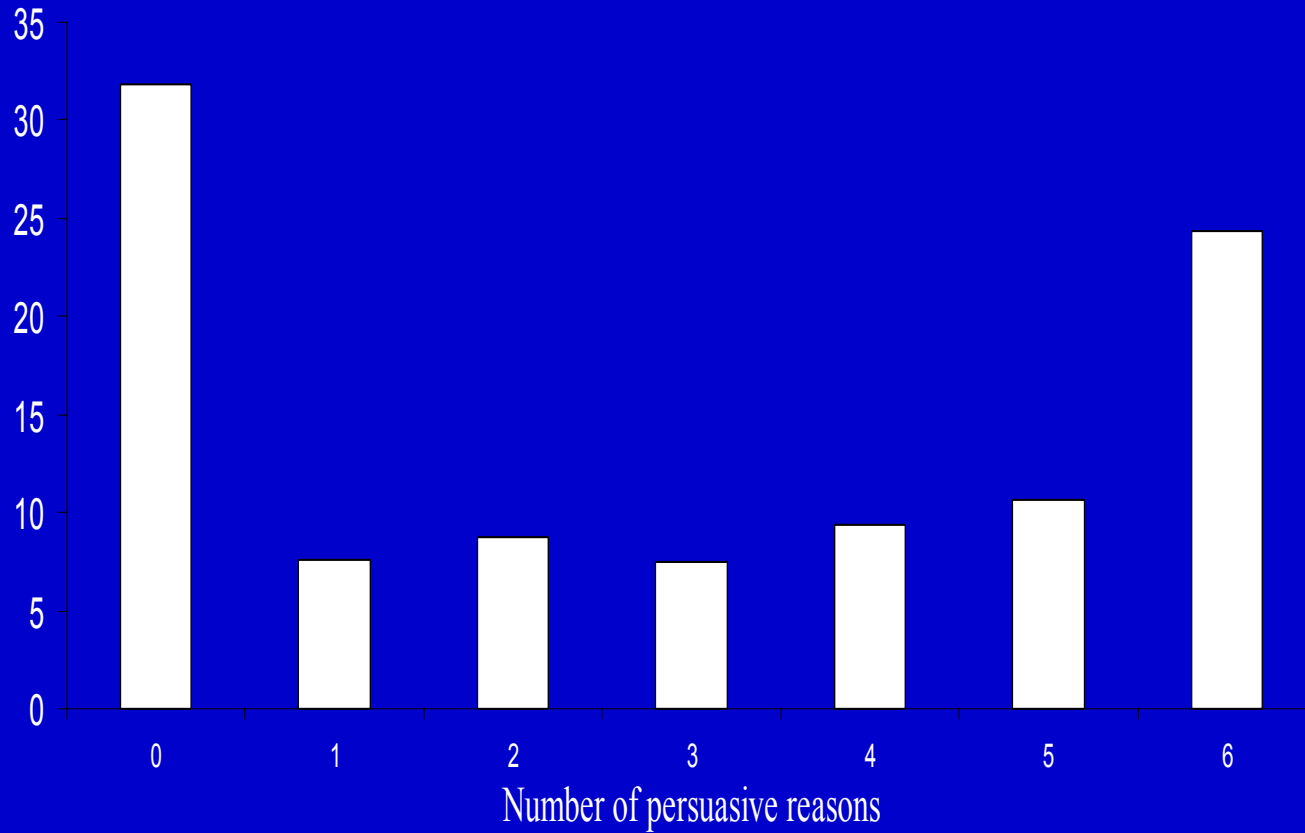


# European intentions about GM food: 2002





## *Number of persuasive reasons for buying GM food*





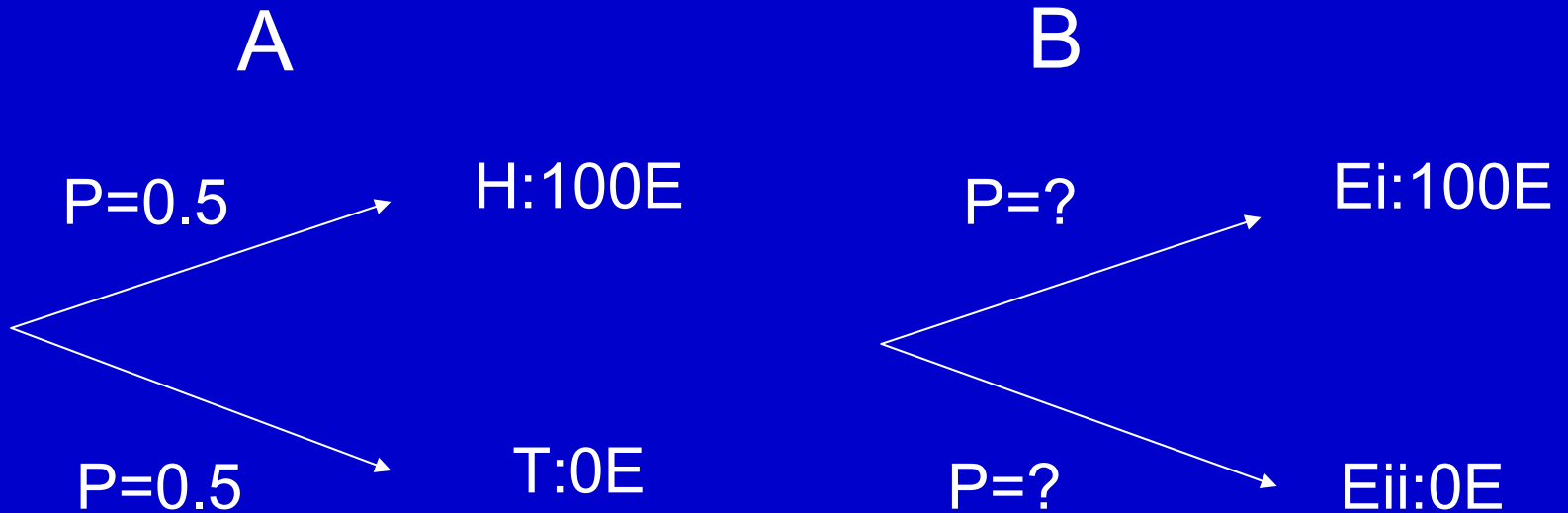
# What has decision theory to say about the public's concerns?

- Important research on two issues
- The impact of uncertainty
- The asymmetry of gains and losses



# Decisions - decisions

Which do you prefer? option A or B?



$$P_{ei} + P_{eii} = 1.0$$



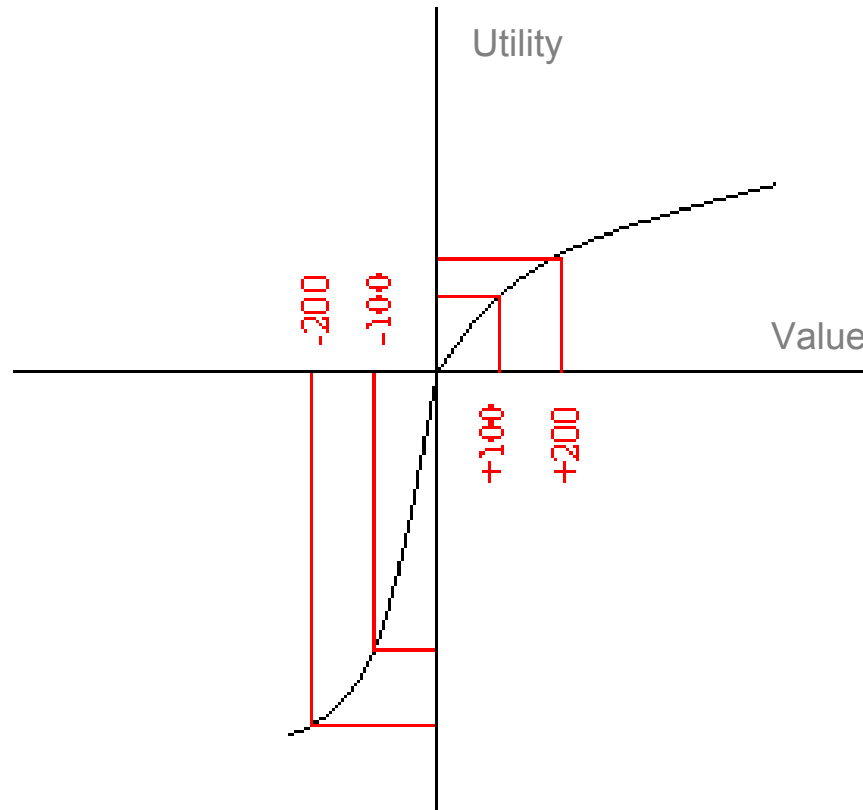
# The Ellsberg paradox

- Two bets offered
- Most people prefer A to B
- Ellsberg: people don't like ambiguity: we might call this uncertainty.
- This runs counter to rational choice which contends that the alternative bets have equal expected value.
- Differing rationalities, sound science confronts other responses to uncertainty



# Prospect Theory: Weighing up gains and losses

Asymmetry between 'equivalent' gains and losses. The pain of a loss far greater than pleasure from an equivalent gain



Benefits need to be considerable in order to justify taking any risks



# Trust and confidence

Actors in their dealings with biotechnology	% good job	% bad job
Industry developing new products	41	27
Farmers deciding which crops to grow	55	21
Shops making sure our food is safe	56	26
Our government making regulations	46	27
EC making laws for all EU countries	51	18
Environmental groups campaigning against biotechnology	59	17
Consumer organisations checking products	70	11
Newspapers and magazines reporting on biotech	59	18



# GM foods: the ambivalent public

- More optimistic about biotech in general
  - But, 50% see no personal benefits of GM foods
  - Absence of benefits combined with uncertainty leads to a *multiplication* and *accentuation* of perceived risks
  - Most persuasive arguments in favour of GM foods are environmental/health
  - While around 30% would not 'buy' GM foods, a majority say they would.
  - Higher confidence in independent voices, a challenge to the 'expertocracy'



# Concluding comments

- Public opinion – considerable differences across EU member states as reflected in the split in the Regulatory Committee's recent discussion on BT maize – pro Netherlands, Spain and the UK and against Austria, Italy and Greece.
- Increasingly perhaps, issues of science and technology are becoming more like politics in reflecting multiple 'rationalities', while choices may follow a rational process, views of risks, costs and benefits differ.
- Hence the disagreements about more about values than about the esoterics of science. What sort of future we want for our societies is a question of ethical values rather than science



# Outlook on risk perceptions and some other issues

- Commissioner Byrne set the scene and posed some questions: how can we
- improve our understanding of the world and respond accordingly – channel into better governance?
- Improve the public understanding of risk to further improve trust?
- Ensure better communication, understanding and engagement of stakeholders?



# Understanding of the world/risk and responding accordingly?

- Comparative assessment of risk to inform decision making – governance and the public
- Evidence based policy making
- Health and safety regimes
- Value per fatality
- Some ways of dying are less acceptable than others
- Risk and risk acceptability is, as many speakers have argued, social and cultural
- We need science to be on tap but not on top
- If science trumps all other concerns then the disconnect between the public and policy making will continue



# The public understanding of risk to further improve trust

- For the person or organisation trust is one risk management strategy
- Would changing risk perceptions impact on trust? Yes and no –
- If there is no perceived risk then trust is not an issue
- But if people do not like a risk then even in small quantities it may impact on trust



# Differing foci of attention

- Public understanding of risk leads to a focus on the public
- However trust is not built by working on the other – it has to be earned by working on oneself and by demonstrating that one is trustworthy
- Few expect zero risk – what they want is evidence of effective risk management strategies
- What the public want to know is whether food or technology is in safe hands



## Better communication, understanding and engagement of stakeholders?

- Public consultation, public debates and full democratic participation in S and T
- From Switzerland to the UK to Denmark
- For different reasons all have limitations
- Questions of legitimacy and of whether the public is interested
- Two issues here – policy making and public involvement in key issues



# Policy making

- Transparency and accountability
- Criteria for the decision, the reasons for the particular choice and basis of risk assessment placed on the public record along with an explanation as to why other options rejected



# Public involvement

- Science makes many futures possible
- But whether these are acceptable or not is a social and ethical, not a scientific issue
- Some new developments relatively uncontroversial – mobile phones - digital information
- Some are universally rejected – human cloning
- Some are hotly debated – stem cell research

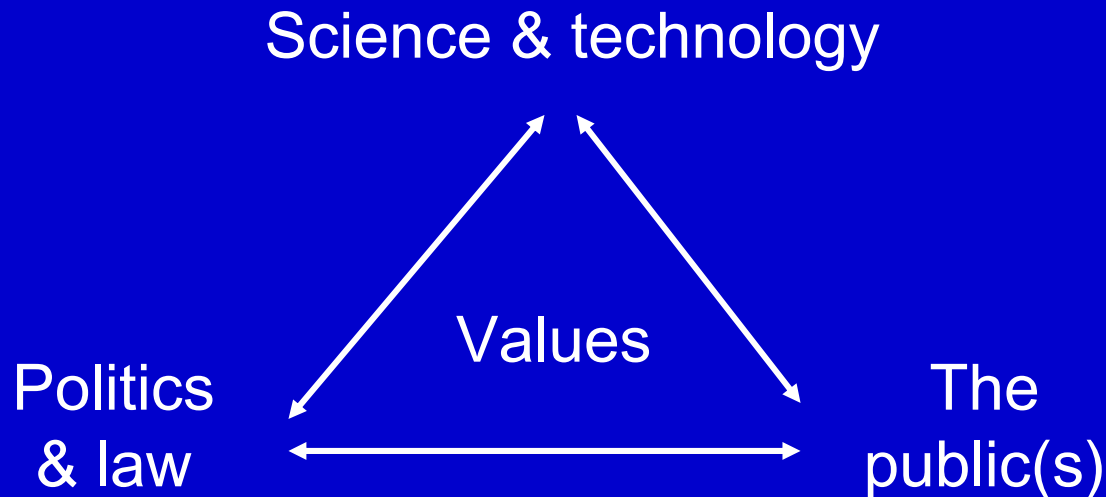


# The stem cell debate

- The debate not about science, per se
- It is about values and as we see in Europe there are rather different positions taken – even entrenched positions
- Ethicists – problem of legitimacy
- Preeminently an issue for wider public involvement



# Meeting the challenge: towards a societal debate on sustainable technology



Broadening the scope of ethics to create a platform for debate on the social implications of S&T.



# The challenges of the knowledge society

Science moves to the post normal

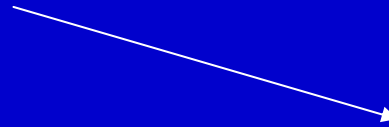
(Funtowicz, S and Ravetz, J.R.)

Risks outside scientific expertise

Post-industrial society

(Weizel, C and Inglehart, R.)

Emancipative replace conformist values



Intelligent – adaptive institutions

