



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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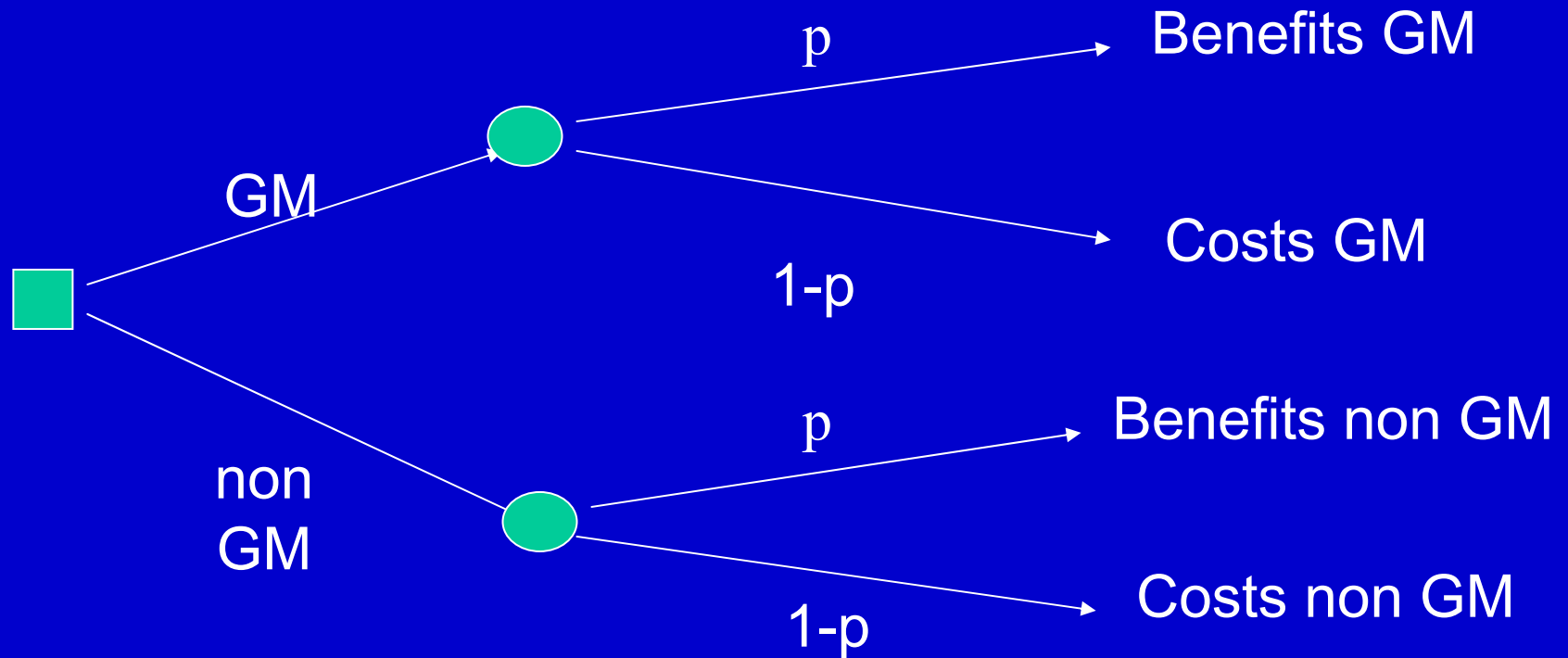


Contemplating the future

- 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 = $p \cdot B_{GM} + 1-p \cdot C_{GM}$

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 rd World hunger	Could be benefits for food production Could be benefits for 3 rd World	Maybe some 3 rd 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

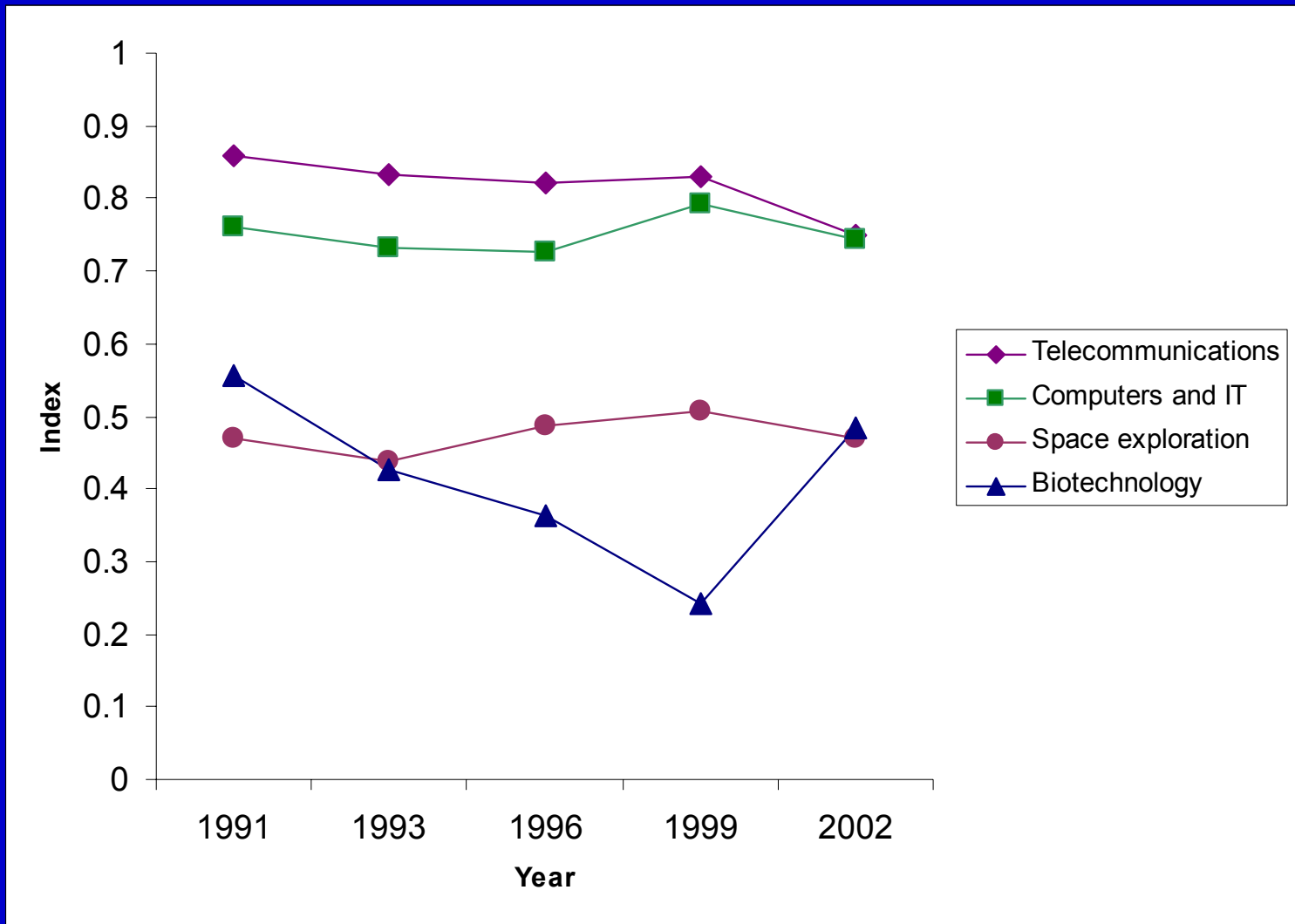


A closer look at the European public's views of GM foods

- 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)

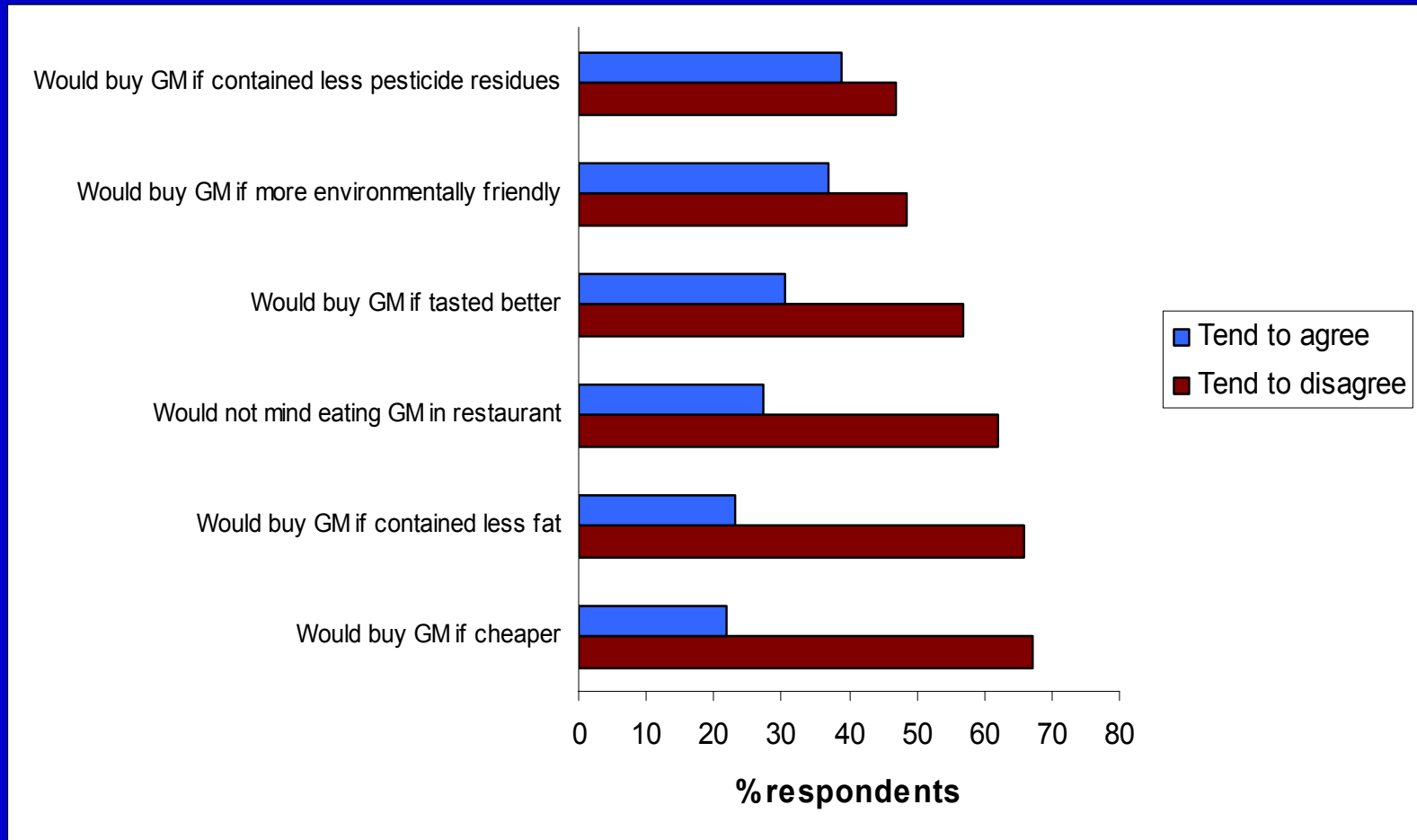
54

Uninterested (no benefit and no risk)

8

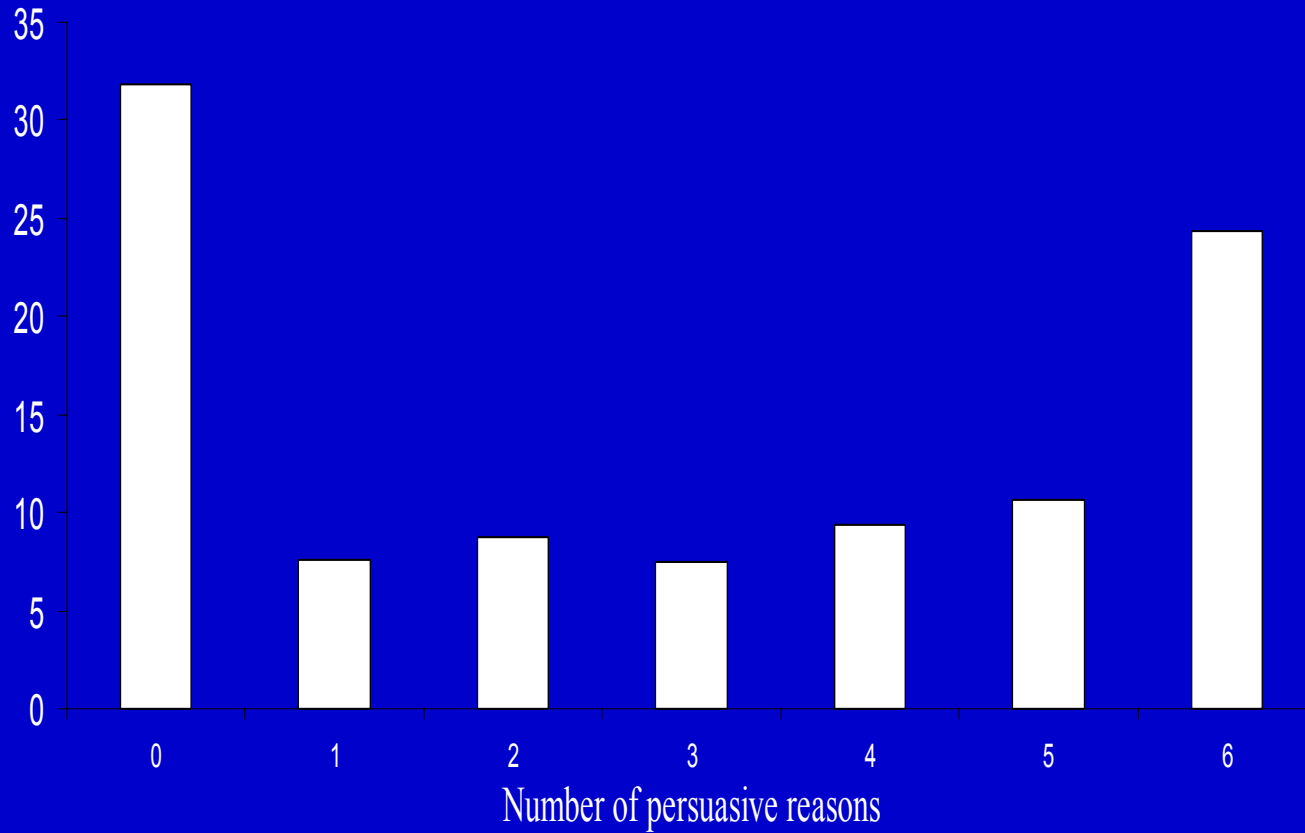


European intentions about GM food: 2002





Number of persuasive reasons for buying GM food





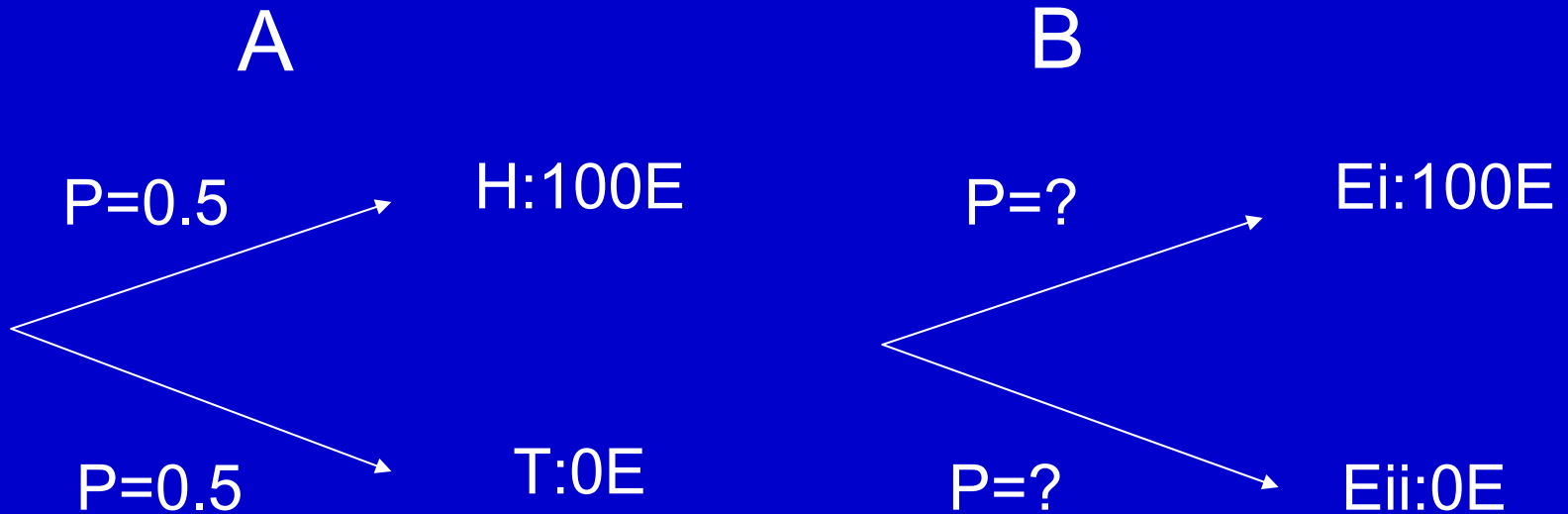
What has decision theory to say about the public's concerns?

- 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?



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



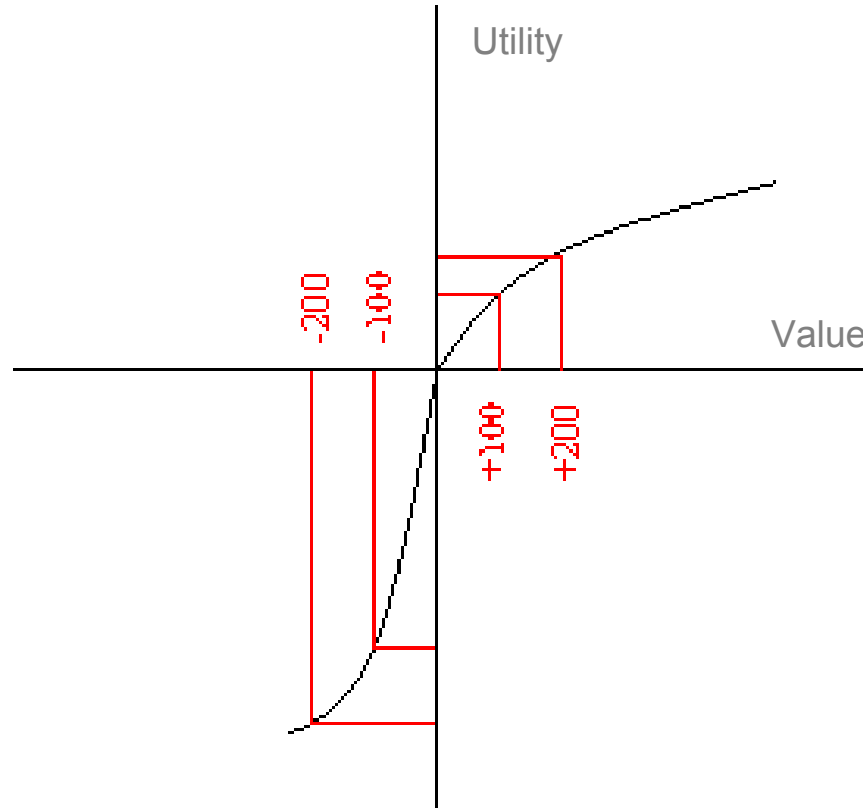
The Ellsberg paradox

- 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



The challenges of the knowledge society

Science moves to the post normal

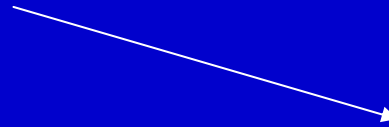
(Funtowicz, S and Ravetz, J.R.)

Risks outside scientific expertise

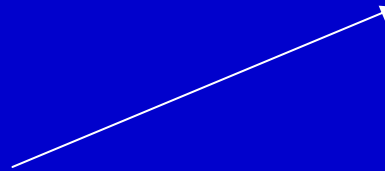
Post-industrial society

(Weizel, C and Inglehart, R.)

Emancipative replace conformist values

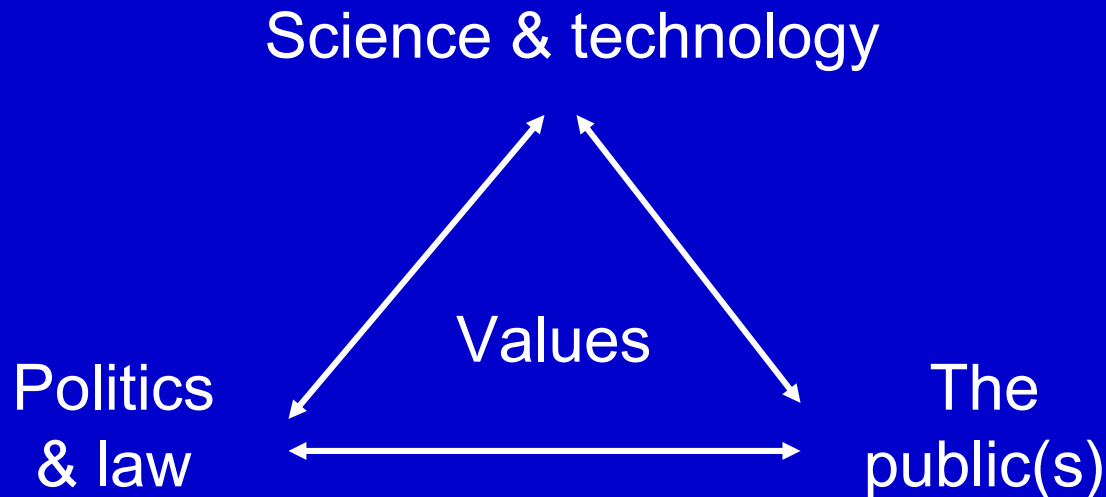


Intelligent – adaptive institutions





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.