

Cognitive and Motivational Biases in Risk and Decision Analysis

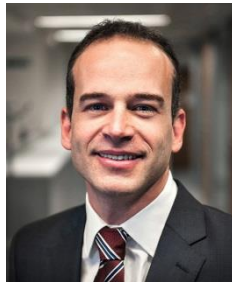
Gilberto Montibeller

Dept. of Management, London School of Economics, UK

&

Detlof von Winterfeldt

University of Southern California, USA



PRESCRIPTION VS. DESCRIPTION

- All research prior to the 1950s (from Bernoulli to Savage) was prescriptive
- Some researchers criticized the DA principles of descriptive grounds (Ellsberg, Allais) already in the 50s
- Edwards laid the foundation of scientific descriptive work in the 50s, but with a prescriptive agenda

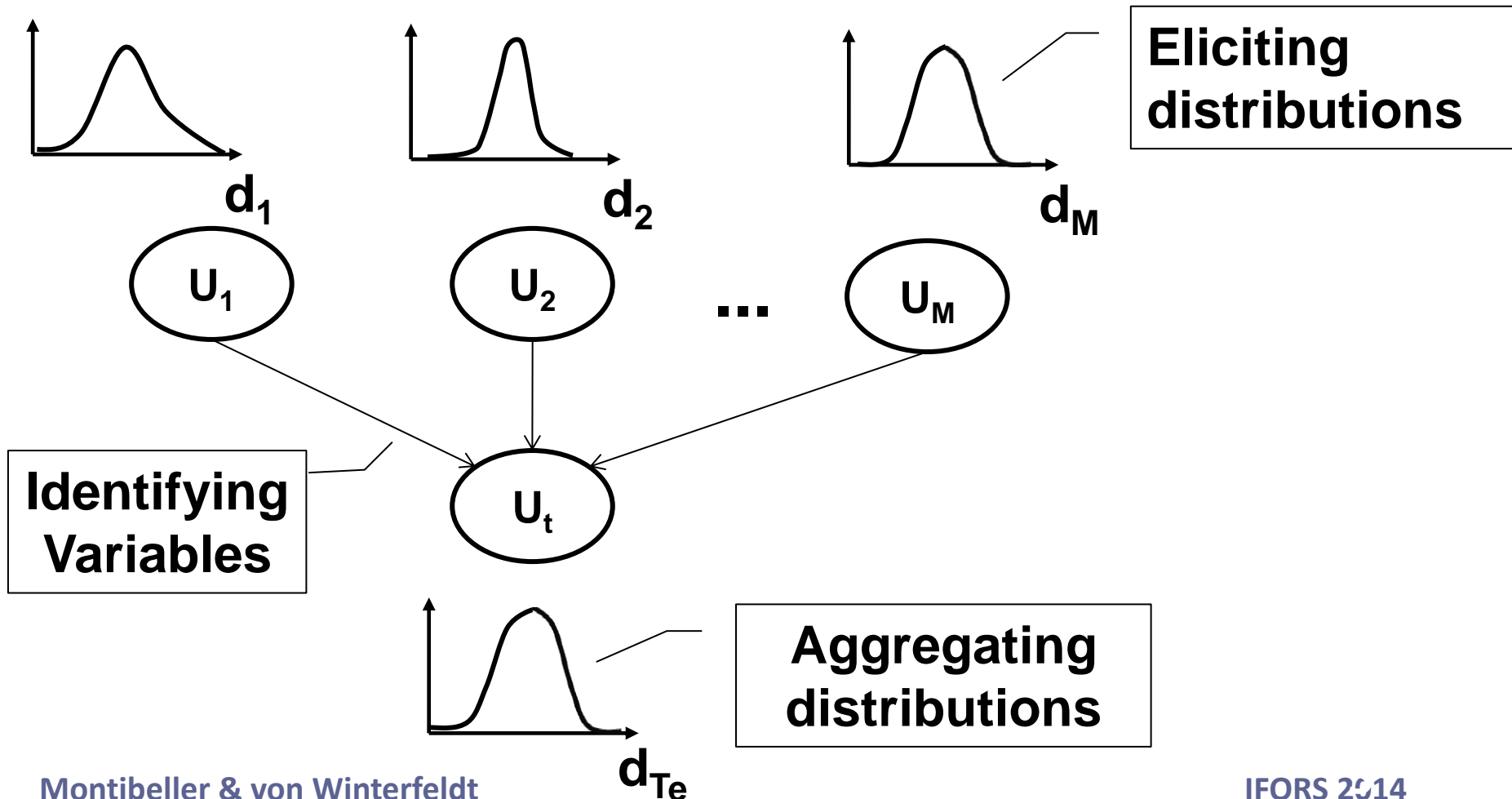
The Prescriptive-Descriptive Split

- Prescriptive work since 1960:
 - 60's: experimental applications of DA
 - 70's: Multiattribute utility theory and influence diagrams
 - 80's: Major applications
 - 90's Computerization
 - 2000 and beyond: Specialization
- Descriptive work
 - 50s and 60s: Early violations of SEU (Allais, Ellsberg)
 - 70s: Probability Biases and Heuristics
 - 80s: Utility biases and Prospect Theory
 - 90s: Generalized expected utility theories and experiments

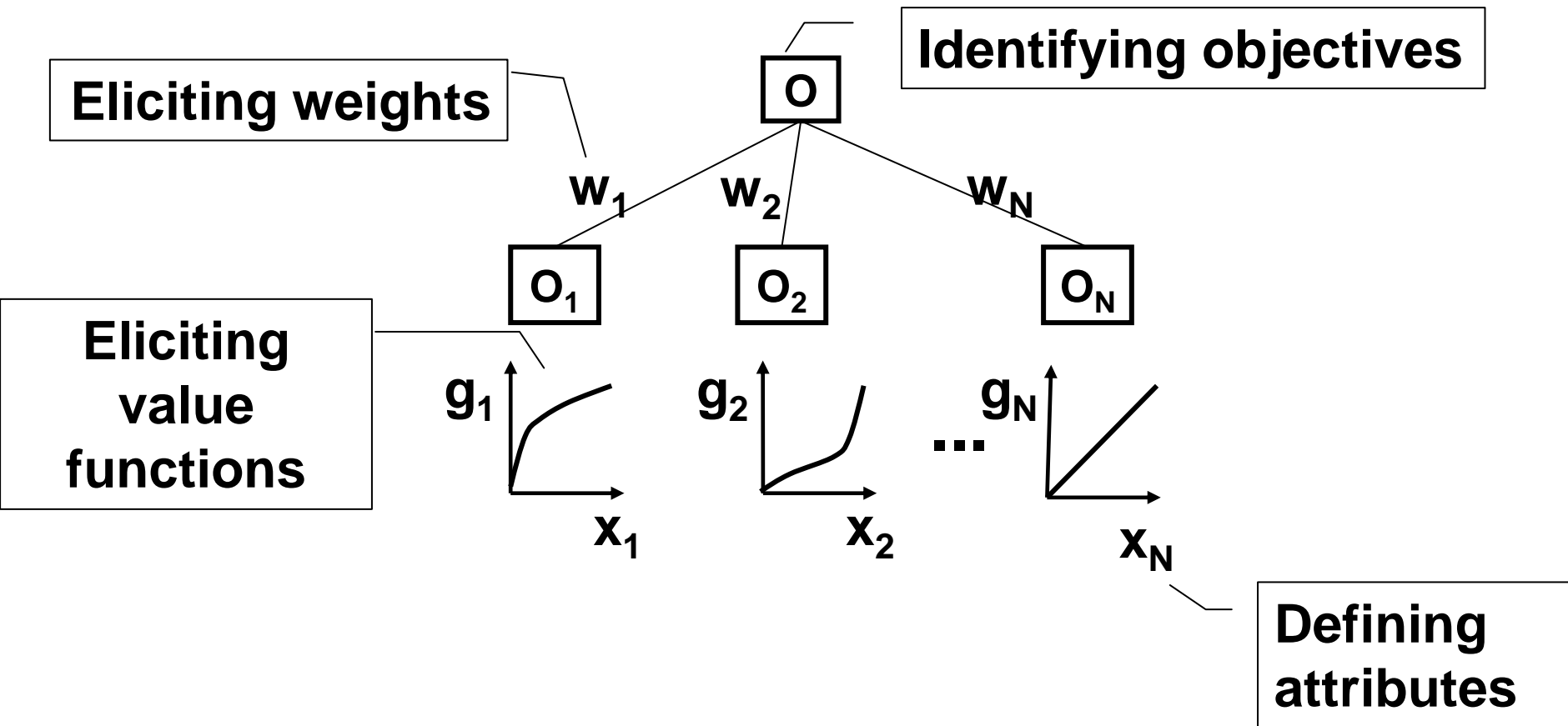
Two Ways Decision Analysts Deal with Biases

- The easy way
 - Biases exist and are harmful
 - Decision analysis helps people overcome these biases
- The hard way
 - Some biases can occur in the decision analysis process **whenever a judgment is needed in the model** and may distort the analysis
 - Need to understand and correct for these biases in decision analysis

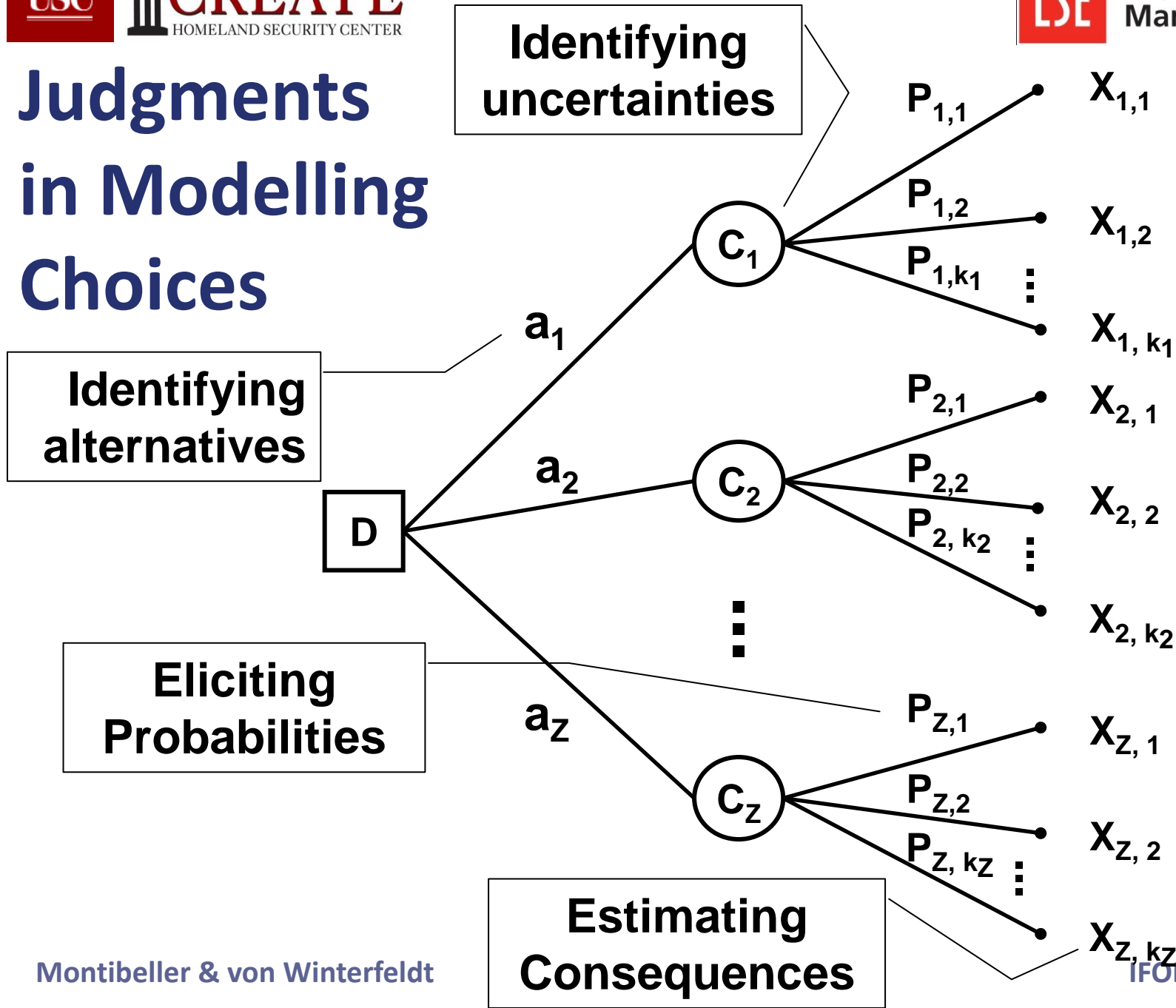
Judgements in Modelling Uncertainty



Judgements in Modelling Values



Judgments in Modelling Choices



Biases that Matter vs. Those that Don't

Biases that matter

- They occur in the tasks of eliciting inputs into a decision and risk analysis (DRA) from experts and decision makers.
- Thus they can significantly distort the results of an analysis.

Biases that don't matter

- They do not occur or can easily be avoided in the usual tasks of eliciting inputs for DRA

Cognitive Biases that Matter

Cognitive biases are distortions of judgments that violate a normative rules of probability or expected utility

- Overconfidence
- Availability
- Anchoring
- Certainty effect
- Omission biases
- Partitioning biases
- Scaling biases
- Proxy bias
- Range insensitivity

Cognitive Biases That Don't Matter

- Base rate bias
- Conjunction fallacy
- Ambiguity aversion
- Conservatism
- Gambler's fallacy
- Hindsight bias
- Hot hand fallacy
- Insensitivity to sample size
- Loss aversion
- Non-regressiveness
- Status quo biases
- Sub/Superadditivity of probabilities

Motivational Biases That Matter

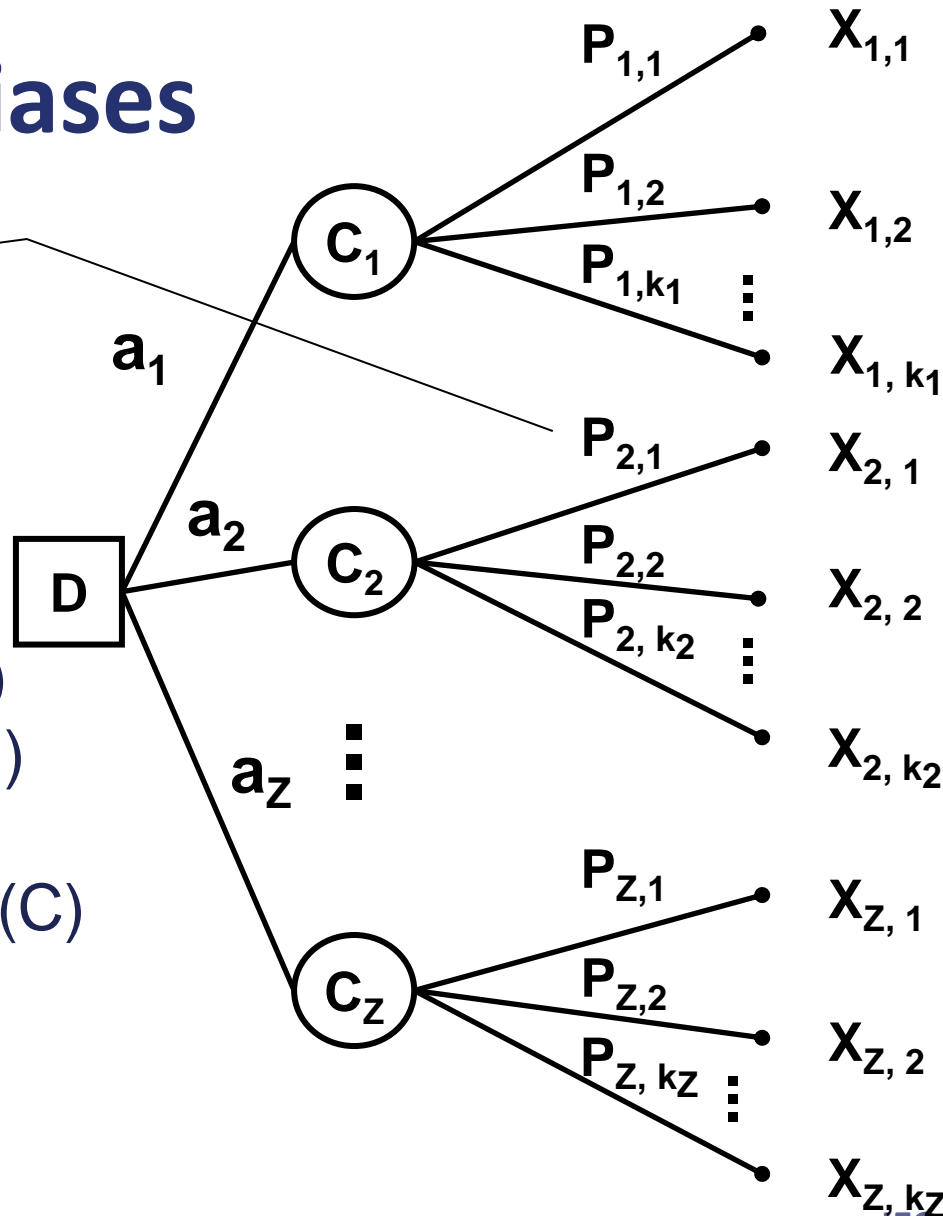
Motivational biases are distortions of judgments because of desires for specific outcomes, events, or actions

- Confirmation bias
- Undesirability of a negative event or outcome (precautionary thinking, pessimism)
- Desirability of a positive event or outcome (wishful thinking, optimism)
- Desirability of options or choices

Mapping Biases

Eliciting Probabilities

- Anchoring bias (C)
- Availability bias (C)
- Confirmation bias (M)
- Desirability biases (M)
- Gain-loss bias (C)
- Overconfidence bias (C)
- Equalizing bias (C)
- Splitting bias (C)



Debiasing

- Older experimental literature shows low efficacy
- Recent literature is more optimistic
- Decision analysts have developed many (mostly untested) best practices:
 - Prompting
 - Challenging
 - Counterfactuals
 - Hypothetical bets
 - Less bias prone techniques
 - Involving multiple experts or stakeholders

New Treatment of the Biases Literature

- We view biases from the perspective of an analyst concerned with possible distortions of judgments required for an analysis.
- We include motivational biases, which have largely been ignored by BDR, even though they are important and pervasive in DRA.
- We separate biases in those that matter for DRA versus those that do not matter in this context.

New Treatment of the Bias Literature (continued)

- We provide guidance on debiasing techniques
 - which includes not only the behavioral literature on debiasing,
 - but also the growing set of “best practices” in the decision and risk analysis field.

Thank you for your attention!

Contact: Dr Gilberto Montibeller

Email: g.montibeller@lse.ac.uk

Address:

Department of Management

London School of Economics

Houghton St., London, WC2A 2AE