

Risk and expert judgment

Mark Burgman

cebra

Centre of Excellence for
Biosecurity Risk Analysis



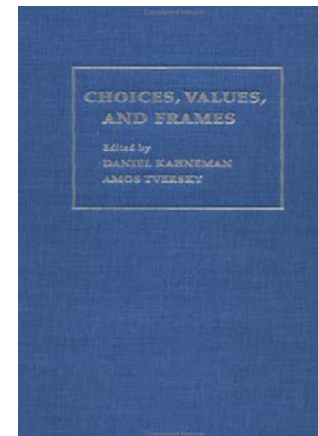
Against the grain: In November last year, demonstrators took their grievances to the World Trade Organisation in Paris.



Why people worry about the 'wrong' things

Judgements in uncertain situations are coloured by...

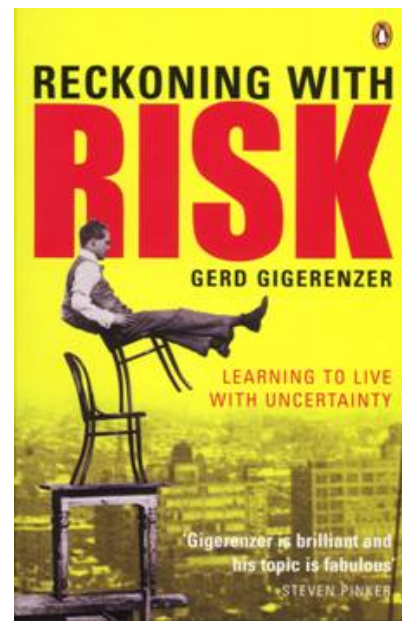
- overconfidence
- framing
- level of personal control
- understanding of the issues
- degree of personal experience
- dreadfulness of the outcome (kill size, outrage)
- equitability
- visibility
- status

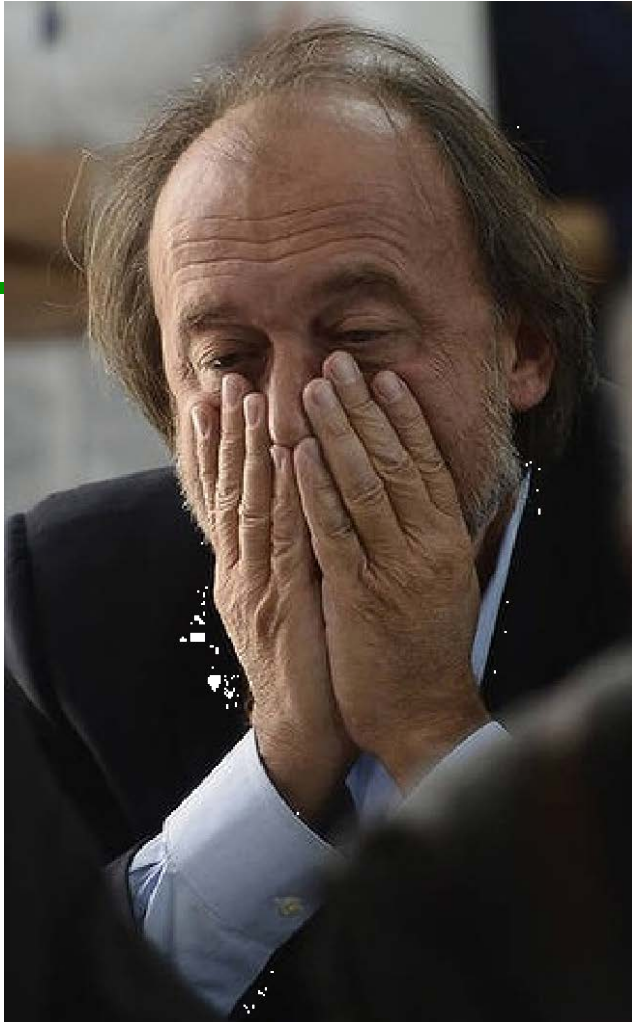


Pathology of risk perception

leading to ...

- insensitivity to sample size (Law of Small Numbers)
- appeals to authority
- framing effects
- overconfidence
- anchoring
- hindsight bias
- availability bias
- motivational bias

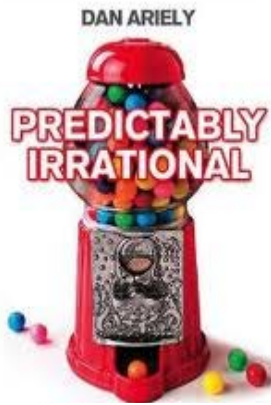




Bernardo De Bernardinis ... gave media interviews saying tremors "posed no danger". Photo: AFP

Read more:

<http://www.theage.com.au/world/scientists-found-guilty-for-earthquake-deaths-20121023-2823y.html#ixzz2AkBfFkMV>



FUTURE BABBLE

Why Expert Predictions Fail — and Why We Believe Them Anyway

Dan Gardner
Bestselling author of *Risk*

"Future Babble is genuinely amusing, and should be required reading for journalists, politicians, academics, and anyone who listens to them."
—STEVEN LEVITT, author of *How the Mind Works*

A NEW YORK TIMES BUSINESS BESTSELLER
"An entertaining and thought-provoking as *The Tipping Point* by Malcolm Gladwell... The Wisdom of Crowds ranges far and wide."
—*The Boston Globe*

THE WISDOM OF CROWDS

JAMES SUROWIECKI

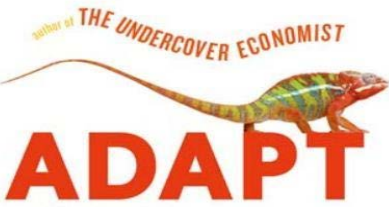
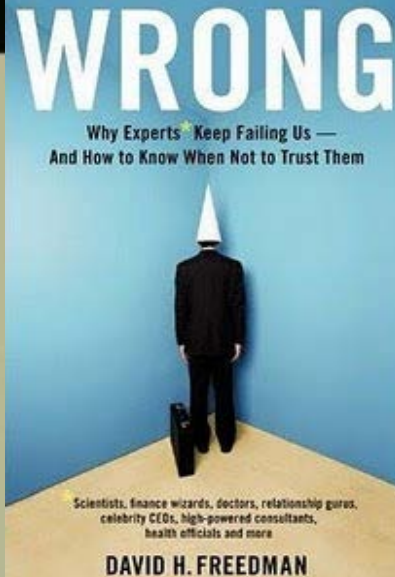
WITH A NEW AFTERWORD BY THE AUTHOR



PHILIP E. TETLOCK

EXPERT
POLITICAL
JUDGMENT

How Good Is It? How Can We Know?



ADAPT

WHY SUCCESS ALWAYS STARTS WITH FAILURE

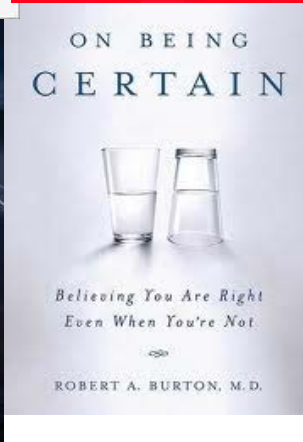
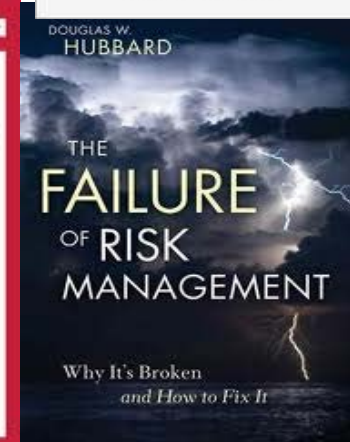
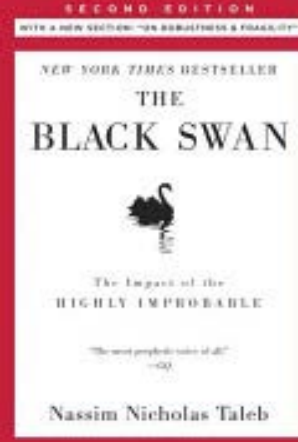
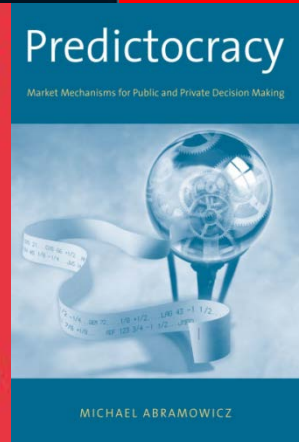
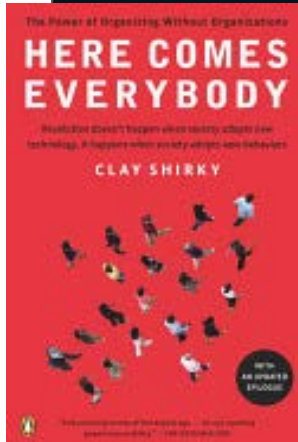
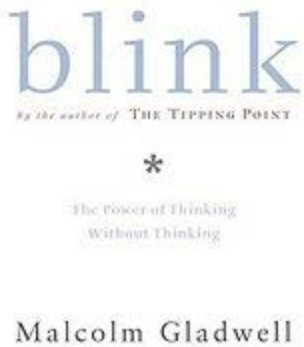
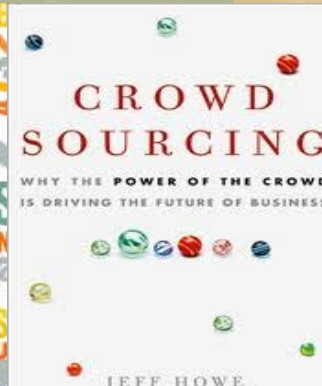
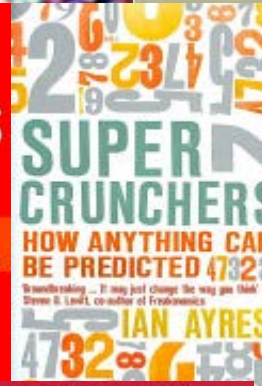
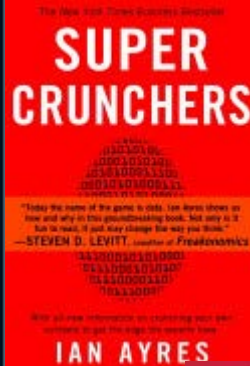
TIM HARFORD

"Harford presents complex arguments with unfailing clarity and wit"
Sunday Times

Harnessing the Power of Counterintuition

THINK TWICE

MICHAEL J. MAUBOUSSIN



What can groups do?

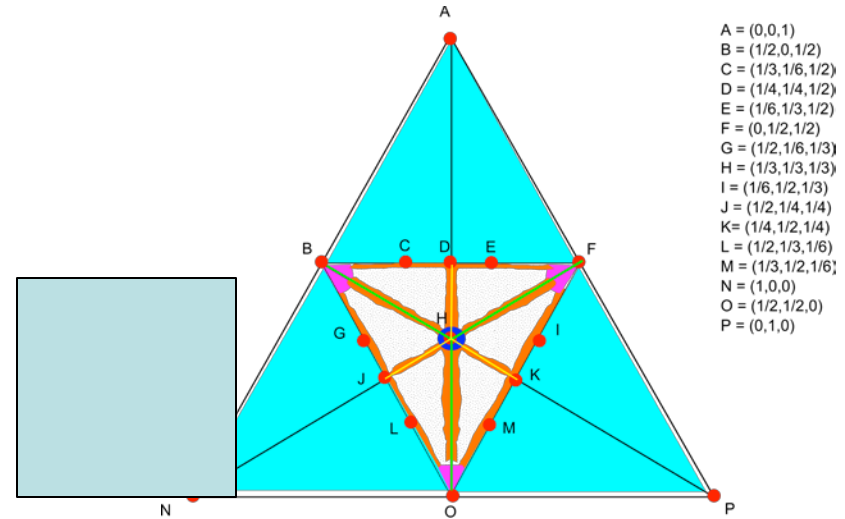
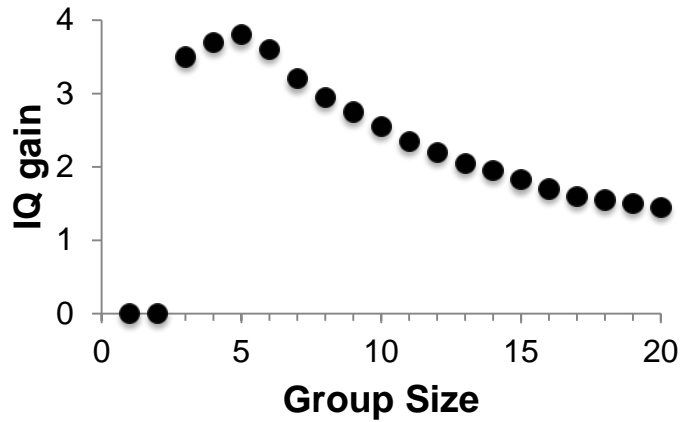
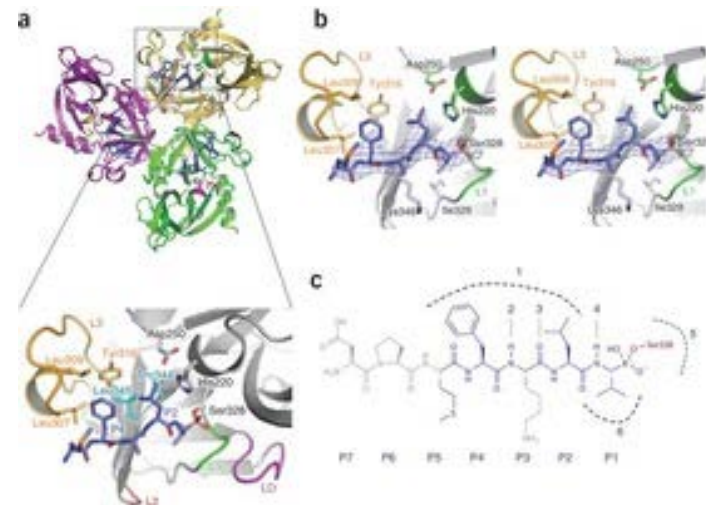
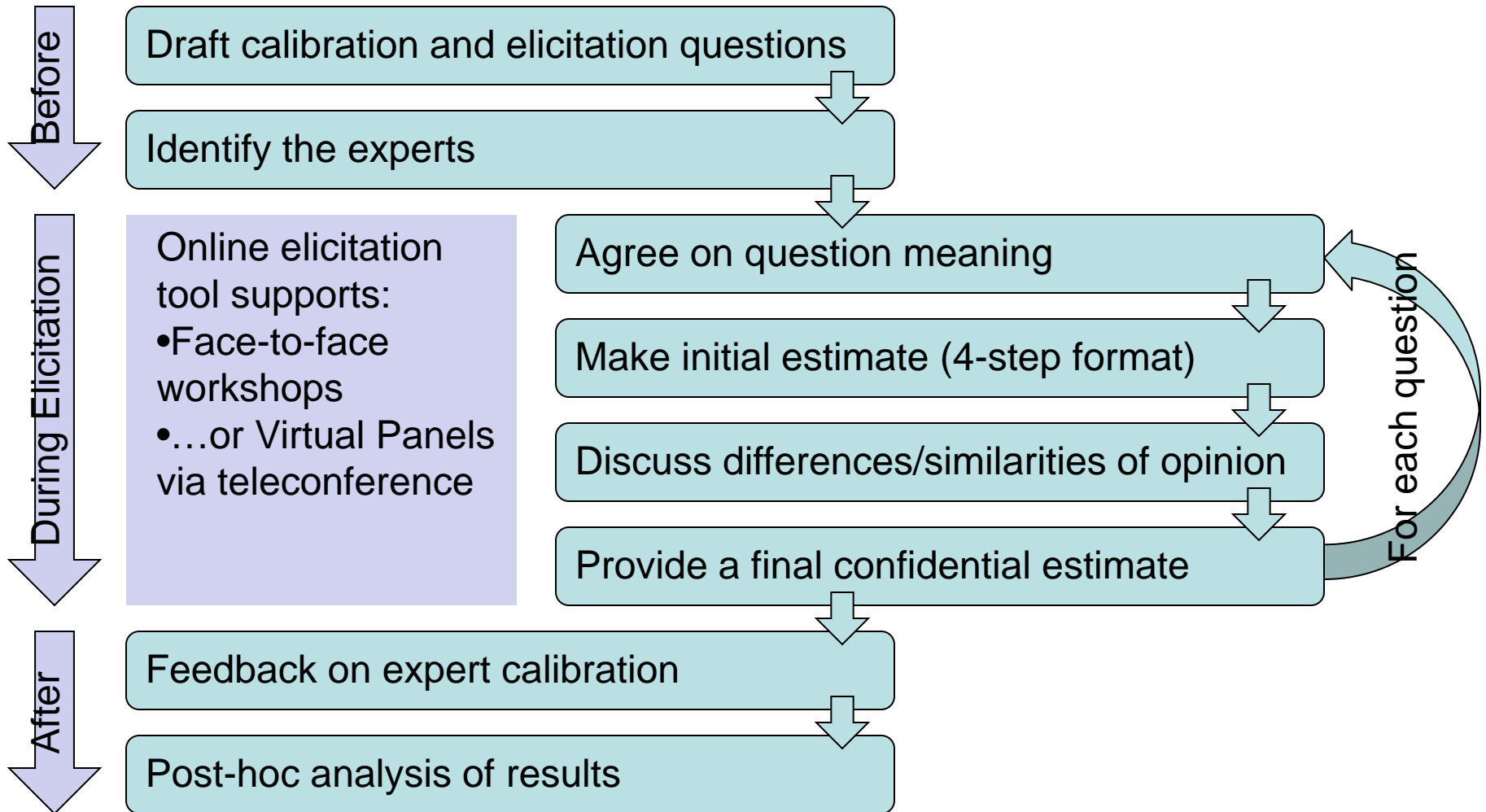


Photo # NH 70305 USS Scorpion comes alongside USS Tallahatchie County, April 1968



Integrated elicitation process



The 3-step Procedure

Columbia University was the last ivy league school to admit women.

Columbia University admitted women before 1980 (Y/N)?

1. What do you think is the **lowest** probability that this statement is true?

2. What do you think is the **highest** probability that this statement is true?



3. Realistically, what is your **best estimate**?

Columbia University was the last ivy league school to admit women. Did it admit women before 1980 (Y/N)?

Columbia University was the last ivy league school to admit women. Did it admit women before 1980 (Y/N)?

NO! They were admitted in 1983.



George Mason University (Mason)

- Charles Twardy (PI), Kathryn Laskey (Co-PI), Robin Hanson

Australian Center of Excellence for Risk Analysis



Gold Brand Software

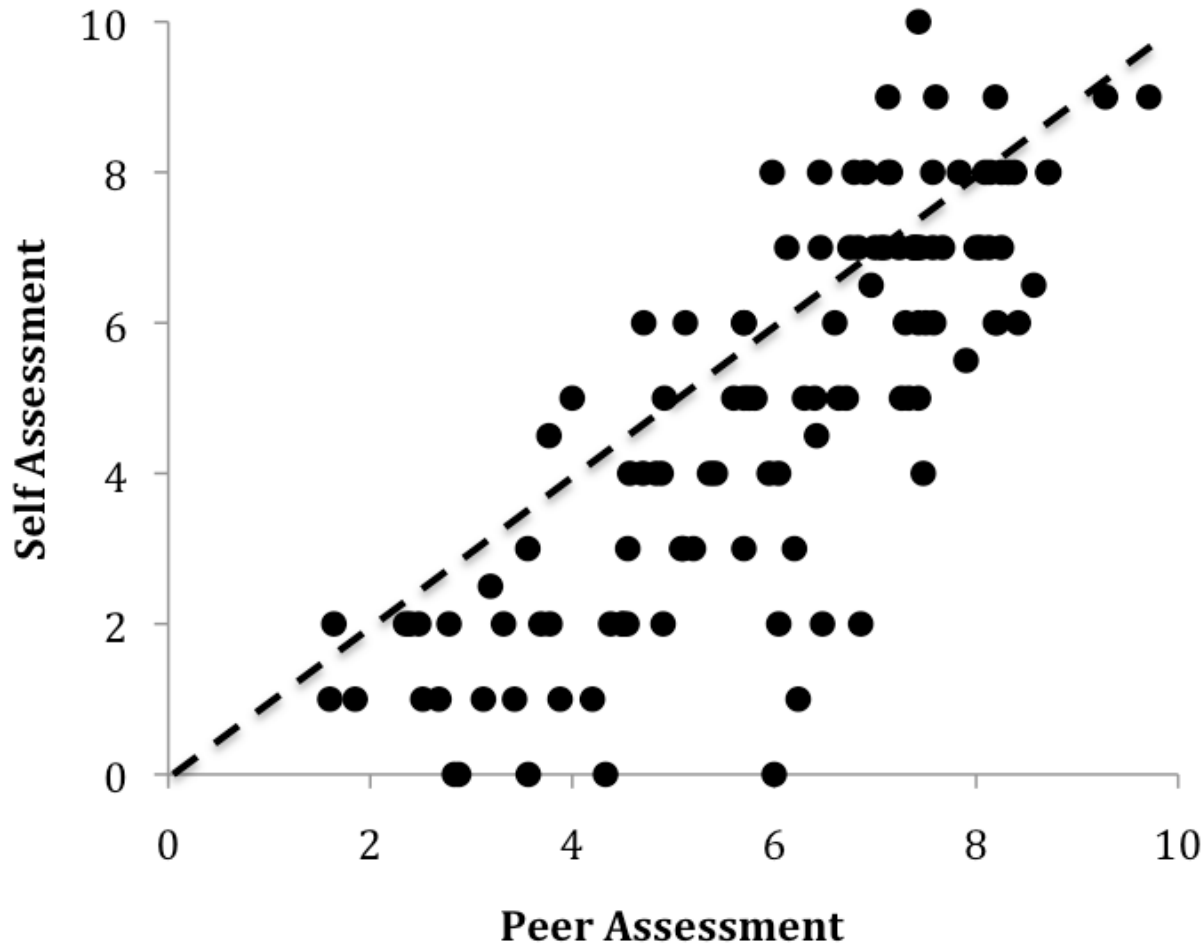
And a supporting cast of thousands....

Intelligence Advanced Research Projects Activity

(IARPA) invests in high-risk/high-payoff research programs that have the potential to provide our nation with an overwhelming intelligence advantage over future adversaries



Peer versus self assessments

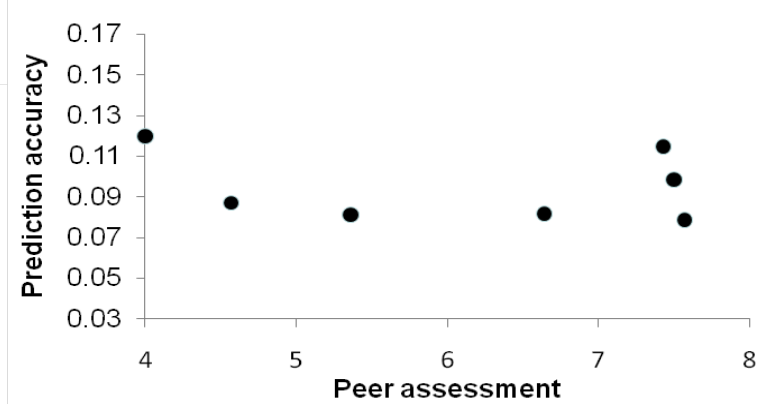
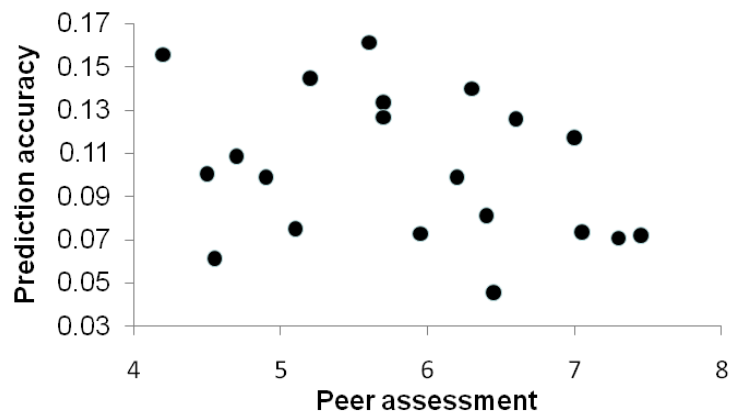
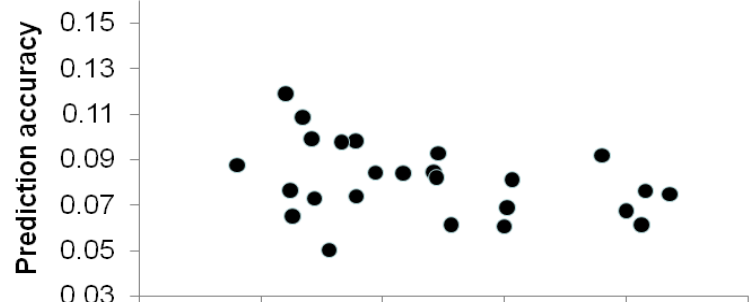
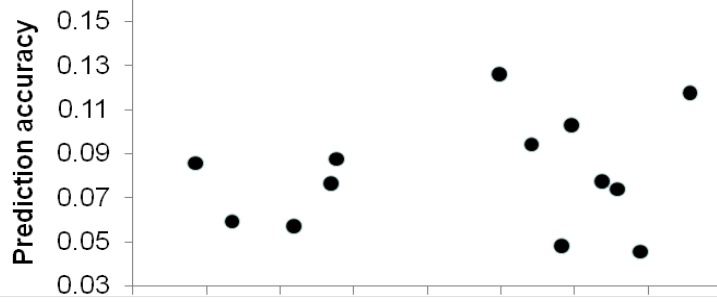
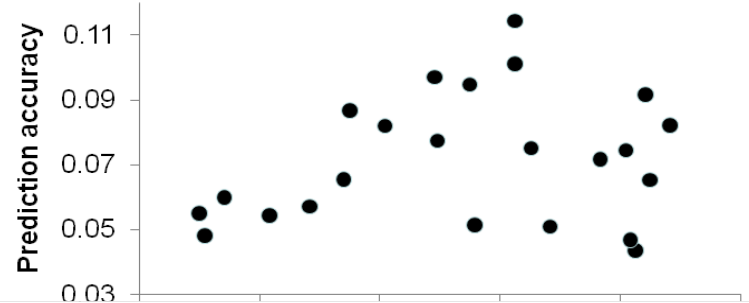
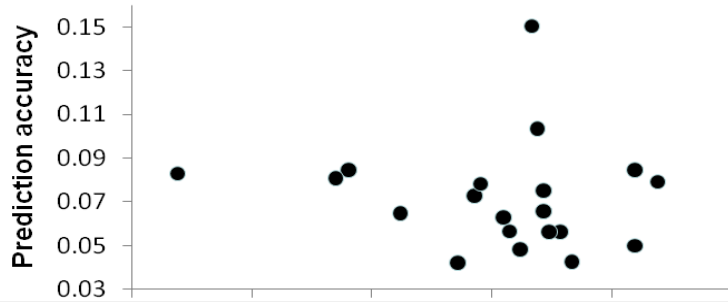


$r = 0.85$

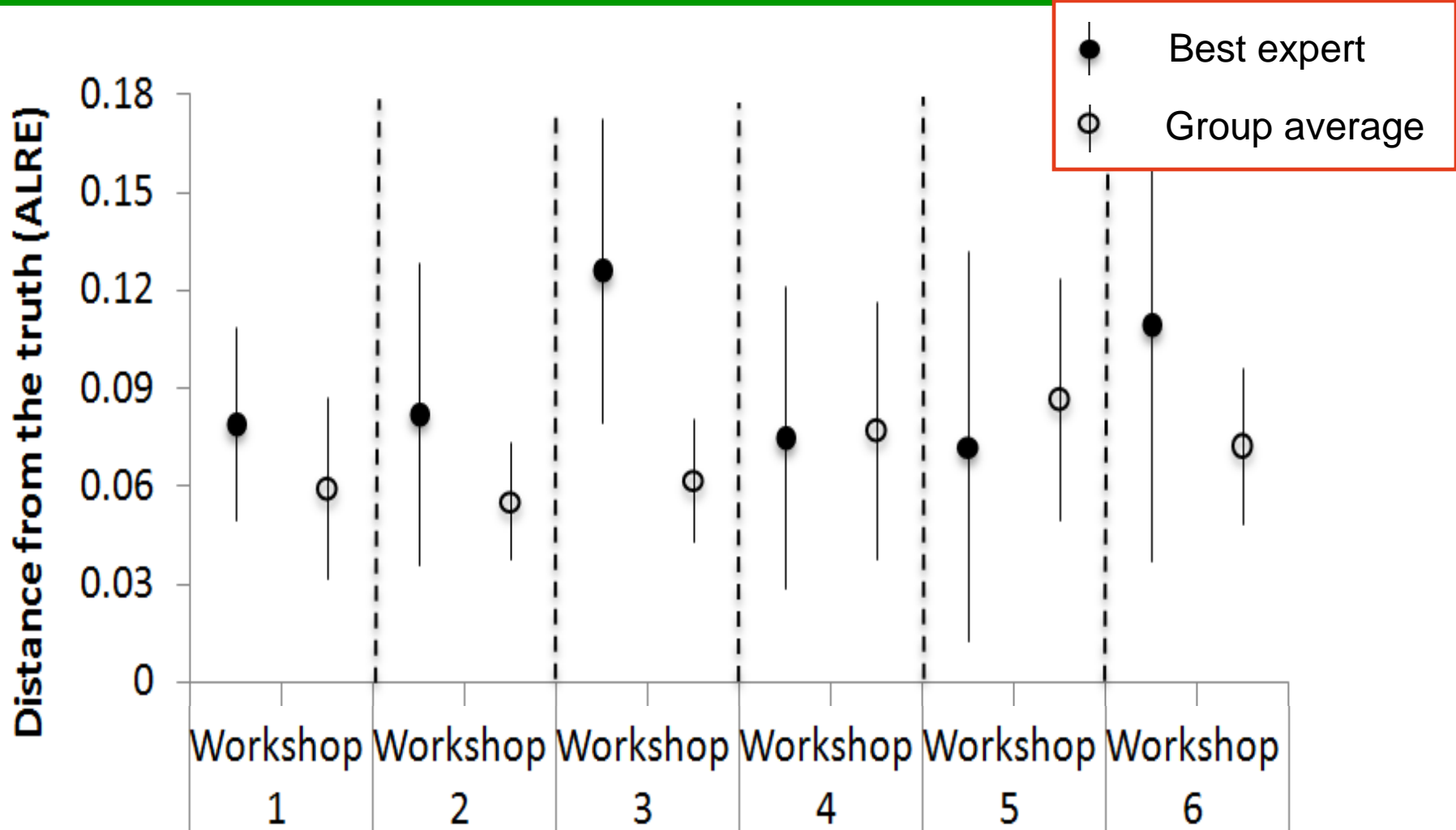
*Range across
workshops
[0.675 to 0.944]*

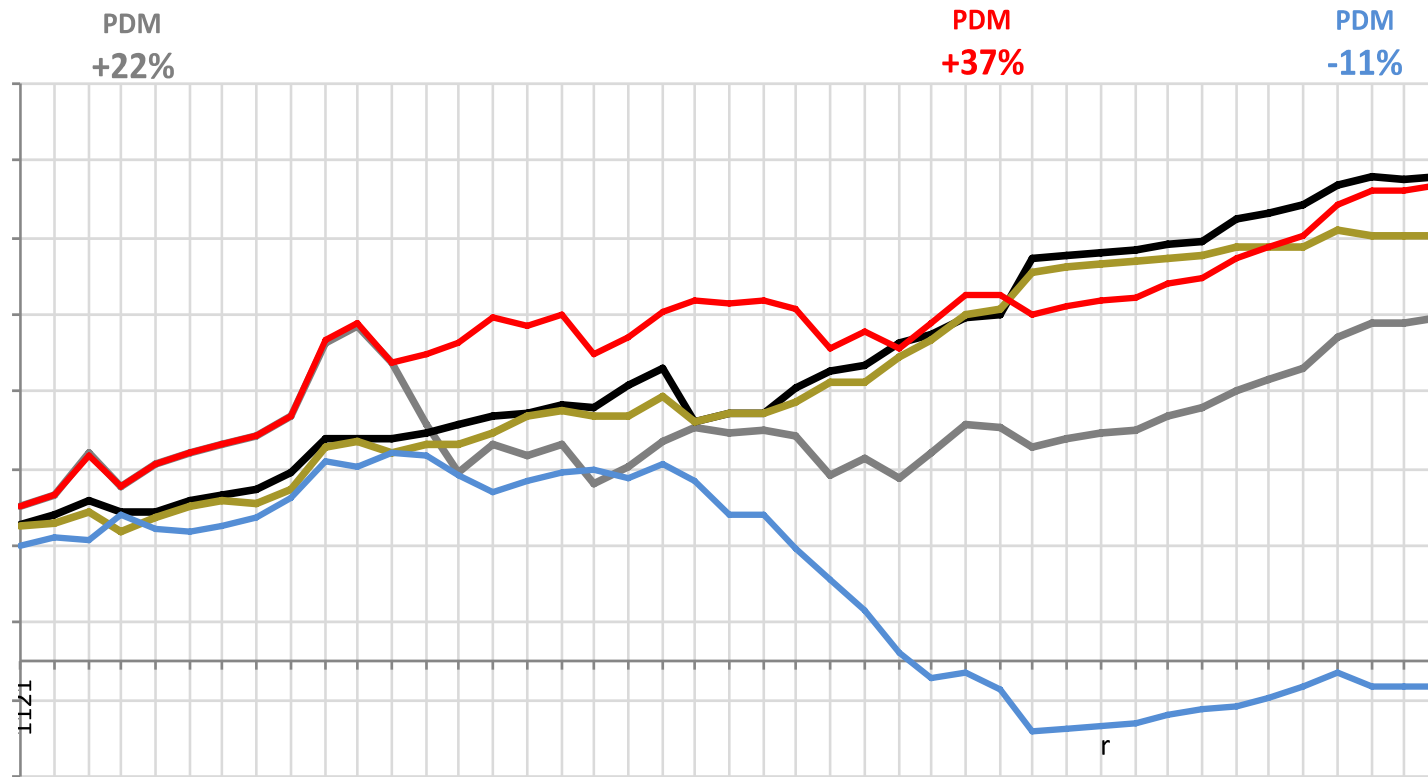


Do peer assessments correlate with performance?



'Best' expert versus the group





Relying on individuals...

- overconfidence, hindsight bias
- framing
- availability bias
- reference group, base rate neglect
- using the person who (everyone believes) knows the most: the status effect
- undetected linguistic uncertainty

Relying on naïve groups...

- naïve question formulation: linguistic uncertainty
- unstructured discussion
- dominance, group-think
- common data sources / lack of independence
- uniformity in context, culture, styles of reasoning

Ask individuals to...

- Consider counter-arguments
- Answer the same question in different ways (lowest, highest, most likely)
- Indicate confidence
- Examine estimates made by other people (feedback)
- Revise original estimates after feedback
- Anticipate issues with conditional probabilities, base rates, ...

Then, don't rely on individuals...

- Discuss questions to eliminate linguistic uncertainty
- Make groups diverse—age, gender, background and cognitive style
- Encourage groups to discuss and revise question meaning
- Use psychologically, culturally and contextually diverse, independent people
- Avoid group think— Delphi / independent data / anonymity in judgments