

How To Measure Anything

An Executive Overview of Applied Information Economics

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How do we know what works?

Applied Information Economics (AIE): A practical decision making approach based entirely on methods that have shown a measurable improvement in estimates and decisions



Introduction

Where you are in the training

www.HubbardResearch.com/Training

Analyst Training	Calibration and Simulation Training	Special Topic Training		
How to Measure Anything: An Executive Overview of AIE	Calibrated Probability Assessments	The Failure of Risk Management		
How to Make Decisions Under Uncertainty	Advanced Calibration Methods	How to Measure Anything (HTMA) in Project Management		
Statistical Measurement Methods in Excel: Basic	Creating Simulations in Excel: Basic	HTMA in Cybersecurity Risk		
Statistical Measurement Methods in Excel: Intermediate	Creating Simulations in Excel: Intermediate	HTMA Innovation		



Deciding How to Decide The Meta-Decision

- How to Measure Anything
 Overcoming the Illusion of Intangibles
- Applied Information Economics
 Putting What Works Together



Introduction

How Applied Information Economics started



























How do we know what works?

"Intelligence analysts should be self-conscious about their reasoning processes. They should think about how they make judgments and reach conclusions, not just about the judgments and conclusions themselves."

Dick Heuer, The Psychology of Intelligence Analysis

Meta-Decision Criteria: Is there real evidence, scientifically measured, that shows that one method is better than another?

















The Analysis Placebo

Confidence in decision making methods is detached from performance

Organizational Behavior and Human Decision Processes

1<u>07 no 2 (2008)· 97– 105</u>

Journal of Behavioral Decision Making 3, no. 3 (July/ September 1990): 153–174.

Law and Human Behavior 23 (1999): 499-516.

Organizational Behavior and Human Decision Processes 61, no. 3 (1995): 305–326.

Interaction with Others Increases Decision Confidence but Not nce Decision Quality: Evidence against Information Coll Province of Interactive Decision Making

Heath and Gonzalez

<u>Abstract</u>

We present three studies of *interactive decision making*, where decision makers interact with others before making a final decision alone. Because the theories of lay observers and social psychologists emphasize the role of information collection in interaction, we developed a series of tests of information collection. Two studies







Why experience alone may not be enough to make the meta-decision





Why experience alone may not be enough to make the meta-decision



Daniel Kahneman Gary Klein



Considerations in using the Subject Matter Expert (SME)

Subject Matter Experts...





Considerations in using the Subject Matter Expert (SME)

Subject Matter Experts...



... are statistically overconfident



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... are statistically overconfident

... are highly inconsistent



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Subject Matter Experts...

... are statistically overconfident

... are highly inconsistent

...have erroneous intuition about the math



Considerations in using the Subject Matter Expert (SME)



Subject Matter Experts...

... are statistically overconfident

... are highly inconsistent

...have erroneous intuition about the math

...vary greatly in measured performance.



Another good quote

"The first principle is that you must not fool yourself, and you are the easiest person to fool." — Richard P. Feynman

"Some remarks on science, pseudoscience, and learning how to not fool yourself." Caltech's 1974 commencement address.



Using qualitative or "pseudo-quantitative" methods





Using qualitative or "pseudo-quantitative" methods





Using qualitative or "pseudo-quantitative" methods





The ubiquitous Risk Matrix



Bad



Unintended consequences of simple scoring methods





Good

Bad



David Budescu and Dick Heuer (separately) Researched the "illusion of communication" regarding interpretations of verbal labels for probabilities





The ubiquitous Risk Matrix





Unintended consequences of simple scoring methods







Craig R. Fox showed how arbitrary features of how scales are partitioned effects responses.

Example:

If "1" on a 5-point impact scale means "less than \$1 million loss", the share of that response is affected by the partition of *other* choices.

The Cost-Benefit Analysis Spreadsheet



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Cost Benefit Analysis probably improves some decisions...but there is a lot it can't do



Published in International Journal of Forecasting, 10 (1994), 495-906

Judgmental Decomposition: When Does It Work?

Donald G. MacGregor Decision Research, Eugene, OR

J. Scott Armstrong The Wharton School, University of Pennsylvania, Philadelphia, PA

Abstract

We hypothesized that multiplicative decomposition would improve accuracy only in certain conditions. In particular, we expected it to help for problems involving extreme and uncertain values. We first reanalyzed results from two published studies. Decomposition improved accuracy for nine problems that involved extreme and uncertain values, but for six problems with target

Conventional "cost-benefit analysis" approaches may improve decisions but...

- They are deterministic
- They do not specify uncertainty
- They can't prioritize measurements
- They can't quantify risk



What the research says about statistical methods vs. Subject Matter Experts



Paul Meehl assessed 150 studies comparing experts to statistical models in many fields (sports, prognosis of liver disease, etc.).



"There is no controversy in social science which shows such a large body of qualitatively diverse studies coming out so uniformly in the same direction as this one."



Philip Tetlock tracked a total of over 82,000 forecasts from 284 experts in a 20year study covering politics, economics, war, technology trends and more.



"It is impossible to find any domain in which humans clearly outperformed crude extrapolation algorithms, less still sophisticated statistical ones."





- 173 cybersecurity were surveyed regarding opinions about quantitative risk analysis methods in their fields
- There was a bit more resistance to quantitative methods than acceptance.
- They also took a quiz on basic statistical literacy
- When we looked only at those responses that scored above the median on statistical literacy, there was a lot more acceptance.
- When we look at those that did not score above the median, resistance was much higher.
- Those who answered "I don't know" on stats literacy questions were not the most resistant to quantitative methods – it was those who thought they did know and were wrong.



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The double standard







The double standard







The double standard



Don't commit the classic "Beat the Bear" fallacy. Exsupero Ursus

There is a double standard when evaluating algorithms vs. human experts.

Even when algorithms perform better than a human expert, people penalize the algorithm for an error more than the human.













- Introduction to the Meta Decision
- Analysis Placebo & Limits of Experience
- Four broad categories of decision-making approaches
- Obstacles to quantitative methods



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The Myth of Immeasurability









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