

DECISION-MAKING UNDER UNCERTAINTY

Naturalistic and Expert Judgement

Klein · Simon · Gigerenzer

PAPER 02 / 03

A Furtherance reference compendium on the intellectual traditions behind organisational design, leadership, execution, and culture.

IN THIS PAPER

The first paper cast heuristics as sources of bias. This paper puts the opposing case: that bounded, intuitive, rule-of-thumb reasoning is not a failure of rationality but an adaptation to a hard, uncertain world – and often the smarter choice. The question: when should we trust intuition and simple rules over analysis?

The three figures reframe the debate. Simon establishes that real rationality is bounded and that people satisfice rather than optimise. Klein shows that expert decisions rest on recognition, not comparison. Gigerenzer demonstrates that simple heuristics can beat complex models when they fit the environment.

Herbert Simon 1916–2001

Bounded rationality · economics, psychology and AI

CORE THESIS

Rationality is **bounded** by the limits of the mind and the constraints of information and time. People do not optimise across all options; they **satisfice** – search until they find an option good enough to meet an aspiration level, then stop. Rational behaviour is shaped as much by the structure of the environment as by the mind.

FRAMEWORK

Concept	Meaning
Bounded rationality	Reasoning constrained by cognition, information and time
Satisficing	Choosing the first option that clears an aspiration threshold
Aspiration levels	The “good enough” bar, adjusted up or down with experience
Cognition–environment	Behaviour is the joint product of mind and setting

METHODOLOGY

Interdisciplinary theory spanning economics, psychology, organisation theory and artificial intelligence; recognised with the 1978 Nobel in economics.

SIGNIFICANCE AND CRITIQUE

The common root of both later camps – the biases programme and the ecological one – and one of the twentieth century's most influential social scientists. The critique: satisficing is under-specified, since the theory says little about how aspiration levels are set and revised.

Gary Klein b. 1944

Naturalistic decision making · the recognition-primed model

CORE THESIS

Experts in real, high-pressure settings do not weigh options against each other. They **recognise** the situation as one they have seen before, generate a single workable option, simulate it mentally, and act – the **recognition-primed decision**. Intuition is not mystical; it is pattern recognition compiled from experience.

FRAMEWORK

Step in the RPD model	What happens
Recognise	Match the situation to familiar patterns and cues
Generate	Produce the first workable option, not a slate of them
Simulate	Mentally run the option through to check it works
Act or adjust	Implement it, or amend and re-simulate if it fails

Klein's **pre-mortem** – imagining a decision has already failed and asking why – is a practical guard against the overconfidence of recognition.

METHODOLOGY

Field studies of experts in situ – firefighters, nurses, military commanders – using cognitive task analysis rather than laboratory tasks.

SIGNIFICANCE AND CRITIQUE

Restored legitimacy to expert intuition against the pessimism of the biases programme; his adversarial collaboration with Kahneman set the terms for when intuition can be trusted. The critique: intuition is reliable only in **high-validity** environments – regular, with prompt, clear feedback – and is hard to systematise elsewhere.

Gerd Gigerenzer b. 1947

Ecological rationality · fast-and-frugal heuristics

CORE THESIS

Heuristics are not second-best shortcuts but smart tools: in an uncertain world, **less can be more**. A heuristic's success is a matter of **ecological rationality** – how well its simple structure fits the structure of the environment. Simple rules often *outperform* complex models, because they ignore the noise that complex models overfit.

FRAMEWORK

Fast-and-frugal heuristic	How it works
Recognition heuristic	If you recognise one option and not the other, pick it
Take-the-best	Decide on the single best cue; ignore the rest
1/N rule	Split resources equally rather than optimising weights
Gaze heuristic	Hold a fixed angle to intercept a moving target

The underlying logic is the **bias-variance trade-off**: simple models generalise better under uncertainty. Gigerenzer also shows that **natural frequencies** (“10 in 1,000”) make risk far easier to reason about than probabilities.

METHODOLOGY

Mathematical modelling, simulation and experiment, comparing the real-world performance of simple heuristics against complex statistical models.

SIGNIFICANCE AND CRITIQUE

Reframed “biases” as adaptations and drew the crucial line between risk (quantifiable) and uncertainty (not). The critique: the scope of the claim is contested – the biases camp argues simple heuristics also fail in identifiable ways – and the debate over when each applies is unresolved.

Synthesis

Theorist	Core stance	Key concept	View of “bias”
Simon	Rationality is bounded	Satisficing	A rational response to limits
Klein	Expertise is recognition	Recognition-primed decision	Intuition as compiled experience
Gigerenzer	Simple rules can be smarter	Ecological rationality	Often an adaptation, not an error

FOR THE OPERATOR

This camp reframes the first paper's pessimism: rationality is bounded but adaptive (Simon), expert intuition is real pattern-recognition (Klein), and simple heuristics can beat complex models when they fit the environment (Gigerenzer). For the operator, the useful question is not “is this a bias?” but “does this rule fit this environment?” – trust intuition where feedback is fast and regular, and distrust it where it is not. The final paper turns to the environments where feedback is poorest of all: forecasting the genuinely uncertain future.