

How we mitigate uncertainty

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Do we need to know that things are certain, or is a little uncertainty still okay?
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Uncertainty is a paradox. On one hand, it is a potent and powerful force that motivates research, a need to know. The gratifying result of research is evidence used to guide practice and policy.

On the other hand, uncertainty always remains after [research](#) because of the inherent complexity and ambiguity of the real world. So policy-makers and practitioners are (or ought to be) troubled about inevitable residual doubt. Examples include what to do about climate change, what body mass index is ideal and whether to test for prostate cancer.

Why uncertainty remains

Research may help reduce uncertainty, but it can never provide certainty. Research is an errorful process that peers into an obscure reality.

Determining what is true is plagued by the [problem of induction](#), which was recognised in antiquity by Pyrrhonian sceptic [Sextus Empiricus](#). As British philosopher [David Hume](#) explains, [it is a mistake](#) to infer "that instances of which we have had no experience resemble those of which we have had experience".

Research evidence may be useful, but it cannot deliver certainty. Another British philosopher, [Charlie Dunbar Broad](#), notes that inductive reasoning is the "glory of science" and the "scandal of philosophy".

In effect, concluding from one observation, or even many, what is true may be wrong. Accordingly then, claims may simply be false alarms.

Falsification was [Karl Popper](#)'s response to the induction problem. In his view, we can disprove notions but can never prove anything. For instance, the generalisation that all swans are white can never be proved, but it can be disproved by the discovery of just one black swan.

The theory of falsification acknowledges that research findings are never certain, but raises a new problem: many useful truths may be missed as confirmation is not possible, and disconfirmation may never be achieved.

Research is caught on the horns of a dilemma, between reporting what may be a false alarm and missing out on identifying an important truth for lack of evidence.

Ultimately, none of this is very satisfying. Researchers, it appears, cannot escape uncertainty.

How do we cope with uncertainty?

Uncertainty is an uncomfortable position for many people and will generally give rise to varying levels of [uncertainty-related anxiety](#). So how do we cope?

One approach is to deny the uncertainty, to act as if the eureka moment is true. But overconfidence does not eliminate the uncertainty as incorrect theories, conclusions and claims based on research often reveal.

Sometimes even the most famous get it very wrong as Mario Livio details in his book, [Brilliant Blunders](#).

Another approach is to accept that there is doubt about what is true, being careful to distinguish doubt from denial. The confusion of the two is seen in the common use of the word sceptic as a denier of the research, such as a climate-change sceptic.

But a sceptic in the philosophical sense of the word acknowledges that what is true is uncertain. Scepticism is a factor that limits confidence as revealed in the 18th-century British anthropologist and philosopher Thomas Henry Huxley's [definition of agnosticism](#):

In matters of the intellect do not pretend that conclusions are certain which are not demonstrated or demonstrable.

For instance, in any modelling of future weather – be it tomorrow, next week or two decades hence – it must be acknowledged that there is doubt about what will happen.

But a researcher expressing such a view about future climate projections in the current environment is very likely to be howled down by those who dogmatically divide the world into believers and deniers.

Claiming evidence-based knowledge and uncertainty simultaneously is a tough position for the researcher to hold, but arguably a very important one. For this reason, epidemiologist and journalist [Elizabeth Pisani](#) and physician and writer [Michael Crichton](#) observe that while research feeds policy, there is much danger when the two become entangled and, in particular, when research becomes political.

Advocates for action can be especially intolerant of uncertainty and may seek to simply dismiss it. An important role for researchers is to stand up for uncertainty.

A good researcher will maintain a degree of scepticism, according to the North American philosopher Pierre Le Morvan. He [describes](#) "the doubtful scientist" and "the humble scholar" as prototypes of "healthy scepticism".

The third option is resignation and despair. This, however, does not solve the problem of uncertainty. Rather, it simply returns us to the observation that uncertainty is unsettling for many.

Uncertainty *is* unsettling. Research seeks truth but will always falls short. The uncertainty that remains encourages humility and discourages hubris among the advocates for action.

For researchers, uncertainty is a motivating force with an endless supply.

If research is never final and [uncertainty](#) always remains, then one certainty is that there will always be plenty more work to do.

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