

## Overview: Theories of Thought Experiments

In the *Logic of Scientific Discovery* (New Appendix XI 1968), Popper distinguishes three uses of *Gedankenexperimente* (thought experiments):

- *Apologetic* use: in defense or support of a theory; dubious success.
- *Critical* use: against a theory. Galileo is classic case; we aim to show that a theory is incoherent, or that certain possibilities are overlooked. The key in this case is to ensure that the thought experiment's scenario is itself possible (if it is not, it cannot be critical).
- *Heuristic* use: to illustrate or make plausible a theory. Example: suppose we divide a piece of gold until we reach particles so small, we cannot further divide them: these are atoms (lit. 'uncuttables').

Brown & Fehige (*Stanford Encyclopedia*, [www.plato.stanford.edu](http://www.plato.stanford.edu)), refine this typology further. Critical thought experiments are *destructive* in four ways:

- highlight or expose a contradiction, which effectively refutes a theory;
- show that a theory is not (fully) consistent with other beliefs that we hold (e.g., Schrödinger's cat);
- undermines a critical premise or assumption of the thought experiment itself: start with an assumption promoted by theory *T*, and then develop a scenario against *T*, which shows that *T* rests on a confused or flawed assumption;
- 'counter thought experiments' that pitch one thought experiment against another; counter-claim is developed plausibly by a different scenario.

*Constructive* (apologetic and heuristic) thought experiments fall into five approaches.

- (1) *Intuitionism* (Brown). Thought experiments yield *a priori* knowledge of a Platonic realm, or of laws of nature.
- (2) *Argument View* (Norton). Thought experiments are (deductive or inductive) arguments; the scenario has premises and a conclusion.
- (3) *Re-Conceptualisation View* (Kuhn). Thought experiments elicit conceptual revision, and hence contribute to paradigm shifts.
- (4) *Experimentalism* (Sorensen). Thought experiments are like real experiments, albeit limiting (unexecuted) cases: they test theories, identify phenomena, and so on.
- (5) *Mental Modeling* (Bishop). Thought experiments manipulate mental models of possible worlds (counterfactual situations).

Of course, there is also the *sceptical view* that thought experimenting is a dubious method that often leads to ambiguous results.

## Molyneux's Question for Locke (*Essay* II.ix.8)

§ 8. We are farther to consider concerning Perception, that the *Ideas we receive by sensation, are often in grown People alter'd by the Judgment*, without our taking notice of it. When we set before our Eyes a round Globe, of any uniform colour, *v.g.* Gold, Alabaster, or Jet, 'tis certain, that the *Idea* thereby imprinted in our Mind, is of a flat Circle variously shadow'd, with several degrees of Light and Brightness coming to our Eyes. But we having by use been accustomed to perceive, what kind of appearance convex Bodies are wont to make in us; what alterations are made in the reflections of Light, by the difference of the sensible Figures of Bodies, the Judgment presently, by an habitual custom, alters the Appearances into their Causes: So that from that, which truly is variety of shadow or colour, collecting the Figure, it makes it pass for a mark of Figure, and frames to it self the perception of a convex Figure, and an uniform Colour; when the *Idea* we receive from thence, is only a Plain variously colour'd, as is evident in Painting. To which purpose I shall here insert a Problem of that very Ingenious and Studious promoter of real Knowledge, the Learned and Worthy Mr. *Molineux*,\* which he was pleased to send me in a Letter some Months since; and it is this: *Suppose a Man born blind, and now adult, and taught by his touch to distinguish between a Cube, and a Sphere of the same metal, and nighly of the same bigness, so as to tell, when he felt one and t'other, which is the Cube, which the Sphere. Suppose then the Cube and Sphere placed on a Table, and the Blind Man to be made to see. Quære, Whether by his sight, before he touch'd them, he could now distinguish, and tell, which is the Globe, which the Cube.* To which the acute and judicious Proposer answers: *Not. For though he has obtain'd the experience of, how a Globe, how a Cube affects his touch; yet he has not yet attained the Experience, that what affects his touch so or so, must affect his sight so or so; Or that a protuberant angle in the Cube, that pressed his hand unequally, shall appear to his eye, as it does in the Cube.\** I agree with this thinking Gent. whom I am proud to call my Friend, in his answer to this his Problem; and am of opinion, that the Blind Man, at first sight, would not be able with certainty to say, which was the Globe, which the Cube, whilst he only saw them: though he could unerringly name them by his touch, and certainly distinguish them by the difference of their Figures felt. This I have set down, and leave with my Reader, as an occasion for him to consider, how much he may be beholding to experience, improvement, and acquired notions, where he thinks, he has not the least use of, or help from them: And the rather, because this observing Gent. farther adds, that *having upon the occasion of my Book, proposed this to divers very ingenious Men, he hardly ever met with one, that at first gave the answer to it, which he thinks true, till by hearing his reasons they were convinced.*

*Study Questions.* How should we classify this thought experiment? Which approach seems to fit it best?

