

Review of Karl Popper, *Unended Quest* (Routledge Classics 2002)

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Read-through quotes and notes

Quotations from *Unended Quest* are delimited using < >, while quotations from elsewhere are delimited using ‘ ’ or “ ”.

Ch.7, pp.15-30: Popper commences this <Long Digression Concerning Essentialism> with his <anti-essentialist exhortation>, <Never let yourself be goaded into taking seriously problems about words and their meanings>; and then he spends the rest of the chapter discussing obscure/arcane arguments concerning what is meant by a <theory>; including what is meant by the <content> of a theory, which in his view comes in two variants, <logical content> and <information content>. There are several problems with this:

- What is the point of an <exhortation> that is so promptly ignored by its own author?;
- While Popper has an assumed idea of what constitutes a <theory>, at no point does he crystallise this idea by means of a working definition, so it's never entirely clear what he's talking about;
- By comparison, my working definition, likening a theory to a model or a tool, is clear, concise, and intuitively easy to interpret and apply;
- And my simple rule-of-thumb that 'Everything is defined through its associations' effectively makes redundant any discussion of the <content> of a theory.

p.82: To Bühler's <three levels or functions of language> {<the expressive function>, <the signal or release function>, <the descriptive function>} Popper adds <the argumentative function>. By also including 'the applicative function', and referring to {Expressive, Imperative, Descriptive, Argumentative, Applicative} respectively, we get the mapping {Empiricist = Expressive; Idealist = Descriptive; Activist = Imperative; Conformist = Applicative; Theorist = Argumentative}, which compares well with those in Review05.pdf p.3.

p.88: Popper describes <scientific progress> as <moving towards theories which tell us more and more – theories of ever greater content>. I disagree: in my view scientific progress involves the continual development of a 'toolkit' of theories, and the refinement of their constraints (or limits, or boundary conditions), and the demonstration of their practical application in classic experiments undertaken by 'scientists', *i.e.*, those who know when and how to use 'the right tool for the job'.

Ch.18, pp.101-108: Popper objects to the prevailing interpretation of quantum mechanics, as set out by <the Copenhagen orthodoxy>, <von Neumann's famous proof> of the <alleged incompatibility> of quantum mechanics with <a prima facie deterministic theory>, and <Heisenberg's so-called "indeterminacy principle">. I agree with his broad sentiment, but not necessarily with some of his more detailed points. In particular:

- Popper's solution to <the famous problem of the "reduction of the wave packet"> <consists in pointing out that the probabilities occurring in quantum mechanics were *relative probabilities* (or conditional probabilities)>, which sounds great, but does it solve the problem as claimed?;
- Popper states that the <particle picture> and the <wave picture> of quantum mechanics were <incompatible> to the extent that <I could not persuade myself that I understood Bohr's "complementarity"> between them. My understanding is that these 'pictures' (or 'models', as I was taught to call them) give two different perspectives of a single underlying reality, in which case the disagreement is simply a matter of semantics, *i.e.* Popper is engaging in what he would call <essentialism>.

pp.117-118: <degree of corroboration> is Popper's proposed mathematical metric for <the content of a statement or a theory>. Clearly this relates to his notion of <scientific progress>, see p.88; and since I don't agree with that description, I'm inclined to disregard this associated metric. In any case, when I was at the LSE in 1983-84 I learned that still there was no robust and practical mathematical formulation of <corroboration>; and thus I was more persuaded by 'the Bayesians', who argued that their formula was easier to defend (theoretically) and to apply (experimentally). But now I don't see the need for either approach.

Ch.28, pp.146-152: Popper and Einstein agreed on a <realist> cosmology, for which <The reality of time and change> was <the crux>. Furthermore, Einstein also <could not understand what Bohr meant by complementarity>. As for the future development of the field, <we can always continue asking why-questions ... This is why the evolution of physics is likely to be an endless process of correction and better approximation>. But this implicitly assumes that the eventual end-point is a single all-encompassing theory: which indeed was the aim of theoretical physics, at least in the 1970s and 1980s when I was a student; then it was called the 'Grand Unified Theory' (GUT); but nobody talks about it now. By comparison, my present view is that the aim of physics (or, indeed, any natural or social science) is the continual development of a toolkit of several different theories, each of which has its own finite domain of applicability, see also my comments for p.88 above. And I'm of the opinion that the arguments about the interpretation of quantum mechanics described here and in Chapter 18 would have evaporated if the combatants had taken this perspective. In particular:

- As I've indicated already, the toolkit approach reduces the incompatibility/complementarity debate to a matter of nit-picking semantics;
- And if there is no GUT then <Gödel's famous incompleteness theorem> doesn't apply, so we can ignore pp.149-151.

p.152: <Already in 1937, when trying to make sense of the famous "dialectic triad" (thesis: antithesis: synthesis) by interpreting it as a form of the method of trial and error-elimination, I suggested that all scientific discussions start with a problem (P₁), to which we offer some sort of tentative solution – a tentative theory (TT); this theory is then criticized, in an attempt at error elimination (EE); and as in the case of dialectic, this process renews itself: the theory and its critical revision give rise to new problems (P₂). | Later, I condensed this into the following schema: P₁ → TT → EE → P₂, | a schema which I often used in lectures.> This is (near enough) what Thomas Kuhn called 'normal science', and I call 'iterative development'; and most or all of Popper's related concerns in this chapter (pp.152-156) can be addressed by also invoking what Kuhn called 'paradigm-shifting', and I call the 'toolkit approach'; see MyPhilosophy03.pdf p.5.

p.153: <Which comes first, the problem or the theory?>, with a reference to endnote 210 on p.265, <Compare this with the problems "Which comes first, the hen (H) or the egg (O)?", and "Which comes first, the Hypothesis (H) or the Observation (O)?", discussed on p.47 of C.&R.>. Likewise my 2001 IDEAL paper refers to the 'chicken and egg' metaphor, see *How to Make a Mind* (HMM) p.201. But this is a thoroughly banal phrase in common usage, and it's unlikely that it came to me just because I'd once read something similar in *Conjectures and Refutations*. For that matter, I don't recall ever reading it there. And my resulting conclusion^{RK} is so different from anything written by Popper^{KP} that I'm confident it's wholly original.

^{RK} "The key feature of 'scientific method' is not 'induction' or 'falsification', but iteration", see HMM p.206.

^{KP} Popper would never have associated induction and falsification in this way, and he doesn't appear to use the word 'iteration'; at least, I've yet to find it in *Unended Quest*.

p.162: <Criticism ... presupposes the existence of objective knowledge, in the form of *formulated theories*. Thus it is only through language that conscious criticism becomes possible. This, I conjecture, is the main reason for the importance of language; and I conjecture that it is human language which is responsible for the peculiarities of man (including even his achievements in the nonlinguistic arts such as music).> It's not just <conscious criticism> or <the peculiarities of man> that can be attributed to our use of language, it's "all of the higher-level cognitive traits and faculties that we associate with the human mind, or the human soul", see Review05.pdf p.2.

p.183: <Boltzmann at first interpreted his H-theorem as proving a *one-directional increase of disorder with time*. But as Zermelo pointed out, Poincaré had proved previously (and Boltzmann never challenged this proof) that every closed system (gas) returns, after some finite time, to the neighbourhood of any state in which it was before. Thus all states are (approximately) recurring for ever; and if the gas was once in an ordered state, it will after some time return to it. Accordingly there can be no such thing as a preferred direction of time – an "arrow of time" – which is associated with entropy increase.> Either the system is sufficiently simple that the H-theorem is provable, in which case Poincaré recurrence also applies; or the system is too complex for either analysis to be valid. In neither case can one infer anything about the <preferred direction of time>, which from Chapter 28 I'd assumed to be a basic axiom of Popper's <realist> cosmology. So while this is an interesting retelling of a tragic episode in the history of physics, I'm not sure it teaches us very much, other than the usual warning not to apply experimental results and/or theoretical parameters outside their intended domain. See also MyPhilosophy03.pdf p.2.

Ch.36, pp.189-194: <The Subjectivist Theory of Entropy ... originally due to Leo Szilard ... The edifice that has been built on Szilard's (in my opinion invalid) argument, and on similar arguments by others, will continue, I fear, to grow; and we will continue to hear that "entropy – like probability – measures the lack of information", and that machines can be driven by knowledge, like Szilard's machine. Hot air and entropy, I imagine, will continue to be produced for as long as there are some subjectivists about to provide an equivalent amount of nescience.> Popper is spot on, both in his <realist> instincts, and in his deployment of such withering sarcasm. The key reference on this topic is K G Denbigh and J S Denbigh, *Entropy in Relation to Incomplete Knowledge* (CUP 1985).

p.211: <If we call the world of "things" – of physical objects – the *first world*, and the world of subjective experiences (such as thought processes) the *second world*, we may call the world of statements in themselves the *third world*. (I now prefer to call these three worlds "world 1", "world 2", and "world 3"; Frege sometimes called the latter the "third realm".)> I reject this entirely. It's just as mistaken as the proliferation of 'worlds' in medieval Christian theology or its modern revival, Philip Pullman's *His Dark Materials* trilogy, see HDMNotes.pdf.

pp.218-219: <I think that I was always a Cartesian dualist (although I never thought that we should talk about "substances"); and if not a dualist, I was certainly more inclined to pluralism than to monism. I think it silly or at least high-handed to deny the existence of mental experiences or mental states or states of consciousness; or to deny that mental states are as a rule closely related to states of the body, especially physiological states.> I am sure that I am *not* a Cartesian dualist; and while I don't <deny the existence of mental experiences> *etc.*, this hasn't given rise to any obvious paradoxes or absurdities in my way of looking at the world. Again, see HDMNotes.pdf for my rejection of "material-spiritual duality" as well as "the many-worlds hypothesis" (as "false metaphysics" and "false physics" respectively), in favour of "the singular material universe".

p.226: <I shall ... say nothing more than that values emerge together with problems; that values could not exist without problems; and that neither values nor problems can be derived or otherwise obtained from facts, though they often pertain to facts or are connected with facts.> As I state in

Review05.pdf p.3, for a language to be capable of expressing anything at all of an abstract nature it must distinguish several linguistic dualisms, including values and facts, and questions and answers. What I don't state (because to me it's perfectly obvious) is that in distinguishing these dualisms the language necessarily establishes the mutual independence of their constituents, including values from facts, and questions from answers. Thus Popper's observations are correct, but they only see part of the picture, in comparison with Review05.pdf, which I maintain is both coherent and complete (while being much shorter and easier to understand than *Unended Quest*).

Summary observations and conclusions

I first encountered Sir Karl Popper and his writings forty years ago, and the experience was profound. At the time I fully subscribed to his descriptions and conjectures concerning the nature of science and its method, and it took years – decades, even – for me to develop my own independent perspective. Indeed, I still consider him to be an equal-but-distinct member of my 'holy trinity' of contemporary scientific heroes, the others being James Lovelock and Daniel Kahneman. This being the case, one would've thought that I'd be well-acquainted with *Unended Quest*, which was first published as *Autobiography by Karl Popper* in 1974: but not a bit of it; this is the first time I've even looked inside its covers. However, this complacent neglect and belated regret can be put to good use, by now framing this review with the (obvious and leading) questions: firstly, how does my reading of Popper's <Intellectual Autobiography> affect my view of the man and his ideas; and, secondly, how does it affect my view of me and my ideas?

I'd been dimly aware that Popper's view of the world had been formed in the crucible of 'logical positivism', as propounded by the Vienna Circle; but until reading *Unended Quest* I'd had no idea of the extent to which he'd also been influenced by his interactions with – and, increasingly, his arguments against – the greatest physicists and philosophers of the twentieth century. Einstein, Bohr, Heisenberg, Schrödinger; Russell, Gödel, Tarski, Wittgenstein: what a pantheon! And Popper was perfectly placed to connect the two disciplines, by taking a philosopher's analytical perspective of the new science, and a scientist's practical perspective of the old methodology. He did both, with mixed results. On the one hand, Bohr's bone-headed Copenhagen interpretation of quantum mechanics has become so much the dominant orthodoxy that Popper's powerful counter-arguments are now worth no more than a brief historical footnote – more's the pity. On the other hand, Popper's successful assault on the venerable but (as it turns out) entirely fictitious method of 'inductive reasoning' has so revolutionised epistemology that it has established a whole new field of research, the 'philosophy of science'. Thus it's clear to me that Sir Karl Popper isn't just a great philosopher of science, he's *the* great philosopher of science. Consequently I'll always regard him as my foremost intellectual influence in this area; and my present reading of *Unended Quest* has only confirmed this perspective.

As for me and my ideas: the earliest evidence of any divergence from Popper's deep footprints was in 2001 with my research paper announcing IDEAL, now reproduced as HMM Appendix 1. As well as emphasising iteration over both induction and falsification, this paper poses a significant challenge to Popper's use of *modus tollens*. My discussion of this in HMM pp.42-43 concludes, "This makes me think that, having spent my entire working life trying to become a good scientist, in this paper I have finally arrived at my true calling, and demonstrated that I have also become a good philosopher of science. ... And you don't need me to define *modus tollens* or falsificationism to understand what this means to me." Further points of agreement or disagreement are discussed in *Principia Intellegentia* (2009), but none of them are as significant as the present finding that Popper's ill-defined and rudimentary notion of a <theory> is easily trumped by my own 'toolkit approach'. This in turn justifies the following main conclusion of this review of *Unended Quest*: Sir Karl Popper was the great philosopher of science; a giant on whose shoulders I stand.