

Debunking Popper: A Critique of Karl Popper's Critical Rationalism

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Introduction¹

Karl Popper was without question one of the most eminent philosophers of the 20th Century. Author of several ground-breaking and highly influential books, and of hundreds of articles; winner of many rare prizes and other honours, such as a British knighthood; and founder of two new schools of thought, Critical Rationalism and Evolutionary Epistemology: few thinkers have made more extensive contributions to the intellectual life of their times. When he died in 1994, after a career spanning nearly 70 years, many agreed with his fellow philosophers Anthony Quinton and Rom Harré that Popper was “this century’s most important philosopher of science,” and “the last of the great logicians.”²

As the name Critical Rationalism may suggest, Popper regarded a critical attitude as the most important virtue a philosopher could possess. Indeed, he called criticism “the lifeblood of all rational thought” (PKP2 977) and, as his obituarists implied, it was towards science, and the logic of science, that his critical powers were chiefly directed. In his magnum opus, *The Open Society and its Enemies*, he wrote: “... all criticism consists in pointing out ... contradictions or discrepancies, and scientific progress consists largely in the elimination of contradictions wherever we find them. This means, however, that science proceeds on the assumption that *contradictions are impermissible and avoidable* ... once a contradiction is admitted, all science must collapse” (OSE2 39).

It is thus surprising to discover that Popper himself hardly lived up to this ideal of non contradiction. When one examines Critical Rationalism, for example, one soon notices that it is based on questionable premises; that its internal logic is seriously flawed; that it is inconsistent with other elements of Popper’s thought; and that it leads to conflicts with his own publicly stated convictions. The following pages elaborate this case.

1. A Brief Description of Critical Rationalism

Critical Rationalism has been referred to, by Popper himself and by others, as the theory of falsification, or falsificationism, and as fallibilism. It would be tempting, for the sake of brevity, to employ ‘fallibilism’ throughout, but the term is also associated with the founder of Pragmatism, C.S. Peirce, who actually coined it long before Popper began his career.³ This paper therefore follows the lead of later Popperians such as W.W. Bartley III⁴ and David Miller⁵ in employing Critical Rationalism, which in any case better encompasses Popper’s thought.

The Critical Rationalism of Karl Popper (henceforth CR) begins by rejecting

induction as a scientific method. The *actual* method of science, Popper maintained, is a continuous process of conjecture and refutation: "The way in which knowledge progresses, and especially our scientific knowledge, is by unjustified (and unjustifiable) anticipations, by guesses, by tentative solutions to our problems, by *conjectures*. These conjectures are controlled by criticism; that is, by attempted *refutations*, which include severely critical tests. They may survive these tests; but they can never be positively justified: they can be established neither as certainly true nor even as 'probable'..." (C&R vii).

Elsewhere, Popper put the matter more succinctly: "all knowledge is hypothetical" (OKN 30) or "All knowledge remains... conjectural" (RASC xxxv); and it is in the form 'all knowledge is conjectural' that the essence of his philosophy has been captured - and has influenced others.⁶

CR was originally developed by Popper to demarcate science from non-science. He stated that for scientific knowledge to be considered *knowledge* it had to be refutable: "In so far as scientific statements refer to the world of experience, they must be refutable ... in so far as they are irrefutable, they do not refer to the world of experience" (OSE2 13).

It follows that we can never attain certainty: "The quest for certainty... is mistaken.... though we may seek for truth... we can never be quite certain that we have found it" (OSE2 375). "No particular theory may ever be regarded as absolutely certain.... No scientific theory is sacrosanct..." (OKN 360). "Precision and certainty are false ideals. They are impossible to attain and therefore dangerously misleading..." (UNQ 24). He summed up with an oft-repeated aphorism: "*We never know what we are talking about*" (UNQ 27).

Accordingly, Popper refused to grant any philosophical value to definitions: "Definitions do *not* play any very important part in science.... Our 'scientific knowledge'... remains entirely unaffected if we eliminate all definitions" (OSE2 14). "Definitions never give any factual knowledge about 'nature' or about the 'nature of things'" (C&R 20-21). "Definitions.... are never really needed, and rarely of any use" (RASC xxxvi).

Although he held these positions all his working life, Popper did acknowledge that they were open to criticism: "nothing is exempt from criticism ... not even this principle of the critical method itself" (OSE2 379).

2. The First Premise of CR

Popper built his philosophy on foundations borrowed from Hume and Kant. His first premise was wholehearted acceptance of Hume's attack on induction. The second, to be addressed in the next section, was agreement with Kant's view that it is our ideas which give form to reality, not reality which gives form to our ideas.

Hume, whom Popper called "one of the most rational minds of all ages" (PKP2 1019), is renowned for elaborating the 'problem of induction' - a supposedly logical proof that generalisations from observation are invalid. Most later philosophers have accepted Hume's arguments, and libraries have been filled with attempts to solve his 'problem.'

Popper thought he had the answer. "I believed I had solved the problem of induction by the simple discovery that induction by repetition did not exist"

(UNQ 52; cf OKN 1ff & PKP2 1115). What really took place, according to Popper, was CR, knowledge advancing by means of conjecture and refutation: "... in my view here is no such thing as induction" (LSCD 40); "what characterises the empirical method is its manner of exposing to falsification, in every conceivable way, the system to be tested" (LSCD 42).

Hume, said Popper, had shown that: "there is no argument of reason which permits an inference from one case to another... and I completely agree" (OKN 96). Elsewhere he referred to induction as "a myth" which had been "exploded" by Hume (UNQ 80). He further asserted that "There is no rule of inductive inference - inference leading to theories or universal laws - ever proposed which can be taken seriously even for a minute" (UNQ 146-7; see also RASC 31).

The Problem with 'The Problem'

Popper's solution was certainly correct in one respect. The problem of induction would indeed vanish if there were no such thing as induction. However, the issue would be resolved much more positively were it to turn out that Hume had been *wrong*, and that there never had been any problem with induction in the first place. And, in point of fact, this is the case. Despite his great skill as a thinker and writer, Hume missed the point. Induction does not depend for its validity on observation, but on the Law of Identity.

Hume stated, in essence, that since all ideas are derived from experience we cannot have any valid ideas about future events - which have yet to be experienced. He therefore denied that the past can give us any information about the future. He further denied that there is any necessary connection between cause and effect. We experience only repeated instances, we cannot experience any "power" that actually causes events to take place. Events are entirely "loose and separate.... *conjoined* but never *connected*."

According to Hume, then, one has no guarantee that the hawthorn in an English hedge will not bear grapes next autumn, nor that the thistles in a nearby field won't produce figs. The expectation that the thorn will produce red berries, and the thistles purple flowers, is merely the result of "regular conjunction" which induces an "inference of the understanding."⁸ In Hume's view, there is no such thing as objective *identity*, there is only subjective "custom" or "habit."

However, Hume also wrote: "When any opinion leads to absurdities, it is certainly false"⁹ and the idea that one might gather grapes of thorns or figs of thistles is surely absurd enough to qualify. And false is what Hume's opinions most certainly are. Left standing, they lead to what he himself called "the flattest of all contradictions, viz. that it is possible for the same thing both to be and not to be."¹⁰

The crux of the case against Hume was stated in 1916 by H.W.B. Joseph in *An Introduction to Logic*: "A thing, to be at all, must be something, and can only be what it is. To assert a causal connexion between *a* and *x* implies that *a* acts as it does because it is what it is; because, in fact, it is *a*. So long therefore as it is *a*, it must act thus; and to assert that it may act otherwise on a subsequent occasion is to assert that what is *a* is something else than the *a* which it is declared to be."¹¹ Hume's whole argument - persuasive though it may be - is,

to borrow Joseph's words, "in flat conflict with the Law of Identity."¹²

Existence *implies* identity. It is not possible to exist without being *something*, and a thing can only be what it is: A is A. Any *actions* of that thing form part of its identity: "the way in which it acts must be regarded as a partial expression of what it is."¹³ Thus to deny any connection between a thing, its actions, and their consequences, is to assert that the thing is not what it is; it is to defy the Law of Identity.

It is not necessary to prolong this discussion. Entities exist. They possess identity. By careful observation - free from preconception - we are able to discover the identities of the entities we observe. Thereafter, we are fully entitled to assume that like entities will cause like events, the form of inference we call induction. And, because it rests on the axiom of the Law of Identity, correct induction - free from contradiction - is a valid route to knowledge. The first premise of CR is therefore false.

There is nonetheless a substantial grain of truth in Hume's position, or few philosophers would have followed him. The grain lies in the *precision* of our knowledge of future events. Hume denied all knowledge of the future because we can have no experience of it. As we have seen, this is not true, it overlooks the Law of Identity. What *is* true, is that our prediction of events is limited by the unforeseeable. An 'O' ring may fail and destroy an otherwise reliable spacecraft; an icy road surface may cause a pristine Rolls-Royce to crash. For, no matter how sound our judgment or wide our experience, we cannot possibly have complete, certain and absolute knowledge of future events. We are not omniscient: all kinds of unforeseen happenings *may intervene* to spoil even the best laid of our plans, and of course new information about old subjects continuously comes to light. But, armed with the Law of Identity, there is no reason to allow the unforeseeable to turn us into sceptics. The universe is not a series of "loose and separate events" any more than time is a series of discrete, unrelated segments of duration.

It should also be noted that, in fact, all knowledge of entities, and all knowledge of language, is acquired inductively. A child's knowledge of apples, for example, is based on a very limited sampling. A student's knowledge of the word 'inference' is founded on a similarly narrow acquaintance. If it were true that induction is a myth, then all knowledge of external reality, all language, and all human thought - which depends on knowledge of reality and on language - would be myths as well, including, of course, CR.

3. Popper's Kantian Premise

Popper described himself as an "unorthodox Kantian" (UNQ 82); i.e., he accepted part of Kant's epistemology, but not all of it: "Kant was right that it is our intellect which imposes its laws - its ideas, its rules - upon the inarticulate mass of our 'sensations' and thereby brings order to them. Where he was wrong is that he did not see that we rarely succeed with our imposition" (OKN 68n31; cf OKN 328, C&R 48-9).

Popper's Kantianism reveals itself most clearly in his view of our senses, which he saw as creative modifiers of incoming data, not as neutral 'windows on the world': "Classical epistemology which takes our sense perceptions as

'given', as the 'data' from which our theories have to be constructed by some process of induction, can only be described as pre-Darwinian. It fails to take account of the fact that the alleged data are ... adaptive reactions, and therefore interpretations which incorporate theories and prejudices and which, like theories, are impregnated with conjectural expectations... there can be no pure perception, no pure datum..." (OKN 145).¹⁴

A Fundamental Difficulty

Popper's Kantian premise raises enough issues for a book. In this short paper, there is room only for a single objection. Namely, if it is true that our senses are pre-programmed; if it is true that "*there is no sense organ in which anticipatory theories are not genetically incorporated*" (OKN 72); then what flows into our minds is *determined* and what flows out of them is *subjective*. If our senses are not neutral, if they organise incoming data using pre-set theories built into them by evolution, then they do not provide us with unalloyed *information*, but only with *prescriptions*, the content of which is determined by our genetic make up. Whatever is thereafter produced inside our heads - cut off as it is from any objective contact with reality - must be subjective.

Popper's Kantian premise thus deprives CR of universality. Since it is ultimately the product of the pre-programmed interpretation of the data which entered Popper's mind, CR is a theory which can only be applied to Popper. According to his own view of his contact with reality, he would not be able to verify the relevance of CR to anybody else.

Solipsism looms, yes, but that is a natural consequence of all theories of determinism. For if thought, or the basis of thought, is determined; whether by social class, or the subconscious, or whatever determinant is preferred; then the deterministic theory itself must be determined, according to the theory, and can only be relevant to the person who expounds it. Everybody else is determined by *their* class, subconscious, genes, material substrate, environment, or whatever it is that is supposed to do the determining. All theories of determinism are, to use Brand Blanshard's term, 'self-stultifying'.¹⁵

The objection is analogous to the one raised by Anthony Flew against those philosophers - eg Hume and Kant - who claim that we can only have knowledge of our own sense impressions. If sense data are all we can know, solipsism is the inevitable result: "mental images ... are (necessarily) private ... and (logically) cannot be accessible to public observation."¹⁶

Objectivity

In *Unended Quest* Popper observed bluntly that "there is no such thing as an unprejudiced observation" (UNQ 51). Although this appears to rule out the possibility of objectivity, that was not Popper's intention. Rather, again following Kant perhaps, he thought the basis for objectivity lay elsewhere: "the *objectivity* of scientific statements lies in the fact that they can be *inter-subjectively tested*" (LSCD 44). He later restated this slightly differently: "it is the public character of science... which preserves the objectivity of science" (POH 155-6).

Unfortunately, these assertions do not bear the weight placed upon them. For if Popper's Kantian premise is true (i.e., if anticipatory theories *are* geneti-

cally incorporated into our sense organs and, therefore, there is no such thing as an unprejudiced observation) then senses would not cease to be prejudiced merely by being multiplied. The defective logic could hardly be more clear. One cannot offer as an universal affirmative proposition 'all human senses are prejudiced, i.e. subjective' then ask one's readers to accept that pooling the senses of many persons yields objectivity. If senses are subjective individually they are subjective collectively.¹⁷

To conclude under this head, it is plain - even after only a very brief treatment - that Popper's Kantian premise, far from providing CR with a secure footing, leads instead to insuperable problems, not least of which are conflicts with Popper's own rejection of determinism and subjectivism in such works as *The Poverty of Historicism* and *The Open Universe*.

4. Language Difficulties

Popper called conjecture and refutation a "new way of knowing" (OSE2 383). However, from a commonsense point of view, it can immediately be objected that we do not normally claim to 'know' something which is neither "positively justified," "certainly true," nor even "probable" (C&R vii). Knowledge, for most people — and for most scientists — is something which it is possible to be sure of, to justify, to validate, to prove; in other words, *to know*.

Conjecture, on the other hand, is by definition not knowledge. According to *Chambers English Dictionary*, a conjecture is "an opinion formed on slight or defective evidence or none: an opinion without proof: a guess". Since one cannot define an idea by means of other ideas which are contrary to it, it is clearly illegitimate to place knowledge in the same category as conjecture. More pointedly, the proposition "all knowledge remains conjectural" is a contradiction in terms.

The objection gathers strength when one notices that Popper's proposition is itself *not* conjectural. Universal and affirmative, it states that "All knowledge remains conjectural" - which is a claim to knowledge. The proposition thus asserts what it denies and is self-contradictory on a second count.

Another immediate problem is that the notion of 'conjecture' depends for its intelligibility upon the prior concept of 'knowledge.' The idea of a 'conjecture' arose precisely to designate a form of mental activity which was *unlike* knowledge, and to distinguish clearly *from* knowledge an idea put forward as opinion without proof. In the Objectivist philosophy of Ayn Rand this error is known as 'the fallacy of the stolen concept.' A classic example was Proudhon's claim that 'property is theft.' But the concept of 'theft' depends on the prior concept of 'property' and would be unintelligible without it.¹⁹ In exactly the same way, and to repeat, the concept of 'conjecture' cannot be understood apart from the prior concept of knowledge - *from which* it is to be distinguished. For example, 'Northern Dancer might win the Kentucky Derby' was once a conjecture. When the horse did come first, its win became an item of knowledge.

The invalidity of the proposition 'All knowledge remains conjectural' becomes even more apparent when one considers that Popper employed a large vocabulary of English and German words all of which he had to learn, and

to *know*, in order to express any or all of his ideas. There is little conjectural about the words of a language: either the German word *Forschung* means 'scientific discovery' or it does not. Similarly, in all his philosophical and scientific work Popper depended on a broad range of core concepts - evolution, energy, light, atom, mass, force, etc - all of which are normally recognised as unalterable brute facts, not as conjectures. 'All knowledge is conjectural' may sound intriguing, but throughout his career Popper actually worked within a framework of knowledge, not of conjecture.

A further problem arises when one considers the concept of 'growth' in Popper's claim that knowledge grows through conjectures and refutations. (The subtitle of his book by that name is *The Growth of Scientific Knowledge*.) A legitimate response to this assertion is: 'What exactly is it that grows?' The concept of *growth* implies the existence of a thing, a body, an entity of some sort, *that which grows*. It may well be true that conjectures and refutations play a role in the growth of knowledge, but they could hardly do this without some knowledge to work on. The growth of knowledge via conjecture and refutation presupposes pre-existing *knowledge*, not pre-existing conjectures.²⁰

That the growth of knowledge implies *knowledge* is another illustration of Popper's dependence on something he attempted to deny, effectively 'stealing' a concept. CR is supposed to replace our commonsense idea of inductively-acquired knowledge with a more accurate one of a continuous process of conjecture and refutation. But that process would be meaningless without something for the process *to process*, and that something is knowledge, not conjecture.

Lastly, the proposition 'all knowledge is conjectural' is simply not true. The writer's observation that 'the sun is shining' is not conjectural, it is a fact known to him and countless other observers. At 2.15pm on 15 March 1999 in western England the sun is shining. The observation is no more conjectural than 'Bill Clinton is President of the USA (at time of writing),' or 'Einstein's grandparents are dead,' or 'the French for 'yes' is *oui*, or '2 plus 2 = 4.' These statements are *true*. They are demonstrable to any sane person; either ostensibly, or through the presentation of evidence beyond reasonable doubt, via simple common sense, or by means of logic. They constitute knowledge, *not* conjecture.

5. Problems in Practice

Other problems surface when one considers actually employing conjecture and refutation; i.e., when one looks at CR in practice. Briefly stated, the method urges us to conjecture, then to subject the resultant theory to severely critical tests. If it survives those tests, we are permitted to grant the theory a degree of verisimilitude, the more stringent the tests, the higher the degree.

The first problem is the method's apparent arbitrariness. The conjecture or theory to be tested - and Popper said the bolder the better - would presumably be selected by the tester. But no criterion for selection is given. We might be referred to an earlier CR exercise, but since that route risks infinite regress (via earlier and earlier CR exercises), the conjecture to be tested must fall outside the scope of CR. Therefore, unless further information is provided, it is not obvious how the charge of arbitrariness can be resisted.²¹

Consequently, the whole approach smacks of straw men. If a conjecture survives all CR tests, it could merely be that a 'virtuous straw man' (the conjecture) has one by one fended off an army of lesser straw men (the tests). But nothing would be proven by all this. Not only do we still require evidence of the worthwhileness of the conjecture, some other method is needed to show that the opposing arguments are truly exhaustive and not just straw. To use an analogy: it is perfectly possible for a dangerous lunatic to pass a driving test. Even the most stringent 'advanced driver' courses ever devised may not uncover the explosive unroadworthiness of 'the nut behind the wheel.'

The method of conjecture and refutation also appears to be a form of question begging. It must surely assume some measure of truth in the conjecture under examination, or there would be little point in the exercise. Put simply, the method states: 'My proposition deserves examination. Nothing in the process of examination undermined my proposition. Ergo my proposition has verisimilitude.' It may well have, but the proposition's *soundness* has not been established by that reasoning. One recalls the famously circular Ontological Argument for the existence of God: 'God is that than which nothing greater can be conceived. If 'that than which' didn't exist, it couldn't be 'the greatest'. Therefore God exists.' But the argument assumes in its first premise that which it sets out to establish and is clearly invalid.

The fact of the matter is that the truth of a proposition rests on the correct identification of the referents and relationships involved, not on any prior or subsequent *argumentation*. In any design, philosophical or practical, if a false identification is incorporated, whole libraries of arguments may not reveal the consequent flaws. A building can be the most beautiful ever built, but a single misplaced decimal point in a stress calculation can bring it crashing down. As Popper so rightly said: "*contradictions are impermissible and avoidable... once a contradiction is admitted, all science must collapse*" (OSE2 39).

6. Refutability as a Criterion of Demarcation

CR claims to distinguish science from non-science by the refutability of scientific theories. Popper's standard example was Newtonian physics, so radically displaced by Einstein.²² On the other hand, Popper maintained, there were theories such as those of Marx and Freud, which were non-science because irrefutable. This was Popper's famous 'criterion of demarcation,' which he developed as a young man and held to all his life.

Relatively few philosophers have embraced it however. Tom Settle, a major contributor to P.A. Schilpp's massive festschrift, *The Philosophy of Karl Popper*, stated firmly in 1970: "As a criterion of demarcation between science and non-science, Popper's 'falsifiability'-plus-a-critical-policy does not work" (PKP2 719). Other contributors evidently agreed; among them A.J. Ayer, William C. Kneale, Imre Lakatos, Grover Maxwell and Hilary Putnam.

One can understand the importance of the distinction to the young Popper. Fascinated by science, he was surrounded by true-believing Marxists and Freudians all of whom claimed science on their side while espousing doctrines which seemed to Popper obviously false. Nonetheless, 'refutability' seems to miss the mark. The ideas of Marx or Freud stand or fall on their conformity to

logic and the available evidence - in exactly the same way as the ideas of Newton or Einstein. Marxism and Freudianism failed to survive as viable theories due to myopic concentration on a narrow range of data, false interpretations of evidence, and logical inconsistency. They never were 'irrefutable.' They failed precisely because they could be, and were, *refuted*; either by contrary evidence, by exposure of contradictions, or by the resolute refusal of reality to conform to their predictions. It wasn't *refutability* which made them unscientific, it was inaccuracy and/or illogicality.

Science is distinguished by its strict adherence to physical evidence. Non-science, on the other hand, is invariably characterised by preconception, followed by a cavalier disregard for, or rationalisation of, anything that doesn't fit into the preconceived schema. In one sense, this is what Popper was saying. But, due perhaps to his dislike of definitions, he homed in on the wrong identifying characteristic.

There are other, more serious, criticisms of Popper's theory of demarcation. Grover Maxwell pointed out that 'All men are mortal' is a perfectly sound scientific statement which is not falsifiable (PKP1 292). Popper defended himself robustly (PKP2 1037ff), but Maxwell seemed to have the stronger case. Maxwell might also have taxed Popper about mathematics. The axioms of mathematics cannot be refuted. According to the demarcation theory, therefore, mathematics is not a science. But physics is inseparable from mathematics. Quantum mechanics, for example, could hardly be expressed without it. So physics cannot be a science either. Much the same could be said about logic. The Law of Contradiction, etc, cannot be refuted, so logic is not a science.

There is besides the singularly Popperian problem of Marxism. Marxism was one of the theories which led Popper to develop his conception of demarcation in the first place: "I had been shocked by the fact that the Marxists... were able to interpret any conceivable event as a verification of their theories" (UNQ 41-2). Yet in "Replies to my Critics" Popper changed his tune: "Marxism was once a scientific theory"; "Marxism was once a science" (PKP2 984-5). No doubt Popper would have swamped this objection with distinctions between Marx and Marxism, but the notion that Marxism could both be and not be a science does little to inspire confidence in Popper's theory of demarcation.

7. Popper's Via Negativa

One of the most troubling aspects of Popper's philosophy is his devout refusal to consider anything positive, a negativity which reminds one of the *via negativa* of medieval theology.²⁴ The scholastic principle, "we cannot know what God is, but rather what He is not" is remarkably similar to Popper's assertion that "natural laws.... do not assert that something exists or is the case; they deny it" (LSCD 69). CR is invariably concerned with what is *not*, never with what is. Yet the negative 'it is not' cannot be uttered without implying the positive 'it.' A negative *implies* a positive, unless one is actually denying the existence of an entity, but that is a different issue.

That negative implies positive was clearly understood by Popper. He referred to "the notion of falsity - that is, of untruth - and thus, by implication,

the notion of truth" (UNQ 98). But he did not seem to see that truth implies a '*what is*' question every time CR tells us *what is not*. It is a stolen concept situation: the idea of 'falsity' depends upon the logically prior idea of 'truth.' Or, as Anthony O'Hear has expressed it: "there can, in fact, be no falsification without a background of accepted truth."

Grover Maxwell also noted this problem. He pointed out that many theories are in fact *positively confirmed* (PKP1 292ff). Yet Popper continued to insist in "Replies to My Critics" that, "we certainly are not justified in reasoning from an instance to the truth of the corresponding law... *we are* justified in reasoning from a counterinstance to the *falsity* of the corresponding universal law" (PKP2 1020).

However, recalling Popper's Kantian premise, one might reasonably enquire at this point: If all observations are theory-laden, and thereby suspect, what justifies our placing any confidence in negative observations? The procedure of observation is identical whether one is seeking evidence in favour of a theory, or testing for evidence against it. If our senses are automatically suspect, as Popper maintained, negative or falsifying instances deserve no more credibility than positive or confirming ones.

Further, remembering Popper's Humian premise, one immediately wants to ask: If we are not allowed to argue from positive instances to true laws, why are we allowed to argue from counterinstances to negative laws (we were told above that "natural laws... deny"). The *reasoning process* is the same. Collecting disconfirmations and arguing negatively scarcely differs from collecting confirmations and arguing positively. Both are inductive procedures and, as such, have been disallowed in advance by Popper's rejection of induction.

Certainly, a single negative instance suffices to refute any universal proposition. Australian black swans falsified the belief that all adult swans were white. Popper was perfectly correct to remind us of this, and also that one or more positive instances do not necessarily *establish* universal propositions. But colour never was the defining characteristic of swans. The discovery of black ones did not entitle Popper to assert that their *essential* features - long necks, powerful wings, etc - were equally suspect.²⁶

The bottom line which CR must confront, however, is that one cannot falsify a scientific theory without inference from observed instances. However much Popper may have rejected induction, his own method was in fact dependent upon it.²⁷

8. Truth, Facts and Realism

As a metaphysical realist, Popper upheld the correspondence theory of truth: "*A statement is true if and only if it corresponds to the facts*" (OKN 46). Although he reiterated this frequently (eg OSE2 369ff, UNQ 140ff), only once did he go into detail about what he meant by 'fact.' "Facts are something like a common product of language and reality... they are reality pinned down by descriptive statements.... New linguistic means not only help us to describe new kinds of facts; in a way, they even create new kinds of facts. In a certain sense, these facts obviously existed before the new means were created.... But in another sense we might say that these facts do not exist *as facts* before they

are singled out from the continuum of events and pinned down by statements - the theories which describe them" (C&R 214).

Unfortunately, neither the lines quoted, nor the rest of the passage in the book, clarify the meaning of the word 'fact.' Since Popper's claim that 'truth means correspondence to the facts' cannot be evaluated without such clarification, we turn again to *Chambers Dictionary*, which defines 'fact' as "reality, a real state of things, as distinguished from a mere statement or belief." But if this definition is correct, it leads immediately to another problem with CR.

CR states that for knowledge to be regarded as scientific it must be falsifiable. Plainly then, if an item of 'knowledge' is falsified, it can no longer be regarded as a fact. In Popper's own words, a false conjecture "contradicts some real state of affairs;" "falsifications... indicate the points where we have touched reality" (C&R 116). What we are left with are conjectures which have not yet been falsified. But a yet-to-be-falsified conjecture can hardly be called a *fact*, 'a real state of things.' It is rather 'a mere statement or belief' *from which* facts are to be distinguished.

Remembering that we have been forbidden to regard as certain anything which we may think we know about facts, all knowledge is conjectural; and that our senses are suspect because 'theory impregnated;' we are led to the seemingly inevitable conclusion that we can never know any facts. All we can 'know' are falsifiable conjectures which, as we have just seen, are not facts. Further, if this is the case, we can never find out what is true. For if truth means correspondence with the facts, as Popper assured us it did, and we cannot know any facts, then we cannot know any truth.

It could be argued that this is precisely Popper's whole philosophy. That might be correct. But so arguing would not remove the incompatibility between Critical Rationalism and Popper's espousal of the correspondence theory of truth.

It would also appear that CR conflicts with another foundation of Popper's thought, his realism. "Denying realism" he stated, "amounts to megalomania (the most widespread occupational disease of the professional philosopher)" (OKN 41). He himself had always been: "a commonsense realist.... I was interested in the real world, in the cosmos, and I was thoroughly opposed to every idealism..." (OKN 322-3). A few pages later he wrote: "whether our man-made theories are true or not depends upon the real facts; real facts, which are, with very few exceptions, emphatically not man-made. Our man-made *theories* may clash with these real *facts*, and so, in our search for truth, we may have to adjust our theories or to give them up" (OKN 328-9).

One must agree with these sentiments. But, if the arguments just outlined are correct, it is CR which is in need of adjustment. For if CR does deny us any knowledge of real facts, the theory not only contradicts realism, it leaves one with no good reason to be a realist. Secondly, if the reasoning in other sections of this essay is correct, then CR conflicts with the fact that, having discovered such real facts as the existence of the works of Karl Popper, say, we *can and do* have true knowledge of reality. No matter which way one looks at it, CR seems out of place in the mind of anyone who aspires to be a realist.

9. Definition and Contradiction

Popper's espousal of the correspondence theory also conflicts with his scorn for definitions. When we assert that a statement corresponds to the facts we mean that the words used accurately describe a specific external situation. But we could not assert correspondence if the words did not have precise meanings; i.e. did not have precise definitions.

Popper liked to aver, provocatively, that we never know what we are talking about. But if his aphorism were *true*, a statement such as 'arsenic is poisonous' would be vacuous. Yet arsenic does exist. It *is* a chemical substance which, ingested above a certain concentration, is very likely to kill a human being. Which means, arsenic is poisonous. The statement is true, it corresponds to the facts. But it is only true because the words employed are accurately defined.

The correspondence theory of truth refers to human *ideas*. Whether one calls those ideas 'concepts,' 'statements,' 'propositions' or 'theories,' we are only able to hold them in consciousness, to relate them to facts, and to communicate them, via the medium of words. Words are the audio-visual symbols of our ideas. In a very real sense they link us to reality. Which means that if their definitions are vague or shifting, we cannot hope to arrive at any reliable truth: no definitions, no correspondence theory. As Aristotle said: "not to have *one* meaning is to have *no* meaning, and if words have no meaning, our reasoning with one another, and indeed with ourselves, has been annihilated."²⁸

Even more serious is the matter of contradictions. Although he held contradictions to be "*impermissible and avoidable*" (OSE2 39) Popper had previously dismissed the Laws of Thought (which of course include the Law of Contradiction) as "psychologism" and "a thing of the past" (LSCD 98). Whatever the merit of that judgment, it is difficult to see how we can uncover contradictions if definitions "never give any factual knowledge about 'nature' or about the 'nature of things'" (C&R 20-21) which statement must imply that there is no significant connection between words and facts. Indeed, it is hard to see how logic and the Law of Contradiction are *possible* if discussions of the meaning of words - i.e., of their relationship to facts - are "tiresome phantoms" or "verbal quibbles" as Popper insisted (eg C&R 28, or TOU xxi). The upshot here is that the Law of Contradiction, far from being all-important to science, as Popper so vigorously implied, seems *excluded* by CR. If all identifications are conjectural, just 'guesses,' and definitions of no value, we would not be able to identify subject and attribute positively enough to show that they do, or do not, belong together.

10. Popper's Three World Theory

Early in his career, Popper began developing a theory in which he split reality into three parts: the physical world, or the world of facts; the world of consciousness, of mental processes and events; and a third world, the products of the human mind, which he called 'objective knowledge.' Popper obviously regarded the theory as important and described it in detail several times (eg OKN 106ff, & 152ff). The following is from his autobiography, *Unended Quest*:

"If we call the world of... physical objects... the *first world*, and the world of

subjective experiences... the *second world*, we may call the world of statements in themselves the *third world*. (I now prefer to call these... 'world 1', 'world 2', and 'world 3') (UNQ 180-1).

After asking us to imagine a picture; distinguishing between the actual picture, one's mental image of it, and one's thoughts about that image; Popper used his own mental processes to illustrate the generation of a world 3 thought which, once written down, and "formulated in language so clearly *that I can look at it critically from various sides*" becomes "the thought in the objective sense, the world 3 object which I am trying to grasp.... The decisive thing seems to me that we can put objective thoughts - that is, theories - before us in such a way that we can criticize them and argue about them. To do so, we must formulate them in some more or less permanent (especially linguistic) form.... Books and journals can be regarded as typical world 3 objects..." (UNQ 182). He added, "we may include in world 3 in a more general sense all the products of the human mind, such as tools, institutions, and works of art" (UNQ 187).

Popper described world 3 somewhat paradoxically as both "man-made" and "autonomous:" "the third world, the world of objective knowledge... is man-made. But... this world exists to a large extent autonomously... it generates its own problems, especially those connected with methods of growth; and... its impact on any one of us, even on the most original of creative thinkers, vastly exceeds the impact which any of us can make upon it" (OKN 147).

Problems

First, there seems little conjectural about the theory of worlds 1, 2 & 3. In none of Popper's several presentations is the theory offered as an hypothesis. Rather, it is laid out as a discovery, as what he thought the facts to be.

Second, the idea of objective knowledge appears directly to contradict CR. If knowledge can exist *objectively*, it is not clear how it remains at the same time *conjectural*. The exercise of studying Popper, for instance, depends on the existence of a dozen or more world 3 objects - his books. Now, either those books exist and say what they say or they don't, there is simply no room for conjecture.

Third, it not clear how we gain access to this *objective* third world when our brains and senses are 'impregnated' with inborn expectations, and are thus incapable of unadulterated contact with reality. World 3 may exist, 'out there,' objectively, but Popper said "there is no such thing as an unprejudiced observation" (OKN 51). It would therefore be difficult to know if we were actually observing world 3, or to identify what we were observing in it.

Further, when thoughts have been objectified as world 3 artifacts, it is not apparent how they accord with Popper's rejection of definitions. Once CR is part of an objective world 3, then either the words 'Critical Rationalism' correspond to the world 3 fact that there is such a scientific method, or they do not. We have a genus (scientific methods) and a species (Popper's method) whose differentia is the process of conjecture and refutation. Calling Popper's method syllogistic, or dialectical, would be manifestly wrong. Thus it would be perfectly in order, not a 'tiresome quibble,' to argue about the definition of CR with anyone who maintained, say, that conjecture and refutation was merely Logical

Positivism in disguise. Their assertion would be *untrue*; it would *not* correspond to the objective, world 3 facts.

The existence of objective world 3 ideas also seems to conflict with Popper's rejection of 'essentialism' - the real existence of concepts - which formed an integral part of his notorious attack on Aristotle²⁹ and underlay his dislike of definitions. Surely it is unreasonable on the one hand to lambast essentialism - the idea that concepts are, or have, real 'essences,' which exist in our own reality or in another dimension - while claiming on the other hand that concepts have a separate existence in world 3.³⁰

Another awkward question must be 'Why should we stop at worlds 1, 2, and 3?' The basis for the theory is fundamental difference in kind, the worlds are "utterly different" (UNQ 181). However, in *The Open Universe*, Popper suggested the possibility of a world 4 of art (TOU 115) and a world 5 of human institutions (TOU 154). He also spoke of "the gulf which separates the human brain from the animal brain" (TOU 122). But if we are dividing reality according to fundamental differences in kind, animal consciousness ought to be world 6; and if art gets a world of its own, surely commerce is sufficiently different to qualify as world 7 - 'utterly different' things should not be left together. So plants would require a separate world from animals; elephants from amoebas; inanimate things from animate, etc. The logic of Popper's argument thus seems to lead to an Aristotelian universe of distinct entities grouped according to the identifying characteristic (or 'essence') of each kind, an inference Popper would have disliked.

Finally, the 'autonomy' of man-made, objective knowledge shows a marked kinship to Aristotle's concept of potentiality. Popper often used number theory to explain world 3: "natural numbers are the work of men," he stated. However "unexpected new problems arise as an unintended by-product of the sequence of natural numbers.... These problems are clearly *autonomous*. They are in no sense made by us; rather, they are *discovered* by us; and in this sense they exist, undiscovered, before their discovery" (OKN 160-1). That is fair enough, but is it not merely another way of saying that the future is not actual but potential; that unknown future advances do not *actually* exist, yet must exist as *potential* in the known?

In this regard it is instructive to look at Popper's idea (in physics) of "the measures of possibilities" which he called "objective probabilities" or "propensities" (TOU 105) and thought of as "*physically real*" (QTSP 133). These provide "a programme for a theory of change... which would allow us to interpret any real state of the world as both an actualisation or realisation of some of the potentialities or propensities of its preceding states, and also as a field of dispositions or propensities to realise the next state" (QTSP 198).

Leaving aside the problem of how 'physically real possibilities' fit into the category of conjectural knowledge, Popperian 'propensity' appears so similar to Aristotelian 'potentiality' - "all movement or change means the realisation (or 'actualisation') of some of the potentialities inherent in the essence of a thing" (OSE2 6) - that, in fairness, one must note that Popper dismissed Aristotle's thoughts about potentiality as "pretentious jargon" (OSE2 7).

Unfortunately, space does not permit exploration of what may be the most serious problem with the three-world theory: its well-signposted detour into

idealism, which Popper told us elsewhere he “thoroughly opposed” (OKN 323).³¹ Suffice it to say that it is *this world* we seek to understand; and while philosophers from Plato onward have speculated about other worlds, not one of their conjectures has deepened our understanding of this one. In the words of John Searle: “We live in one world, not two or three or twenty-seven.”³²

11. Established Theories

The last major area of difficulty with CR to be examined in this paper concerns theories which have successfully withstood criticism. Popper did allow that after scientific theories have passed a great number of severe tests, “their tentativeness may cease to be obvious” (POH 131). But if asked about ‘established’ theories he was very likely to point to Isaac Newton’s “unquestionable truths” (UNQ 37) which, seemingly unassailable for over 200 years, were pushed aside by the “Einsteinian revolution” (UNQ 81).

Yet theories do exist which, in fact, are positively confirmed, as Grover Maxwell has pointed out (PKP1 292ff). Copernicus’s heliocentric theory, for example, was indeed hypothetical in 1543 because the instruments did not then exist with which to prove it. But now that huge telescopes and space probes have eliminated any rational doubt that the earth revolves around the sun, it would seem bizarre to maintain that heliocentricity remains conjectural.

Another famous theory is that of Harvey and the circulation of the blood. Once, that was indeed a bold conjecture. But if one were to declaim nowadays that Harvey’s theory is refutable, or that we don’t know what we are talking about when we say that blood circulates in the human body, one should expect laughter from one’s audience.³³

Popper was evidently aware of this problem. He once wrote about the “realisation” of the “conjecture” of an atomic bomb (TSIB 47). But if a conjecture is *realised* it is very difficult to see how it remains a conjecture. One might fairly retort, rather, that this one admission blows apart the notion of demarcation by refutability and the whole of CR along with it.

There is also the awkward subject of evolution. Popper called Darwinism “a brilliant scientific hypothesis” about “a host of biological and palaeontological observations.” He added: “I see in modern Darwinism the most successful explanation of the relevant facts” (POH 106). Later, he confirmed that he was “very ready to accept evolution as a fact” (UNQ 167).³⁴ But it is not easy to see how a ‘fact’ can be based on observations when Popper has told us that there is no such thing as an unprejudiced observation. Nor did he explain why we should suddenly accept an ‘hypothesis’ as a fact and not as a conjecture.

Popper’s problem was of course that the theory of evolution is just about as inductive as one can get, yet he wanted us to believe that induction is a myth. He found no way out of this impasse, and in the end decided that the only solution was to evade the issue: “I have come to the conclusion that Darwinism is not a testable scientific theory, but a *metaphysical research programme*” (UNQ 168).³⁵

12. The Ultimate Test

CR urges us to submit our theories to severely critical tests. For a philosophy, the most critical test of all may be whether its proponents actually follow it. The example was set by Hume, who admitted that he found his scepticism hard to live by. Popper evidently experienced the same difficulty. It is easy enough to say “our scientific theories must always remain hypotheses” (OSE2 12) but much more difficult to abide by that principle consistently. Thus Popper’s use of the words ‘knowledge,’ ‘know,’ ‘truth’ and ‘fact’ often seemed to conflict with CR. He wrote, for instance: “Matter... consists of complex structures about whose constitution we know a great deal” (TOU 152-3). He urged us to pay attention to the “*invariant content or meaning*” of a theory “upon which its truth depends” (OKN 240). He referred to “universal laws” as “part of our common knowledge” (POH 145); to “objectively true” statements (TOU 119); to the ‘fact’ that “theories or expectations are built into our very sense organs” (OKN 146), and to the “undoubted” fact that “we can *learn from experience*” (C&R 291). All these assertions seem to defy, in one way or another, the idea that knowledge remains conjectural.

Popper’s philosophical premises also led him into more serious confusions. For example, he explicitly rejected as “utterly naïve and completely mistaken” what he called “the bucket theory of the mind” (OKN 61), the idea that “before we can know or say anything about the world, we must first have had perceptions - sense experiences” (OKN 341). Yet earlier he had stated: “I readily admit that only observation can give us ‘knowledge concerning facts’, and that we can... become aware of facts only by observation” (LSCD 98).

Popper’s attitude to ‘the laws of nature’ was just as perplexing. In *Open Society* he called natural law a “a strict unvarying regularity.... A law of nature is unalterable; there are no exceptions to it.... laws of nature... can be neither broken nor enforced. They are beyond human control...” (OSE1 57-58, cf OKN 196). But such absolutist claims are difficult to reconcile with the actual discovery of natural laws when, according to Popper: “There can be no valid reasoning from singular observation statements to universal laws of nature” (RASC 32, cf OKN 359).

In like vein, Popper’s use of illustrations often involved disregard of his own dicta. In *Realism and the Aim of Science*, when once again attacking induction, he told us that “mere supporting instances are as a rule too cheap... they cannot carry any weight” (RASC 130); and that, “confirming instances are not worth having” (RASC 256). However, when he had earlier sought to demonstrate the case that “practically every... ‘chance observation’ is an example of the *refutation* of some conjecture or assumption or expectation,” he unhesitatingly drew attention to scientific discoveries by Pasteur, Roentgen, Crookes, Becquerel, Poincaré and Fleming to reinforce his point (RASC 40).

The trait of employing what he sought to deny can be found throughout Popper’s work. Take his critique of Plato’s politics. In Volume 1 of *Open Society* Popper went through the *Republic*, *Laws*, etc, with a sort of remorseless philosophical laser. Yet not once did he give any hint that he regarded the object of his study as conjectural. His method was purely and simply inductive. He took Plato’s dialogues as fact, examined them line by line in search of evidence, and generalised his (very firm) conclusions.³⁶

As an aside, it may be noted that Popper was not renowned for living up to his philosophy in his professional life. His obituary in *The Times* recorded his reputation as “a difficult man.” *The Daily Telegraph* commented, “Popper’s belief in his own infallibility was remarkable.” Later, *The Times Magazine* reported that Popper’s students at the London School of Economics found him so intolerant of criticism that they used to joke about “The Open Society by one of its enemies.”³⁸

Popper and Marx

Popper’s most egregious lapse as a critical rationalist concerns Karl Marx. Like so many young men of his era, Popper early embraced Marxism, but unlike so many, he also early rejected it - as an economic theory: he never discarded the Marxian ideal of social betterment for the working class, and for most of his life remained a dedicated interventionist and welfare-statist. Thus in *Open Society*, while criticising *Marxism*, he presented an almost fulsome portrait of Marx the man as a brilliantly original thinker and philanthropist, and as one of the “liberators of mankind” (OSE2 122).

In 1948, however, Leopold Schwartzschild published *The Red Prussian*. In this critical biography, based on original sources such as the Marx-Engels correspondence, Marx emerged as anything but a philanthropist. He was in fact a disgraceful sponger and drunkard, as deceitful and vindictive as he was lazy, who loathed and despised the workers (“those asses”) and whose only real animus was a deep lust for power. Nor was Marx’s thinking either original or based on original research. He borrowed most of his ideas from other socialists and his best-known thesis was pulled out of thin air without a shred of fact to support it. When he did bestir himself to try and corroborate “our view” - and found that the historical and economic data flatly contradicted him - he ignored or suppressed the evidence.³⁹

Although Popper read *The Red Prussian* “some years” after it came out (OSE2 396), he never corrected or modified the glowing portrait of Marx he had given us in *Open Society*. It took him some 15 years even to acknowledge his awareness of the “shattering” evidence which had so drastically falsified his most famous work (OSE2 396).

In 1986, Anthony Flew, in his Introduction to a new edition of Schwartzschild’s book, gently chastised Popper for not correcting his false picture of Marx.⁴⁰ The publisher sent a copy to Popper, and two years later Popper wrote to Flew saying, “I wish to explain my final note (on Schwartzschild). (1) Routleges [sic] never told me in time of a new reprint. I had to squeeze things in, at the last moment. (2) I was personally shattered by Schwartzschild’s book; and it was only my view of Marx’s moral stature that was shattered. The reason that my view of Marx’s status as a scientist was not shattered is very simple: I had not had a very high opinion to start with, but I had given him all the benefit of the doubt; and my opinion had slowly deteriorated, both while writing the book and after.... it was only when I now read your Introduction that I saw I ought to have referred to my changed view of Marx’s scientific sincerity. I therefore accept your criticism fully.”⁴¹

This explanation is not really satisfactory. Popper saw the ‘shattering’ evi-

dence about Marx in the late 1940s or early 1950s, yet his “final note” was not penned until 1965. In between, there were no less than four new editions of *Open Society* in which he could have published a revised judgment of Marx. In the end, all he gave us was a reluctant, 150-word appendix on the last page of the last edition (1966).

It is also hard to accept that Popper’s opinion of Marx had not been very high. When someone writes, for example, that Marx’s theory of surplus value was “brilliant” and “a theoretical success of the first order” (OSE2 172-3); that Marx’s exploitation theory “deserves the greatest respect” (OSE2 178); and that Marx made “serious and most important contributions to social science” (OSE2 253); it does not look as though the writer’s opinion is ‘deteriorating.’

There is besides the problem that Popper later had a perfect opportunity to retract his portrait of Marx. In 1966, Professor H.B. Acton of Edinburgh University wrote that, according to Popper, “Marx was primarily concerned with achieving freedom for individual men and women” and that nothing published in the twenty years since *Open Society* had appeared required “any radical modification” of this view (PKP2 876). Yet, in his 1974 response to Acton, Popper merely pleaded guilty to having “idealized the picture of Marxism” over some minor points: there was not one word about Schwartzschild (PKP2 1162-5).⁴²

Conclusion⁴³

This paper is not the first to subject Popper’s Critical Rationalism to detailed criticism. P.A. Schilpp’s *The Philosophy of Karl Popper* contains several less than sympathetic essays, as does Anthony O’Hear’s *Karl Popper: Philosophy and Problems*. And of course O’Hear earlier devoted a whole book to the matter. Other writers have been led to outright rejection. When *The Logic of Scientific Discovery* first appeared, Popper’s famous contemporary Hans Reichenbach asserted bluntly: “The results of this book appear to me completely untenable... I cannot understand how Popper could possibly believe that with respect to the problem of induction his investigations mean even the slightest advance.”⁴⁴

Nonetheless, although this paper rejects Popper’s main thesis, it should not be interpreted to imply that the study of his work is valueless. Far from it. Popper wrote well and clearly, and books such as *The Open Society and its Enemies*, *The Poverty of Historicism* and *The Open Universe*, while flawed or incomplete, are full of valuable insights, astute observations, and stimulating, sometimes inspiring, prose.

A critical attitude, particularly a self-critical one, is also every bit as important in philosophy as Popper thought it was, even if he did not always exercise his own. Subjecting one’s pet theories to the kind of penetrating analysis Popper was so good at is the healthiest mental activity one can undertake. Conviction is much easier to come by than rectitude and we must always be on guard against “cocksureness” - as Popper so rightly warned us (OSE2 387).

It is also well worth keeping in mind that even if Popper was mistaken in his overall rejection of induction, CR does share with induction one of its most important elements - disconfirmation - an element which has not lost one iota of its importance since Francis Bacon first drew our attention to it in the 17th

Century. We are *not* omniscient. We *are* fallible. Disconfirming instances *must* be sought and, where not found, anticipated at any and all times.

One famous instance cited by Popper was the discovery of deuterium in water, or 'heavy' water: "Prior to this discovery, nothing more certain and more settled could be imagined in the field of chemistry than our knowledge of water... This historical incident is typical... we cannot foresee which parts of our scientific knowledge may come to grief one day" (OSE2 374-5).

There is much truth in that. But "come to grief" overstates the case. And that is where Popper went wrong: he focused on disconfirmation to the exclusion of everything else. He tried to elevate an important but isolated premise to the status of a philosophical system. Critical Rationalism is not so much a *replacement* for induction, as an exaggerated focus on the *negative element* of induction.

The Objectivist philosophy of Ayn Rand was referred to earlier. Although as unacademic as Popper was academic, Rand did share with him a number of philosophic premises; such as metaphysical realism, an opposition to idealism (including conceptual realism) and rejection of determinism and subjectivism. Indeed Wallace Matson has suggested that Rand and Popper had "much in common." His view has been partially endorsed by Robert Hollinger, who has written of "parallels" between the two thinkers.⁴⁵

This paper will therefore conclude by conjecturing that when Popper said "in science there is no '*knowledge*'. . . in the sense which implies finality" (OSE2 12) what he may have been after was Rand's insight that concepts are *open-ended*.⁴⁶

For if *Rand* had been confronted with Einstein's rewrite of Newton; or a black swan where there had only been white ones; or the discovery of a new kind of water; she would not have said, as Popper did, that our previous knowledge had been "overthrown" or had "come to grief" or that "the belief in scientific certainty... is just wishful thinking" (OSE2 374). Rather, she would have said simply that our knowledge had been *expanded*.

The description of concepts as 'open-ended' does appear to be the Philosopher's Stone which Popper sought but never found. He correctly saw that there was a problem with most people's idea of certainty, yet never quite fought his way through to an acceptable solution.

But be that as it may. Whatever one may think of Popper, or of Rand, the open-endedness of concepts certainly seems to be a more fruitful, less fraught, and more commonsensical qualification of certainty than, "We never know what we are talking about."

Sources and Acknowledgements

The works consulted for this paper were: *The Open Society and its Enemies*, Volumes 1 and 2 (OSE1/2);⁴⁷ *The Poverty of Historicism (POH)*;⁴⁸ *The Logic of Scientific Discovery (LSCD)*;⁴⁹ *Conjectures and Refutations (C&R)*;⁵⁰ *Objective Knowledge (OKN)*;⁵¹ *The Philosophy of Karl Popper*, Books 1 and 2 (PKP1/2);⁵² *Unended Quest (UNQ)*;⁵³ *Realism and the Aim of Science (RASC)*;⁵⁴ *The Open Universe (TOU)*;⁵⁵ *Quantum Theory and the Schism in Physics (QTSP)*;⁵⁶ *The Self and Its Brain (TSIB)*;⁵⁷ and *A World of Propensities (AWP)*.⁵⁸

To reduce the number of endnotes most references have been given in square brackets in the text, in the form of initial letters from Popper's titles followed by a page number. Thus the quotations in the introduction, annotated (PKP2 977) and (OSE2 39), are from *The Philosophy of Karl Popper*, Book 2, page 977, and *The Open Society and its Enemies*, Volume 2, page 39. Re style, double inverted commas are used for actual quotations, single ones for emphasis. Where a quotation begins a sentence, initial letters are sometimes capitalized to assist readability. Italics are in the original.

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NOTES:

1. This paper is an abbreviated and amended version of Nicholas Dykes, *A Tangled Web of Guesses: A Critical Assessment of the Philosophy of Karl Popper* (London: Libertarian Alliance, 1996).
2. In obituaries in *The Guardian* and *The Independent*, 19 September 1994.
3. E. Freeman and H. Skolimowski noted that Peirce anticipated some of Popper's central ideas (PKP1 464ff). Popper acknowledged this (PKP2 1072) though he did not read Peirce until the 1950s. He added "I feel proud of so eminent a predecessor" (PKP2 1119). The author is indebted to David Conway for pointing out that Peirce coined the word 'fallibilism.'
4. Bartley developed 'Comprehensive Critical Rationalism.' See *Evolutionary Epistemology, Theory of Rationality, and the Sociology of Knowledge*, G. Radnitsky and W.W. Bartley III Eds (Lasalle, Illinois: Open Court, 1987). Cf I.C. Jarvie's review, *Critical Review* 2/1.
5. David Miller, *Critical Rationalism: A Restatement and Defense* (Lasalle, Ill: Open Court, 1994). Though vigorously written, this book did not seem to solve the problems raised by this paper, nor others raised by Anthony O'Hear in *Karl Popper* (London: Routledge and Kegan Paul, 1980). See also Anthony O'Hear, Ed, Karl Popper: *Philosophy and Problems* (Cambridge, UK: Cambridge University Press, 1996).
6. The proposition is used as a first premise by Jan C. Lester in *Escape from Leviathan: Liberty, Welfare, & Anarchy Reconciled* (London: Macmillan, forthcoming 1999). Well-known scientists who acknowledged Popper's influence include Jacob Bronowski, John Eccles, Peter Medawar and John Maynard Smith.
7. David Hume, *An Enquiry Concerning Human Understanding*, 3rd Edn, L.A. Selby-Bigge & P.H. Nidditch Eds (Oxford: Oxford U.P. 1975), p. 74.
8. *Ibid.*, p. 96.
9. *Ibid.*
10. David Hume, *A Treatise of Human Nature*, Book 1 (London: Fontana/Collins, 1975), p. 63.
11. H.W.B. Joseph, *An Introduction to Logic*, 2nd Edn (Oxford: OUP, 1916), p. 408.
12. *Ibid.*, p. 408.
13. *Ibid.*
14. Popper's notion of innate cerebral content is deeply problematic but space permits no discussion. For details, see OKN 26-7, 63, 71-2, 258; C&R 27, 47-8; TSIB 116, & AWP 37, 46.
15. Brand Blanshard, *Reason and Analysis* (Lasalle, Ill: Open Court, 1964) p. 39. See also Nathaniel Branden, "The Contradiction of Determinism," *The Objectivist Newsletter*, May 1963.
16. Anthony Flew, *Hume's Philosophy of Belief* (1961, 1966; Bristol, UK: Thoemmes, 1997), p. 31. The author is indebted to Professor Flew for this point.
17. J.W.N. Watkins noted that if our senses were actually unreliable we wouldn't be here (PKP1 404). Popper half acknowledged this (PKP2 1114, AWP 32).
18. 'Knowledge remains conjectural' resembles the traditional sceptic's claim that "knowledge is impossible," which is an obvious self-contradiction. Popper allowed that "the term 'conjectural knowledge' may be claimed to be a contradiction in terms" (OKN 76), but did not explain why he chose to use it. Imre Lakatos observed: "The difference between total scepticism and humble fallibilism is so small that one frequently feels that one is engaged in a mere verbal quibble" (PKP1 260).
19. Nathaniel Branden, "The Stolen Concept," *The Objectivist Newsletter*, January, 1963.
20. Popper touched on this: "the growth of knowledge consists in the modification of previous knowledge" (OKN 71). He attempted to resolve the infinite regress by positing 'inborn dispositions and expectations.' See note 14.

21. Tom Settle has made the same complaint. On the question of which hypothesis to choose he wrote, "we get no good guidance from Popper" (PKP2 702).
22. Einstein was Popper's "hero" (AWP 8). There are over 120 references to him in just three books: LSCD, C&R and OKN.
23. Cf Anthony O'Hear, *Karl Popper*, op cit, p. 97.
24. George H. Smith, *Atheism: the Case against God* (Buffalo NY: Prometheus Books, 1989), p. 51ff.
25. *Karl Popper: Philosophy and Problems*, op cit, p. 4.
26. Brand Blanshard noted that particular propositions such as 'some swans are white' can only be falsified by showing that 'no swans are white;' *Reason and Analysis*, op cit, p. 228. This creates a serious difficulty for CR, but the problem has been ignored by Popperians such as Bryan Magee, whose *Popper* (London: Fontana, 1973, 1985) has maintained through ten editions that: "Popper's seminal achievement has been to offer an acceptable solution to the problem of induction" (p. 22).
27. The same point has been made by Peter Lipton: "There is no reliable route to falsification that does not use induction..." "Popper and Reliabilism," *Karl Popper: Philosophy and Problems*, op cit, p. 43. The author is indebted to Dr Lipton for sharpening his focus on this issue.
28. Cited by John Herman Randall, Jr., *Aristotle* (New York: Columbia University Press, 1960), p. 116.
29. OSE2 1-26. See *Tangled Web*, op cit, pp. 18-20, for a detailed examination of Popper's odd critique.
30. Popper saw this weakness and later referred to worlds 12&3 as "modified essentialism" (PKP2 1115). For further criticism see O'Hear, *Karl Popper*, Ch. IX.
31. See *Tangled Web*, op cit, pp. 22-4, for a discussion of Popper's 'idealism.'
32. John Searle, *The Mystery of Consciousness* (London: Granta Books, 1997), p. 88.
33. Cf C&R 41n8: "most dissectors of the heart before Harvey observed the wrong things - those which they expected to see." But this is to argue for Baconian objectivity, *against* CR. Harvey broke free in a way Popper thought impossible.
34. Confusingly, Popper also wrote that Darwinism, "has very little content and very little explanatory power, and it is therefore far from satisfactory... we should try hard to improve upon Darwinism, or to find some alternative" (PKP2 1084). He may have meant Lamarck; cf RASC 94 & TSIB 425.
35. Cf John Maynard Smith: "[It is] an occupational risk of biologists to claim, towards the end of their careers, that problems which they have not solved are insoluble." *Did Darwin Get it Right? Essays on Games, Sex, and Evolution* (London: Penguin, 1993), p. 249. See also UNQ 187: "theories which deny what they cannot explain," and TOU 151, "The solution... is the denial." Popper and induction?
36. For criticism of Popper's view of Plato see R. Levinson, *In Defense of Plato* (Cambridge Mass: Harvard U. Press, 1953); and J. Wild, *Plato's Modern Enemies and the Theory of Natural Law* (Chicago: U. of Chicago Press, 1953), also PKP2 859. For Popper's replies, see OSE1 323 and PKP2 1159.
37. Both obituaries appeared on 19 September 1994.
38. Jim McCue, "Mind Reading," 13 May 1995, p. 21. Confirmed by Frederick Raphael in *Popper* (London: Phoenix, 1998), p. 12.
39. Antony Flew, "Introduction to the 1986 Edition," in Leopold Schwartzschild, *The Red Prussian* (London: Pickwick Books, 1986), p. 7.
40. *Ibid*, pp. 3-4.
41. Karl Popper to Anthony Flew, private letter, 1988. The author is deeply indebted to Professor Flew for providing a copy.
42. For a detailed discussion of Popper's attitude to Marx, see *Tangled Web*, op cit, pp. 26-29.
43. Since this paper rejects CR on logical grounds, it has not been thought necessary to discuss buttress concepts such as 'degrees of testability,' 'corroboration,' 'verisimilitude,' etc. These are analysed in O'Hear, *Karl Popper*, Ch. 3, and defended by David Miller, *Critical Rationalism*, Ch. 10 and passim. For accounts of Popper's ethics and politics, see *Tangled Web*, op cit, pp. 24-26 & 29-30.
44. Quoted on the dust jacket of the 1972 Hutchinson edition.
45. Wallace Matson, "Rand on Concepts," and R. Hollinger, "Ayn Rand's Epistemology in Historical Perspective," in *The Philosophic Thought of Ayn Rand*, D. Den Uyl & D. Rasmussen Eds. (Urbana, Ill: University of Illinois Press, 1984), pp. 22 & 56.
46. "... a concept is an 'open-end' classification, which includes the yet-to-be-discovered characteristics of a given group of existents." Ayn Rand, *Introduction to Objectivist Epistemology* (New York: The Objectivist Inc, 1967), p. 60.
47. London: Routledge and Kegan Paul, 5th Edn, 1966.
48. London: Routledge and Kegan Paul, 1961.
49. London: Hutchinson, 1972.
50. London: Routledge, 1989.
51. London: Oxford, 1972.
52. P.A. Schilpp Ed, *The Library of Living Philosophers*, Volume XIV, Books 1 & II (Lasalle, Illinois: Open Court, 1974).
53. London: Fontana/Collins, 1976.
54. London: Routledge, 1992.
55. London: Hutchinson, 1982.
56. London: Hutchinson, 1983.
57. John C. Eccles, Karl R. Popper, *The Self and Its Brain: An Argument for Interactionism* (London: Routledge and Kegan Paul, 1983).
58. Bristol, UK: Thoemmes, 1990.