What Critical Rationalism is For
by Richard Burnham

This easily understandable essay relates to “the problem of induction” which David Hume recognized, and to the theory of critical rationalism in the philosophy of the 20th century philosopher Karl Popper (which was Popper’s very influential answer to Hume’s problem). This aspect of Popper’s philosophy is often referred to as “falsificationism,” which is the idea that falsification of scientific (and other) theories is much more productive in arriving at or near the truth than seeking to confirm theories.

Relate CR to Xenophanes’ belief that there really isn’t all that much humans can know; to Parmenides’ way of doxa; and to Plato’s and Aristotle’s suggestions that we can arrive at knowledge of the forms of things from a theoretical understanding of many specific instances.

There are two main questions that I want to discuss; the first is:

**How do we know what we know, and how can we tell whether it is true or not?**

This may seem an academic topic, but in a world where people believe in alien abductions and astrology, fall for the claims of advertisers, politicians and media moguls, and vote for the suppression of important branches of science in schools, I think it is actually a matter of real importance. [Like all the basic issues in our course, these issues may seem purely academic but they are actually the most existentially important topics for life.]

The second question is:

**What is the best way to solve problems?**

"Problems" is used in a wide sense here: you are in a given situation, and you would like to change it. Life, in this sense, is series of problems, and so is the acquisition of new knowledge.

The second question depends on the first, because all problems depend on having the right information for their solution, and the more we can rely on this information, the better. [Is this true? My own experience indicates that this is not always the case. If I do not have the necessary information I will go into a deep relaxed state of stillness and assume the experience that my problem is solved. This works most of the time for me. This is the New Thought philosophy approach to better “naming” that we previously studied.]

**Knowing a fact and knowing generally**

There are two kinds of information.

One is the "here and now" kind, the isolated fact: it's raining, there is fish for dinner, this is a dagger I see before me. Obviously, this kind of knowledge can be important, for example if a car is bearing down on you.

But most important information (and most misinformation) consists of generalisations: most rain in California falls in the winter, the British are reserved, \( e=mc^2 \), the average temperature of the world is rising (you can't measure the average temperature, only the temperature in a finite number of individual places).

We could not manage without generalisations. Imagine a shop assistant who had to be trained in advance to deal with every possible customer who could walk into the shop. The assistant has to make generalisations about customers in order to work. All scientific theories and laws are generalisations.
The problem of induction

Philosophers in the past commonly believed that achieving generalised knowledge consists of this procedure: you observe lots of isolated facts and examples, recognise what all of them have in common, and use that common factor to make the generalisation. This is called induction.

They also recognised that there is a problem with this procedure. In most cases, you can't check out every example yourself, or even find people to do it for you. How can you know that the next example, which you have not yet seen, will fit the generalisation? The traditional case used by philosophers was the statement "all swans are white": how do you know the next swan you see will not be black or some other colour? (If you go to Western Australia, you can actually see black swans.) Information obtained by induction can never be totally reliable: even if it is true, we have no way of ever knowing that it is.

Inductive logic has been important to life, as Pavlovian association embodies a kind of inductive logic. Perhaps this is because it often provides a high margin of safety: once a creature associates a situation with pain, it will avoid that situation again, increasing its chances of survival and opportunity to transmit its genes. But it is not a basis for understanding subtle details and connections between things. The cat that jumps on a hot stove will avoid all stoves, not just hot ones, in the future.

Inductive thinking can have destructive effects: many hateful statements are made about ethnic and religious groups that are really inductive thinking in disguise.

Despite all this, inductive thinking is highly valued in Western society. If you are good at it, you will score well on intelligence tests and be admired for your high IQ, and may even be admitted to Mensa. But it is a blind alley off the intellectual highway.

Being negative about positivists

Popper (Sir Karl Popper, 1902-94, professor at LSE) was particularly concerned about the nature of science, how it works, and how we can know that scientific knowledge is true. Science has turned out to be the most powerful way of understanding our universe, but no-one really understood why.

There was a group of philosophers called the "logical positivists", who believed that all scientific statements were statements that could be confirmed. They rejected all other statements as being meaningless. But, as we have seen, scientific theories and laws are generalizations. We can't just collect confirming examples and use those to prove the theory, because we run up against the problem of induction.

In fact, you can go on collecting confirming examples all your life, and the theory you are trying to prove could still be false.

Collecting confirming examples is the basic technique of pseudoscientists like Velikovsky. Typically, this involves collecting legends from around the world that fit the theory. Any other information collected is rejected as irrelevant (or twisted to fit the theory).

Consider a drug that was tested using only confirming examples. The tester records all the people who are cured using the drug, but throws away the details of those who die during the tests. Would you be happy using the drug?

Being positive about negative things

We have seen that the practice of confirmation can give us no confidence in our generalisations. Yet generalis-
ing and abstracting from specific instances in the real world is the most powerful feature of human thought. It enables us to predict things in the future, respond to situations we have never encountered before in a rational way, and reason productively about the connections between and the causes of things. Scientific laws and theories are often regarded as the most reliable kind of knowledge we have.

What's wrong here? Do we always have to believe that our knowledge is uncertain and dependent on the pure chance that we have hit on the right generalisation? Some philosophers may argue from this that all knowledge is totally uncertain, that there is no knowable physical reality, that all knowledge is relative to the culture of the person concerned, and so on.

But Popper argued that, although absolute certainty about things in the world is impossible, there is such a thing as objective knowledge about the world, and that with the right method we can always approach closer to it. [Remember that Parmenides taught the Two Ways, the way of certainty and the way of probability, opinion, or reasonable assurance. He valued objective knowledge, but realized it had nothing to do with certainty.]

**Turning confirmation on its head: falsification**

Popper pointed out that, **although you can't confirm a generalization, you can falsify it.** In the simplest cases, all you need to do is find a counter-example to the generalization, for example, a swan that is not white.

This suggests an (in principle) straightforward method of testing theories. Instead of looking for confirmation of a theory, which carries no guarantee of the truth of the theory, and may waste a lifetime, it is much better to **look for counter-examples** to the theory. This may mean that the theory is quickly disproved and abandoned, but so much the better, because a bad theory is a waste of time and a hindrance to the advance of knowledge.

If we have a theory, it should **predict** new observations. We test those predictions against all the new evidence we can find, in an attempt, not to prove it, but to **disprove** it. If, despite all our efforts, the theory still survives and explains the new evidence successfully, we can at least be sure that the theory is better than all the others yet advanced.

This attitude encourages radical thinking. Instead of hanging on to dead ideas, we should try out new ones all the time, but subject them to the severest of criticisms. Hence the name, "critical rationalism." We should be daring in our hypotheses, but once we have created them, we should be rigorous in testing them against observation and experiment, and willing to ditch them when they fail the tests.

Of course, trying to disprove your own ideas runs counter to what many people would regard as "common sense", but so also do many of the discoveries of science. *Reasoning involves questioning the lazy assumptions of "common sense."

**Two misunderstandings about Popper**

To try to clear up one common misunderstanding: Popper did **not** suggest that unfalsifiable statements are necessarily "meaningless": this is an idea of the **LOGICAL POSITIVISTS** that does not apply in critical rationalism. **There are many areas of human thought in which meaningful things can be said but for which the falsification criterion may not be appropriate. These include ethics, aesthetics and religious thought, for example, except where they claim to make objective statements about the external world.**

Another confusion is with the **LINGUISTIC PHILOSOPHERS**, who insisted that the important thing is to define the words that you use. On the contrary, critical rationalism insists that the important thing is to tackle pro-
found problems, not to fuss over word meanings. The idea is to express problems in such a way that you can devise appropriate solutions for them, and test the solutions against new evidence.  

**How can critical rationalism be used?**

Many scientists now use Popper’s philosophy as a guide. The cycle of hypothesis and criticism fits in well with the long-established practice of peer review of all research before it is published in scientific journals. This practice ensured that a critical process was applied to scientific results and theories long before Popper described what was happening.

Of course, no critical process can guarantee absolutely against fraud and error; the activity of science is a human activity, and no human activity can ever be perfect. CR tells us that we have to live with this, but that we can at least do the best possible in the circumstances. [This applies to my comments above about using the technique of assuming the experience I desire with the expectation it will manifest in my life. There seem to be no guarantees in that either. “No human activity can ever be perfect.”]

Popper did not stop at science, though. He applied the ideas of CR in other fields of thought, in particular the philosophy of politics and society. Popper’s life included the periods of the major totalitarian philosophies of the 20th century, Nazism, Soviet communism and Maoist communism. Much of Popper’s thought was concerned with the nature of authoritarian systems, and how they obstructed rather than enabled the pursuit of human ideals.

He promoted two main ideas here. One was the idea that progress (however you conceive it) must require the freedom to subject all ideas to rigorous criticism, because otherwise false ones may flourish. This requires an open society where debate and criticism are freely allowed.

The second idea is that there is no inevitable “march of progress.” Both Nazism and communism promoted some kind of ideal future that each was inevitably bringing about in its own way: this notion is called historicism. In fact, human activity brings about both intended and unintended consequences, and the unintended consequences are by their nature unpredictable. We need the open society, so that all political and social activities can be openly monitored and freely criticized and corrective action taken in the political sphere.

Popper covered these ideas in his books *The Open Society and Its Enemies* (two volumes) and *The Poverty of Historicism*. In particular, he is known for his critique of Marxism, the driving force behind early communism, and one of the major influences in 20th century thought.

**Critical rationalism in practice**

CR is a practical guide to knowledge and action. It offers guidance in acquiring new information, in assessing the validity of information offered by others and in taking action to solve problems using the information that is to hand.

Unlike some other so-called "philosophies", it does not offer a solution to everything or an infallible guide to all the problems of life. In fact, CR shows that there can be no such things. We have to work within the limits of our knowledge, knowing that we can never have the whole truth and we can never be certain about the consequences of our actions. It is because science and technology work within these limitations that they have become the most successful of all knowledge-driven human activities.

I shall attempt to summarise the main guidance of critical rationalism in a few points:
Subject all theories and ideas, your own and other people's, to the most rigorous criticism, trying to falsify the ideas by finding countervailing evidence. Do not become bogged down in searching for confirming examples - if your idea is good, you will find plenty of those in your attempt to disprove the idea.

Be as creative and adventurous in your ideas as you can be. As long as you subject those ideas to the most rigorous criticism, it does not do any harm to have wild ideas.

Be alert to the unforeseen consequences of actions, and be prepared to change the ideas that led to those consequences.

Promote the "open society" in whatever sphere you have influence: in most cases, encouraging creativity in ideas, open debate on those ideas and continual review of the consequences will be the surest means to solving a problem. But always bear in mind that there is no certainty.

Do what you can, whether it is small or great: do not be deterred from your ideas by the fact that you can never achieve certainty or perfection.

Although I have not discussed ethics here, I believe that all actions should be guided by a system of ethics. Since the application of ethics has practical consequences, the application of those ethical rules should be assessed as rigorously as any other ideas.

Are these guidelines easy to carry out? Certainly not. They involve continual application of criticism to your own ideas, as well as to those of others. It is difficult to criticise one's own ideas, which is why one needs debate and discussion with others, but it is also difficult to accept criticism, as we all know. To apply CR successfully, one needs to be fully aware of how one is applying criticism to ideas, and also of one's emotional reactions.

Other people may not share the values encouraged by CR, and may not welcome criticism of their ideas. This needs care and tact (which we do not all have in equal measure). But realize that other people's reactions can be part of the unforeseen consequences of our own actions (see above).

Some value systems emphasise not criticising others, lest they lose face. But, in the long run, cultures that suppress open debate end by settling their differences in violence and bloodshed. Popper emphasised that CR is a way of "letting our ideas die in our stead."

Personally, I sometimes get depressed by the way that debate often turns out on the Internet: criticism of an idea (not of a person) is followed by a personal attack on the character and motives of the other person, or with assertions that the other person has views that he or she does not possess. CR can help here: assess what you know of the other person (which may simply be through the words you have seen posted) and apply falsification to any attempt to extend your "theory" about the other person beyond what you actually know.

Our ideas exist independently of ourselves, and an argument should be treated separately from the person who advances it. The validity of an idea does not depend on the character or behaviour of the person who first put it forward. Recognizing this opens the way to more productive and more peaceful debate.