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Critical Rationalism and the Principle of Sufficient Reason

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The great transformation and the quest for certainty

A great transformation occurred in ancient Greece more than 2000 years ago. The ancient myths were gradually replaced by philosophy and science. It was a transition from myth (*mythos*) to reason (*logos*), accompanied by a transition from the closed to the open society. During this transformation philosophy, science, and democracy were born (cf. Armstrong 2006, 138-46; Popper 1966, ch. 10). Plato interpreted it as a transformation from uncertain *opinions (doxa)* to certain *knowledge (episteme)* and tried to show how man could get certain knowledge, get rid of the ancient myths and opinions, and introduce an age of enlightenment and reason.

Certain knowledge could be attained if we were able to prove our opinions, if we were able to give sufficient reasons for them. This ideal of knowledge can be expressed in a principle of sufficient reason according to which we should always try to give sufficient reasons for our opinions (cf. Albert 1985, § 2).

Can we get certain knowledge if we follow the principle of sufficient reason? Assume that we have a statement and give a premise as a sufficient reason for the truth of the statement. If the premise is true, then the statement is true. But is the premise true? If we follow the principle of sufficient reason, we must give sufficient reasons for the premise in the form of another premise. But this only shifts the problem into giving sufficient reasons for the other premise and so on forever. We get an *infinite regress* of sufficient reasons. In order to

stop the infinite regress, we can introduce a *logical circle* at some point. From a logical point of view any premise is a sufficient reason for itself. But if we are trying to get certain knowledge, neither an infinite regress nor a logical circle is satisfactory. The only remaining possibility is to abstain from giving further reasons at some point where we break the chain of sufficient reasons, declare that some type of reasons are ultimate and accept them without further reasons. If we accept the principle of sufficient reason, it is dogmatic to accept a statement in this way.

The principle of sufficient reason leads to a *trilemma of justification*: it forces us to choose between infinite regress, logical circle, and dogmatism (cf. Münchhausen's trilemma, Albert 1985, § 2). Sceptical Greek philosophers used this trilemma in order to show that we cannot get certain knowledge and have to choose between scepticism and dogmatism. The Greek enlightenment, which had began so gloriously, ended in doubt, scepticism, and ultimately in the rebirth of myth and the closed society. Is it possible to avoid this fate, to resolve the trilemma of justification, to avoid to have to choose between scepticism and dogmatism?

Logic can be used as an instrument for proving statements. But it can also used as an instrument for criticism in order to refute statements. Perhaps the important use of reason is not to prove statements, but to criticize them. Perhaps we can resolve the trilemma of justification if we replace the principle of sufficient reason with a principle of critical test, according to which we should always try to criticize our opinions seriously (Albert 1985, § 5). Can critical reason show us a course allowing us to sail between the epistemological monsters of dogmatism and of scepticism?

Scientific theories

Astronomy was the first science born in Greece. Its success was impressive. Greek astronomers were able to explain not only the movements of the sun, the moon, and the

stars, but also the movements of the planets, which seem to be rather irregular when observed from the earth.

Attempts to prove scientific theories with sufficient reasons lead to the trilemma of justification. However, it was possible to test theories with the help of experience. For example, the position of a planet in the sky at a specific point of time can be predicted with them. Observations showed that such predictions were correct. But the empirical success of Greek astronomy was not a sufficient reason for the truth of it. As is well known in logic, the truth of a consequence does not show that the premises are true: deductive reasoning does not transmit truth from consequences to the premises. Reasoning from singular test statements to general hypotheses is deductively invalid: no finite number of true singular test statements is sufficient for the truth of a general hypothesis.

Aristotle called reasoning from singular test statements to general hypotheses *inductive*. In order to bridge the gap between theory and observation, we can try to introduce an *inductive principle* telling us when test statements are sufficient for the truth (or probability) of the tested hypothesis or theory. Can induction be justified? If we try to give sufficient reasons for an inductive principle, we have to introduce more general principles, which in their turn depend on still more general principles, and so on. We are caught in an infinite regress. If we try to avoid the infinite regress by referring to the empirical success of science, we are arguing in a circle. If we introduce the inductive principle without any reasons, we are dogmatic. Once again, the trilemma of justification appears, this time as a trilemma of justifying an inductive principle. Such arguments led David Hume (1739–40) to scepticism. In spite of the vast successes of modern science, as for example Copernican astronomy and Newtonian physics, Hume argued that science does not give us certain knowledge, only uncertain opinions.

In order to solve the problem of induction, Popper suggested that we should give up the principle of sufficient reason and instead use the principle of critical test. Logic can be used not only as an instrument of proof, but also as an instrument of criticism. In proofs truth is transferred from the premises to the consequence; in criticism falsity is re-transferred from a consequence to at least one of the premises (Popper 1976, 98, theses 15-17). For the discussion of scientific theories it is important that a theory is false if it has a false consequence. Theories can be falsified by consequences about observable events, by test statements. We do not need any inductive assumptions in order to understand science. They only lead to unnecessary problems (Popper 1959, § 3).

According to Popper (1959, ch. 10) critical tests are central for science, not proofs. If a theory withstands critical tests, it is *corroborated*. The ancient aim of certain knowledge is not attained by testing theories. Corroborated theories remain *fallible* and can always be falsified by the next critical test.

Can theories corroborated by experience be accepted for the time being and claimed to be true? In the recent discussion of critical rationalism there are two answers to this question.

A sceptical answer is that we should not accept any theory, not even temporarily, since corroboration is not a sufficient reason for the truth of a theory. Nevertheless, we should classify theories as true or false. There are no sufficient or even good reasons for such classifications. The answer the question why we think that a theory is true is 'Why not?'. This is an invitation to show some disadvantage of the theory, for example that it is falsified, not to marshal any reasons in favour of it, for example that it is corroborated. It is essential for this answer that we should be prepared to classify statements as true or false without having any reasons for so classifying them (Miller 1994, 71-72).

Another answer to the question whether we should accept corroborated theories, is that we should do so because they have withstood serious criticism (Musgrave 1993, 281-83; 1999, 322-25). The corroboration of a theory makes it reasonable to claim that the theory is true according to the following principle of critical rationalism (*CR*):

(*CR*)	It is reasonable to claim that a statement is true if and only if it has withstood serious criticism.

Theories claimed to be true remain fallible. The corroboration of a theory is not a sufficient reasons for the truth of the theory. Nevertheless, it is reasonable to claim that a well corroborated theory is true.

There are important differences between attempts to find sufficient reasons proving that a theory is true and attempts to test a theory severely in order to be able reasonably to claim that a theory is true. Attempts to find sufficient reasons for the truth of a theory leads to the trilemma of justification. Therefore inductivism fails. Attempts to show that it is reasonable to claim that a theory is true does not lead to any trilemma of justification. Such attempts do not presuppose inductivism, only that a theory can be corroborated. Asked why we claim that some theories are true or why we classify them as true, we do not have to answer only 'Why not?', but can say that the theory has withstood serious criticism. Falsifiability and the absence of falsifications are not enough. It is important that theories actually have been tested and that they have withstood serious tests. There are no reasons why we should not claim that corroborated theories are true. Such claims do not presuppose any concessions to inductivism or justificationism.

Critical tests weed out theories that are refuted by experience, restrict our choice of theories, and allow us to make a reasonable selections among them. The sceptics are right when they point out that critical tests do not give us certain knowledge, but wrong when they think that the choice of a scientific theory is arbitrary. We do not have to choose between

dogmatism and scepticism, but can choose a third possibility: the critical method of testing our opinions and of claiming that those opinions are true, that have survived critical tests.We need statements about serious observations and experiments in order to be able to test scientific theories. When we discuss scientific theories, we presuppose the principle of critical rationalism. In order to show that the trilemma of justification does not reappear, two problems remain to be solved:

(1) When we say that a statement has withstood serious criticism, we need test statements. Does the discussion of test statements lead to the trilemma of justification?

(2) Why should we accept the principle of critical rationalism? Does the discussion of this principle lead to the trilemma of justification?

Test statements

Like general hypotheses, test statements are fallible, for example the test statement 'The planet Venus is about 13° above the horizon in the east when observed at 5 o'clock in the morning in Prague on the 14th of September 2007.' Attempts to find sufficient reasons for test statements, to prove that they are true, lead to the trilemma of justification, in the same way as attempts to find sufficient reasons for general hypotheses did (cf. Fries' trilemma, Popper 1959, § 25).

What happens if we substitute the principle of critical test for the principle of sufficient reason in our discussions of test statements? Test statements can be tested by other test statements. For example, we can test if a planet is Venus by observing its brightness. There are no ultimate or last test statements, no foundation of *basic* statements. The chain of test statements is in principle infinite: a test statement can be tested with another test statement, which can be tested with still another test statement, and so on. We get an infinite regress of test statements. From a logical point of view a test statement can be tested with itself. But such a logical circle is unsatisfactory from a critical point of view: if a test

statement is problematic, it should be tested with a less problematic and hence different test statement. A third possibility is that at some point a test statement is dogmatically accepted without any further derivation of test statements. The principle of critical test seems to lead to a trilemma of testing similar to the trilemma of justification.

However, this is not the case. Test statements can be tested by experience without any derivation of further test statements. Such derivations end at test statements that are especially easy to test by experience, that is, to that are especially easy to compare with experience.[1] Ultimately every derivation of test statements has to end at such unproblematic test statements. Consider for example the test statement just mentioned about the position of Venus. This statement can be tested directly by observation. There is no need to derive further test statements.[2]

Assume that Venus is observed in a position predicted by a test statement (cf. the test statement about Venus above). Then the test statement has been tested by observation and has withstood criticism; it is reasonable to claim that the test statement is true according to the principle of critical rationalism. The infinite regress of test statements is broken by an unproblematic test statement that easily can be *tested* by direct comparison with experience. Such tests do not provide an infallible empirical basis for science, but provide test statements that reasonably can be claimed to be true (Andersson 2007, 180-81).

Impressed by the principle of sufficient reason, Donald Davidson (1986, 331) maintains that test statements can be tested by experience only in a metaphorical sense. Davidson probably thinks that in the literal sense a statement can be tested only by another statement. But if we are interested in *testing* statements, not in *proving* them, then there is no

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[1] Cf. (Popper 1959, § 29): "It is fairly easy to see that we arrive in this way at a procedure according to which we stop only at a kind of statements that is especially easy to test."
[2] Cf. Popper's (1959, § 28) material requirement on test statements: "[B]asic statements must be testable, inter-subjectively, by 'observation'."

reason why it should not be possible to test simple statements directly by experience, without the intervention of any statements. Although a statement can be proved only by other statements, it can be tested not only by other statements, but also by experience.

There is an important distinction between the principle of sufficient reason and the principle of critical test. With the principle of sufficient reason we try to justify statements as true; with the principle of critical test we do not. In order to break the potentially infinite regress of test statements, we need test statements that reasonably can be claimed to be true. Using the principle of critical test we do not need test statements proved to be true.

A similar solution to the problem of test statements is to introduce a special principle for test statements (cf. Musgrave 1999, 342) according to which:

(*E*)	It is reasonable to perceptually believe that a test statement is true if and only if it has not failed to withstand criticism.

If we concede that perception can be used in order to test statements, we do not need this principle: perceptual truth-claims have already withstood perceptual tests and can be judged with the principle of critical rationalism.

The derivation of test statements can be continued and the observation of reproducible effects can be repeated. If somebody doubts the results of a critical test of a theory, we would not try to present sufficient reasons for the truth of test statements for him, but we would ask him to test the theory himself and to repeat the relevant tests. This is the critical solution to the problem of test statements that avoids the dogmatism of absolutely certain test statements and the scepticism of arbitrarily accepted test statement.

Critical Rationalism

Why should we accept the principle of critical rationalism? If we try to justify critical rationalism with sufficient reasons, we once again encounter the trilemma of

justification, as Popper did when he first introduced critical rationalism and argued that rationalism itself cannot be justified: “Since all arguments must proceed from assumptions, it is plainly impossible to demand that all assumptions should be based on argument” (Popper 1966, II: 230). Such demands would lead to an infinite regress that only can be avoided by a logical circle or a dogmatic break. According to Popper (1966, II: 231): “[W]hoever adopts the rationalist attitude does so because he has adopted, consciously or unconsciously, some proposal, or decision, or belief, or behaviour.” Since the adoption of rationalism cannot be justified by sufficient reasons, Popper calls it unreasonable.

When discussing the introduction of critical rationalism, Popper faces the trilemma of justification and consciously opts for a minimal kind of dogmatism. For Popper a critical rationalist is a person who is dogmatic only at one point: when he decides to accept the rationalist attitude. Such a person who understands the limits of reason Popper calls a *critical rationalist*. His “fundamental rationalist attitude results from an (at least tentative) act of faith—from faith in reason” (Popper 1966, II: 231).

According to Popper a critical rationalist makes a minimum concession to irrationalism when he decides to adopt the rationalist attitude. This can be compared to the *academic scepticism* in ancient Greece. In order to avoid the trilemma of justification, these sceptics made a minimum concession to dogmatism in their fundamental decision to accept scepticism. In this way scepticism became a logically tenable position. In a similar way Popper makes a minimum concession to dogmatism in order to avoid the trilemma of justifiation.

In spite of his minimum concession to dogmatism and irrationalism, in spite of realizing the logical problems of justifying rationalism, Popper analyses the consequences of rationalism and irrationalism and says that there is a vast difference between a blind decision

and a decision made with open eyes (Popper 1966, II: 233). The analysis of the consequences of the decisions induces Popper to decide in favour of rationalism (Popper 1966, II: 240).

Why does he not say that a critical discussion of the two positions makes it reasonable to decide in favour of rationalism? The reason why Popper does not say so is that he implicitly assumes the principle of sufficient reason in his discussion of rationalism. But why should we assume this principle as an ultimate principle when discussing rationalism? This question becomes especially urgent when we discuss a type of rationalism stressing the importance of critical discussions and critical tests. The aim of this type of rationalism is not proofs and certain knowledge, but critical tests and reasonable truth-claims. Critical rationalists should reject justificationism and the principle of sufficient reason and should not try to justify critical rationalism by giving sufficient reasons for it. Such attempts are motivated by the old tradition that rationalism is based on sufficient reasons leading to certain knowledge.

Why not say that we accept or adopt rationalism, because it has withstood serious criticism? An objection is that it is circular to adopt rationalism in this way (cf. Miller 2006, 128-29; Musgrave 1999, 330-31). If we assume the principle of sufficient reason, this is a devastating objection: circular proofs are worthless. If we do not assume it, the objection is without force. If we accept the principle of critical test, it is a good reason for critical rationalism that it has withstood serious criticism. Different types of criticism that can be directed against principles of rationality. One type of criticism is that they do not fulfil their own demands. Critical rationalism survives this type of criticism. To show this is not to give a circular proof for critical rationalism, but to show that it is internally consistent (cf. Popper 1966, II: 230).

Another type of criticism maintains that also the principles of critical testing leads to the trilemma of justification. How do we know that a hypothesis has survived critical

tests? Are there sufficient reasons for such claims? If we try to find sufficient reasons for test statements the trilemma of justification arises. It arises also if we try to find sufficient reasons for the claim that critical rationalism itself has survived critical discussions (cf. Miller 1994, 133). However, in both these cases the trilemma arises only if the principle of sufficient reason is assumed, explicitly or implicitly. But a critical rationalism should not assume the principle of sufficient reason, not even implicitly. For a critical rationalist who does not search for certainty, or proofs, or sufficient reasons, no trilemma of justification arises. Such a person does not have to choose between infinite regress, logical circle, or dogmatism.

Conclusions

Our point of departure was the great transformation from the closed to the open society, from myth to reason. It was interpreted as a transition from arbitrary opinions to certain knowledge. In order to guarantee certain knowledge, the principle of sufficient reason was assumed.

The search for certainty led to unexpected difficulties. The attempt to be reasonable led to a trilemma of justification and often also to dogmatism or scepticism. In our time the situation is similar. Today European enlightenment has ended in postmodernism and a fight between dogmatic fundamentalism and relativistic scepticism. In this fight critical reason is often muted by different kinds of dogmatism.

In order to overcome this situation it is important to understand that reason is not a road to certainty, but a road to critical discussion and reasonable judgement. If we replace the principle of sufficient reason with the principle of critical test, many of the difficulties marring modernity and enlightenment can be solved. We can avoid dogmatism and scepticism and find a critical middle way between them. This can contribute to the great transformation that today is more needed than ever.

Comments on a technical note

In a technical note David Miller (1994, 133) has argued that applications of the principle of critical rationalism (abbreviated to *CR* above) lead to an infinite regress of a special kind. When we use this principle, by Miller abbreviated to *P*, and reports of tests *e* of the hypothesis *H* we can derive that it is reasonable to accept *H* (abbreviated to *AH*):

P, e therefore *AH* (1)

In a similar way, when critically discussing the principle *P* using reports *e** of such discussions, we can deductively derive that it is reasonable to accept *P* (abbreviated to *AP*):

*P, e** therefore *AP* (2)

Miller admits that (1) is a valid derivation, but remarks that *P* is not known to be true, though it is reasonable to accept it according to (2). Since there are no sufficient reasons for *P*, Miller suggest that in our derivation (1) we should use *AP* instead of *P* as a premise. Then Miller derives that it is reasonable to accept that it is reasonable to accept *P* (*AAP*) from (1) (using a principle of applied deductive logic proposed by Musgrave 1999, 338):

AP, e therefore *AAH* (3)

According to Miller the looming infinite regress is obvious. In order to avoid it, we could try to argue that if it is reasonable to accept that it is reasonable to accept *P*, then it is reasonable to accept *P*:

If *AAP*, then *AP* (4)

But the principle (4) is not known to be true either. Although such a principle might be reasonable, it is dogmatic to assume so without further reasons according to the principle of sufficient reason. In this way Miller argues that a trilemma of justification arises, when we use the principle *P*. However, this is only the case if we assume the principle of sufficient reason. Why should we assume this justificationist principle when using the principle *P*? Why not overcome the justificationist addiction also in this situation (cf. Miller 2007, sections 1 and

2)? If we take our point of departure from the principle of critical testing, no trilemma arises. Then there is no need to use (3) instead of (1). As in most derivation the premises in (1) are not known to be true. We have sufficient reasons neither for *P* nor for *e*. From premises that can reasonably be claimed to be true we derive *AH*. Since we have given up the vain search for absolute certainty, we do not try to find sufficient reasons for the premises *P* and *e* and avoid the infinite regress.

If we ask for sufficient reasons for the premises in any arbitrary derivation, we get a trilemma of justification. Of course, this is true also for the derivation (1). The solution of this problem is to give up the quest for certainty, the addiction to justificationism, and the associated principle of sufficient reason. Instead we should use the principle of critical testing and try to test the premises severely and to discuss them critically. This step is crucial in order to avoid the trilemma of justification in our discussion of general hypotheses, of test statement, and of critical rationalism itself.

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