



Rationalism, Relativism and Scientific Method

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(1) That it is excellent to be rational is admitted by many people, but hardly anyone is able to tell us what it means to be rational and why being rational is so important. The Presocratics were called rational because they omitted the gods from their explanations, the Church Fathers were called rational because they eliminated Gnosticism, Einstein was called rational because he abolished, or seemed to abolish the aether. In all these cases there is the assumption that some doctrines are true, others false, and being rational means accepting what is believed to be true.

(2) But the truth of a doctrine is not easy to ascertain. The assumption that a certain view is true may turn out to be mistaken. One may even find that the view does not make sense. This applies not only to complex views such as Newton's views of space, time and matter, it applies also to such simple and apparently fundamental principles as the principle of contradiction (contested by Hegelians) and the principle of the excluded middle (contested by constructivists). The realization that all our knowledge has this precarious, "hypothetical" character makes it rational to explore views assumed to be false. Hence, rationality can no longer be defined as adherence to a certain view.

The second disadvantage of the view that being rational means accepting what is believed to be true is that it takes the idea of truth for granted. But this idea is a relatively recent product. It arose with the Presocratics, it is absent from Homer.¹

¹For some comments on this matter and further literature cf. chapter 17 of my essay *Against Method*, London 1975 (or the improved German version *Wider den Methodenzwang*, Frankfurt 1976).

In Homer we have something very close to the notion of fitting which depends on special circumstances. Homer, accordingly, has not one notion of knowledge, but many without there being any possibility of regarding them as instances of a more comprehensive idea (except by enumeration). Yet there was never any argument to show that the modern and more totalitarian notion of truth has advantages, and what the advantages are.

(3) It is therefore advisable to connect rationality with *procedures rather than with views*. And indeed, such a *formal* notion of rationality has become prominent in more recent discussions. Rationality now means acceptance of certain *procedures* (rules, standards) together with the *results* of these procedures, rules, standards; it does not mean acceptance of *views* (except insofar as the views emerge from the application of the procedures, rules, standards): it is rational (a) to make one's actions conform to certain rules (standards, procedures), i.e., one must not act erratically, and (b) to stick to the procedures, rules, standards that have been chosen.

This explanation of rationality at once raises a whole batallion of questions, for example: why is it better to behave in an orderly fashion rather than erratically? How are the rules that determine rational behaviour to be chosen? How will one determine whether the chosen rules continue to be acceptable and need not be replaced by other rules. And so on.

(4) One answer to the first question that has some chance of being relevant is that the cosmos is an orderly structure which can only be explored by orderly procedures. Neither the assumption nor the consequence can be accepted without criticism. The assumption: that the cosmos is orderly. There are certainly lots of erratic events in it including erratic behaviour on part of individuals and erratic historical occurrences.² Science tries to understand and tame such events on the basis of general principles (sociological laws, etc.) There is no attempt to school the intuition of individuals so that it produces erratic behaviour which is in phase with unusual events. One moves in the opposite direction, behaviour is made more uniform and less capable of dealing with surprises.³ (This may be one of the reasons why politicians with a theoretical bend are doing such an execrable job. It may also

²"Primitive" societies detect and school the ability of children to divine unusual events.

explain why the ability to influence nature in a direct manner has now declined and why parapsychological and parapsychical effects are so difficult to find.)

The consequences of the assumption cannot be accepted either. An orderly world whose laws are not manifest has many surprises in store. None of the apparent regularities it contains is a suitable guide to the laws themselves. And there is no reason to believe that the laws of the world are manifest.

(5) We may classify the attempts to reply to the second and the third question (section 3, last paragraph) by distinguishing naive and sophisticated rationalism on the one side, cosmological, institutional and normative rationalism on the other.

rationalism	cosmological	institutional	normative
naive			
sophisticated			

The first distinction deals with the *form* of the rules, prescriptions, standards one wants to introduce.

Naive rationalists assume that there are standards and/or rules which must be obeyed, come what may and which in practice are obeyed by science at its best.

Sophisticated rationalists assume that rules and standards are restricted to certain conditions and that no standards can be presumed to have universal validity. Even the rules of logic may have to be changed when we move from one domain to another. Scientists must keep this in mind and look out for the boundaries.

Naive rationalism is the philosophy of the founders of Western culture and it comes to the fore in times of crisis and change. Examples are Aristotle, Descartes (but not Bacon), Newton, Kant. Russell, Popper and Lakatos are more recent examples. Among its ancestors we have the apodictic laws of Exodus and the list of curses embedded in Deuteronomy 27.

Sophisticated rationalism is quite rare. It may be found in traces in Aristotle⁴, it is accepted among some sceptics and it occurs again in Hegel and in dialectical materialism. According to dialectical materialism all principles (standards, rules) have their limits, the contradictions inherent in things drive them towards these limits, and the researcher must not fall behind. Sophisticated rationalists occasionally express their ideas in conditional statements while others have pointed out that

⁴Cf. W. Wieland *Die Aristotelische Physik* Tübingen 1964.

making such statements measures of rationality overlooks that they, too, have their limits, that these limits (like all other limits) are discovered by research which therefore cannot be guided by the statements exclusively: concrete research both determines and is determined by standards of rationality. Important ancestors of sophisticated rationalism of the non-dialectical kind are the case laws in the Book of the Covenant (Exodus 21-23) which go back to the Sumerian jurisprudence of the third millennium B.C.⁵

(6) The second distinction deals with the *reasons* for the rules, standards, procedures that are being proposed.

Cosmological rationalists view the process of knowledge-building in analogy with physical processes such as the process of bridge building. The rules of bridge building involve practical considerations (material, maximum weight, funds), aesthetic considerations (shape of bridge) and facts of nature (including laws and special natural conditions in which the laws are being applied). In the same way the rules of knowledge building involve practical considerations (funds, wishes of special interest groups, capacity of the computers used etc.), aesthetic-metaphysical considerations and facts of nature. Both kinds of rules can be criticised by showing that, given the facts and the aim (to construct a bridge of a certain kind; to improve theories of a certain kind) an application of the rules is not going to lead to the aim. Thus, given a world whose laws are embedded in sizeable fluctuations (which may or may not be reducible to the laws), a principle of falsification that eliminates views inconsistent with facts would lead to a breakdown of knowledge.

(7) *Institutional rationalists* have noticed that the activity of knowledge-building depends on institutions and traditions. So, of course, does the activity of bridge building. But while the inadequacies of traditions of bridge building can be ascertained with comparative ease, the inadequacies of epistemic traditions are much harder to find. The reason is not that they are so well hidden, the reason is that epistemic traditions are more pervasive than traditions of bridge building and therefore allow for a greater variety of adaptations. Thus, in the case of the example of section 6 we may conclude, as we did in that section, that falsification is too severe and that knowledge-construction requires more lenient rules. But we may also conclude that the rule is a suitable guide to natural knowledge and regard the

⁵For the distinction between apodictic laws and case laws and their historical ancestors cf. W.F. Albright, *Yahweh and the Gods of Canaan* New York 1968, Chs. ii and iv.

exceptions as miracles.⁶ Or we may retain the rule and conclude with the sceptic that knowledge is impossible. Also what counts as a fact, or as a law, depends on criteria of precisely the same kind the cosmological rationalist examines with the help of facts. Considerations such as these have prompted some thinkers to conclude that rules and standards are entirely institutional: we accept them because we participate in certain institutions and traditions and we defend them by reference to these institutions and traditions. The problem is that there are many institutions and traditions -- so why choose a particular one as a "basis of rationality?"

(8) Philosophers of the Enlightenment up to and including Kant have answered this question by asserting that all traditions have certain features in common and that these common features are sufficiently rich and detailed to serve as a basis for rationality:

Und unterm braunen Sud fuhlt auch der Hottentot
Die allgemeine Dflicht und der Natur Gebot.⁷

Rules, ideologies, traditions incompatible with such "laws of nature" are not impossible, they can be discussed, the most beautiful arguments can be used in their favour. However, they are rarely *rich* enough to provide a framework for life in the full sense of the word and they often lack the *strength* to influence such life. We may therefore distinguish between two kinds of traditions and institutions which I shall call primary and secondary traditions (institutions) respectively.⁸ Primary traditions contain the ingredients that are necessary for (temporary) survival and understanding. For example, they contain all those principles which make it possible for us to perceive and to understand what we perceive. They arise in a manner that is only in part influenced by reason and that is often difficult to explain: we know only little about perception, we are

⁶The nova of 1572 and the comet of 1577 were regarded by some as divine interventions and not as refuting instances of the assumption of the unchangeability of the heavens. For the nova, cf. Tycho Brahe *Astronomiae Instauratae Progymnasmata*, for the comet, cf. Doris Hellman *The Comet of 1577* New York 1944, 132, 152, 172.

⁷Cf. A. O. Lovejoy, "The Parallel of Deism and Classicism", reprinted in *Essays in the History of Ideas* Baltimore 1948, 78ff. The quotation (from Albrecht von Haller's *Ueber den Ursprung des Ubels*) is on page 87.

⁸"Tradition" is here used in a wide sense, covering social, psychological as well as bio-physiological phenomena.

not even clear about its phenomenological features, let alone its causal ingredients. Secondary traditions have often been built up with the explicit intention of changing (parts of) primary traditions. They are much more intellectual, they rest on principles of reason and are defended by arguments conforming to explicitly formulated rules. It is asserted by the view we are considering at the moment that secondary traditions can never approach the complexity of primary traditions and that they can only change those parts of primary traditions that provide suitable points of attack and levers. Rationality and the conditions for its change are restricted to primary traditions entirely. And there is only one primary tradition.⁹ (Hegelians assume that this tradition develops and that all traditions that occur in history and seem to be primary traditions have a place somewhere in this development.)

This theory solves the problem of the institutional rationalist only if its basic assumptions have greater weight than the many traditions that today compete for our attention. This is not the case. Despite determined attempts to find one "basic rationality" that underlies all societies we are still left with a multiplicity of traditions and institutions of comparable strength and plausibility. Institutional rationalism, therefore, does not solve the problem of rationality.

(9) Only few people are aware of this situation. Most modern rationalists take their cue either from science or from some "logical reconstruction of science." We can easily disregard the latter. Reconstructions arose when philosophers who were unable to participate in scientific debate and unwilling to do without the halo of science turned illiteracy into expertise by insinuating that the simpleminded logical systems they knew revealed deeplying structural properties of the scientific enterprise. Now there is a simple test to show whether this is indeed the case: replace the part of science that has been "reconstructed" by the reconstruction and see what happens. In all the cases where the replacement can be carried out the result is clear: science replaced by the reconstruction ceases to work:¹⁰ interesting problems disappear, revolutionary

⁹This was J.L. Austin's view (private communication). It was also one of the points at issue in the debate between Kant and Herder.

¹⁰On the history and the problem of reconstructions cf. my paper in *Minnesota Studies* Vol. V (1970), my essay "Die Wissenschafts-theory -- eine bisher unbekannte Form des Irrsinns?" in *Natur und Geschichte* ed. Kurt Hubner and Albert Menne, Hamburg 1973 as well as my review of Stegmüller's *The Structure and Dynamics of Theories* in *BJPS* 1977 (title: "Changing Patterns of Reconstruction.")

suggestions become either trivial or cease to make sense, concepts lose the ambiguity and indefiniteness that is needed to move from one stage to another. Reconstructions, therefore, cannot replace science as a measure of rationality.

Nor can science itself be such a measure. First, because it lacks the uniformity that is needed to give us a coherent point of view.¹¹ Secondly, science has frequently employed procedures which are now regarded as "irrational." To use it as a standard of rationality we would already have to know how to separate the good from the bad.¹² Thirdly, science is not the only institution that has results, reaches its aims, has a certain amount of coherence. Today, of course, science is believed to be far ahead of alternatives, but this is due to ignorance (of alternatives), arbitrary social decisions and not to any inherent excellence of science. When modern science arose it had some successes¹³ and was close to the heart of powerful interest groups.¹⁴ The successes combined with the power gradually eliminated competitors such as alchemy and the magic world view although these competitors had suffered only a temporary setback and although they were still studied by outstanding scientists such as Newton.^{14@} This is a familiar phenomenon: ideas such as the idea of the atomic constitution of matter, the idea of the motion of the earth, the idea of action at a distance have their ups and downs, they are occasionally ahead of other ideas, then new evidence turns up, it is not easy to explain this new evidence, so the rivals gain an advantage until the correct explanations are found and the rivals are again overtaken. The scientific revolution of the 16th and 17th centuries *froze one particular step* in this dialectical development, assigned to the temporarily defeated rivals a place outside science and so prevented their return.¹⁵ Today science is on top because the show has been rigged in its favour and not because of any inherent excellence either of its methods, or of its results.

¹¹ For details cf. *Against Method*, 202ff.

¹² According to Lakatos we follow the judgment of outstanding scientists. But outstanding scientists have often gone astray and, besides, there is no unambiguous way to separate them from the rest.

¹³ These 'successes' are often a quite mysterious matter. What seems like a success from afar often turns into neutral research, or propaganda when looked at from close by.

¹⁴ Examples of such groups are described in R.K. Merton *Science, Technology and Society in Seventeenth Century England* New York 1970.

^{14a} Cf. Frank E. Manuel *The Religion of Isaac Newton* Oxford, 1973, and Betty Jo Dobbs *The Foundation of Newton's Alchemy* Cambridge, 1975.

¹⁵ Interestingly enough such freeing procedures did not occur in the arts; the discovery of central perspective was soon followed by mannerism and the revolt against strict and unrealistic rules.

(10) Modern science overtook its *scholarly* rivals in a competition that at least at some stage had the appearance of fairness and rationality.¹⁶ The *primitive* views that were found during the expansion of the 15th and 16th centuries were never considered worthy of entering such a competition. They were simply pushed aside and replaced, first by Christianity, later by science. Their removal was not a result of research, but of a firm belief in the superiority of the white man and of all of his works. The excellence of science that is the basic creed of almost all institutional rationalists may therefore be nothing but a pious wish.

Just how far this pious wish is removed from reality has been shown by more recent research into older cultures and contemporary non-Western cultures and civilizations. We know now that Stone Age man possessed a fairly well developed lunisolar astronomy that was used for practical purposes, tested in observatories and incorporated into social fables so that we have here an astronomy that is factually adequate, practically useful and socially relevant.¹⁷ Considering that the average workday of Stone Age man was about four hours¹⁸ we may conjecture that the astronomy became part of a philosophical world view of considerable sophistication.¹⁹ Bits and pieces of such a world view that seem to have spread all over Europe as well as into India and China can be restored from later literary products.²⁰ They show an insight into the role of change that was superior by far to the later assumption of "eternal laws of nature."²¹ Speculation was combined with experiment and so we have

¹⁶ It is interesting to see that a more detailed examination of scientific episodes always show them to be much less rational than everyone is inclined to think. Cf. *Against Method*, chapters 6-12.

¹⁷ Cf. the reports in F.R. Hodson (ed.) *The Place of Astronomy in the Ancient World*, London, 1974.

¹⁸ Cf. the work of Marshall Sahlins.

¹⁹ Cf. Alexander Marshack *The Roots of Civilization* New York, 1972.

²⁰ On the work of the restorers cf. de Santillana-von Dechend *Hamlet's Mill*, Boston, 1969.

²¹ In Hesoid laws of nature are subjected to change and they are the result of a dynamic equilibrium between opposing forces (law of Zeus vs. the laws of the titans). Also, the basic principles of the universe have various aspects (live and generative, dead and passive) which come forth in different circumstances. All this is much closer to modern science than it was to the science of the 19th century: myth was in many respects closer to reality than the highly sophisticated scientific ideologies that replaced it.

now various theories and forms of healing that are better in diagnosis and therapy than the unwieldy, clumsy, though spectacular methods of modern scientific medicine. Scientific medicine seems successful because the point of comparison is its own average achievement. Choose a different and more realistic point of comparison and the success story turns into a story of dismal failure. And, mind you, the comparison would still be between a science that is being fed by billions of dollars of tax money and whose ideology is supported by the whole educational process and an opponent whose only strength (apart from sound theory and efficient practice) is the persistence of its followers. It is therefore very doubtful indeed whether a fair competition would today make science come out on top. Result: science cannot solve the problem of rationalism, it is itself part of the problem.

(11) Considerations such as these are a starting point for the *normative rationalist*. Normative rationalism points out that institutions and traditions have their ups and downs, that they are always capable of improvement, that even the most perfect institution may come off badly when compared with ideals different from those it tries to realise. Also, standards are expressed by thought-statements which can never be obtained from an analysis of what is, even if the object of the analysis should happen to be the fact that certain standards are used and held in high esteem. The domain of rationality is therefore separate from the domain of facts, traditions, institutions. Facts, traditions, institutions may be rational in the sense that they conform to the laws of this domain (so that it would be irrational to deny them, or to go against them), but they cannot give us the values and the standards that generate such judgments.

Now standards, or rules, are used not just because of the intellectual pleasure one may derive from their discussion. They are supposed to guide real actions, they are supposed to produce results in this world. "Rational" procedures that run counter to sociological and psychological tendencies have not much chance of succeeding. Rules that demand actions contrary to physical laws are hopeless. "Valid" standards that do not belong to any tradition might as well not exist. Even those standards that are examined in a purely intellectual fashion and in utter disregard of sociological and cosmological facts still form part of a tradition of intellectual debate (which may or may not be strong enough to influence, and perhaps even to change primary traditions): there is no appeal to standards outside traditions.²² The question is therefore not whether and how

²² This is a trivium for a Wittgensteinian (cf. my review of the *Philosophical Investigations* in *Philosophical Review*, 1955).

standards can influence traditions, the question is how certain traditions (intellectualistic traditions considering validity, truth, etc.) can influence other traditions: insofar as normative rationalism is supposed to have effects in this world it turns out to be a special version of institutional (cosmological) rationalism.

(12) With this we are back to the problem of chapter 7: there are many institutions -- so why choose a particular one as a basis of rationality? The normative rationalist tried to solve the problem by appealing to a judge that is "objective" and independent of traditions. He fails because a judge is effective only if he is institutionalised. Result: *there is not one rationality, there are many and it is up to us to choose the one we like best.*

(13) For many thinkers such a result is intolerable. Relativism, they believe, opens the door to chaos and arbitrariness. The fear of chaos, the longing for a world in which one need not make fundamental decisions but can always count on advice, has made rationalists act like frightened children. "What shall we do?", "How shall we choose?", they cry when presented with a set of alternatives assuming that the choice is not their own, but must be decided by standards that are (a) explicit and (b) not themselves subjected to a choice. Relativism, however, brings choice into everything -- hence the aversion.

(14) The first objection against this assumption is that it gives standards a one sided authority. Traditions, actions, decisions are measured by standards, standards are not measured by traditions (actions, decisions). This is, of course, the view of normative rationalists. But normative rationalism, insofar as it has an effect upon research was found to be a special case of institutional rationalism and institutions, having all the same "ontological status" both influence and are influenced by, other institutions (traditions, etc.)

The second objection is a direct consequence of the reply to the first. Traditions, institutions influence behaviour not only via rules and standards that can be made explicit. When recording an observation, reacting to a smile, checking the results of a complicated calculation, we act "automatically, without consulting explicit rules and without being able to say what rules were involved. Nor is it possible to avoid such behaviour. Assume we want to judge action A by standard S. We apply S to A and render our judgment. But the application must also be rational, so there must be standards S' which judge the pair (A,S) and so on in infinitum unless we admit that at some place we simply act without being able to provide the standards which make this action rational.²³

²³ For details cf. the work of Michael Polanyi.

This general observation is supported by concrete historical research.²⁴ Everyone agrees that in Newton's celestial mechanics, Kepler's planetary theories, Maxwell's electrodynamics, the special and general theories of relativity are splendid achievements of rational thought. We also know the rules and standards that were popular when the theories were developed and other rules and standards which are today said to have led to them. None of these rules and standards would have permitted the theories to survive and those that are more premissive are too weak to give any guidance whatsoever. One might conjecture that the correct rules will one fine day be found and that their discovery will reveal the rationality of all important episodes of science. The conjecture does not seem very plausible and, besides, the need to make it shows that the rationality of science in the sense of the assumption (of section 13) is nothing but a dream. Let us now collect and ideas that may give us a more realistic account.

(15) We have seen (section 11) that standards are not outside traditions, but are parts of them. We have also seen (section 12) that there are many traditions containing different sets of standards. Moreover, action, even complex action, can proceed and often does proceed without standards that are either explicit, or can be made explicit (section 14). And as extending a tradition into the future is always an open matter²⁵, we may say that traditions not merely guide actions, but are constituted by them. Now actions which introduce new traditions lack even the proper starting point. They do not fit into any pre-existing pattern. In some cases they even clash with authoritative traditions and are therefore irrational in a very strong sense of the word.²⁶ Yet such "homeless" and "irrational" action, being joined by other homeless and irrational actions may coalesce into a new form of life which later generations regard as the very essence of reason.²⁷ A researcher, therefore, does not just follow rules and standards, he also *invents* them and in the course of his inventions often goes against what his own time calls "reason", but what later on may turn out to be no more than the reason of the time.

(16) We can now return to the two forms of rationalism that were introduced at the beginning of the present short note. Naive and sophisticated rationalists assume that each individual action, each individual piece of research must be

²⁴ For details concerning the assertions made in this paragraph cf. *Against Method*.

²⁵ Cf. Wittgenstein on continuing series of integers, etc.

²⁶ For an example cf. *Against Method*, 260-271.

²⁷ Cf. *Against Method*, 256f.

subjected to their rules. The rules (standards) determine the structure of research in advance, they guarantee its objectivity, they guarantee that we are dealing with rational action. We have seen that every action and every piece of research may be regarded as a potential instance of the application of the rule, but it may also be regarded as a test case: we may permit the rule to guide research, we may permit research to suspend the rule. In making the latter decision we acknowledge that there are no rules apart from traditions (result of the criticism of normative rationalism), that traditions give not only explicit rules but also tendencies for action (result of the second and third objection in section 14), that the tendencies not only guide actions, but are also constituted by them, that actions may change them and introduce entirely new traditions. A researcher who deviated from the tradition in which he works does not rely on any clear insight into its limitations, for these limitations appear only when new traditions have arrived. He relies, rather, on a vague hope that he will find such traditions and will then be able to explain what at first seemed like madness and irrationality.²⁸ Not every researcher who does unusual things succeeds in this; nor is lack of success always to be ascribed to the irrationality of the ideas used; it is often due to the absence of historical circumstances which are needed if irrational actions are to coalesce into a new form of reason. Those thinkers, however, who do succeed show that scientists (philosophers, religious leaders) are inventors of theories, instruments as well as of entire forms of life which they introduce, bit by bit, against all rhyme and reason because rhyme and reason are often found only after one has moved a considerable distance without them.

Now a researcher who admits such possibilities (and I do not see how, considering the historical evidence, one can deny them) will not abolish any rules and standards. Rather, he will try to learn as many of them as possible, he will try to improve them, to make them more flexible, for on his ventures into the unknown he needs all the help he can get. He knows that every step he makes is a step into darkness. He may end up in obscurity and empty verbiage; but he may also find new canons of action and understanding. Even close attendance to the laws of the tradition in which he grew up and which dominates his surroundings does not increase the light on his path. His life may be safe, "rational," secure, he may achieve fame among the public and earn the respect of his peers and yet all this, seen from an as yet undiscovered form of life, may be but a grandiose exercise in futility. So, here is a really interesting choice to be made. It is the choice between adherence to a predominant

²⁸ The appearance of irrationality is often concealed by the fact that one continues to use the same words though their *meaning* is gradually bent in a new direction. For an example cf. p. 267, third paragraph of *Against Method*.

tradition and "rationality" in the sense of this tradition on the one side, and the path of "irrationality" which may, or may not, lead to a new and perhaps better form of life on the other. This choice confronts the scientist even at the most trite step of his research and it cannot be replaced by any appeal to standards. One might call the omnipresence of this choice the "existential dimension" of research.²⁹ The fact that there is such an existential dimension to every single action we carry out shows that rationalism is not an agency that forms an otherwise chaotic material, but is itself material to be formed by personal decisions. The questions "What shall we do? How shall we proceed? What rules shall we adopt? What standards are there to guide us?" however are answered by saying: "You are grown up now, children, and so you have to find your own way."

²⁹Cf. Kierkegaard *Concluding Unscientific Postscript*, as well as Polanyi's *Person*.

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