Science and rationality

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Scientism is the claim that science provides the only legitimate explanation of our existence. It represents science as the most rational and intellectually defensible of all forms of human endeavour. This article reveals that there is no purely rational justification for rationality or science and examines the implications for the creation/evolution debate. Much of the article is devoted to an evaluation of the concept of retrovalidation, which is an attempt to provide a rational justification of rationality. It is concluded that rationality and science are contingent concepts and that philosophical rationalism and scientism therefore involve commitments that are outside the scope of rationality.

On the links between science and rationality, Newton-Smith writes: "The image that the scientific community likes to project of itself, and indeed the image that most of us accept of that community, is that of rationality par excellence. The scientific community sees itself as the very paradigm of institutionalized rationality."[1] Similarly, Rorty notes that since Kant (figure 1 – optional), "the physical sciences have been viewed as the paradigm of knowledge, to which the rest of culture has had to measure up."[2] This depiction of science as the paradigm of rationality was called into question by the publication in 1962 of Thomas Kuhn's seminal work, *The Structure of Scientific Revolutions* (figure 2).[3]

Drawing on the history of science, Kuhn challenged the view of "scientific development as a process of accretion".[4] Rather, he suggested that the development of science should be seen as a series of scientific revolutions in which scientists move from one incommensurable paradigm to another.[5] While a particular paradigm governs research, it is called normal science.[6] When anomalies accumulate, a new paradigm emerges, which is incommensurable with the previous paradigm, and which constitutes a scientific revolution.[5] Kuhn likens paradigm choice, which is at the heart of the revolutionary process, to a conversion experience or gestalt switch.[7] D.C. Phillips notes that, on this view, "the movement of a scientist from one paradigm to another is, in a sense, not a rational affair."[8]

In 1965, Hanson advanced the notion that the hypothesis which an observer holds can influence their perception.[9] This is known as the theory-ladenness of perception. Hanson was not the first to advance this idea but was responsible for popularising it. The influence of Kuhn and Hanson is reflected strongly in Brown's account of the new philosophy of science, *Perception, Theory and Commitment: The New Philosophy of Science*.[10] Wagner notes that the characteristic features of the new philosophy of science, represented in Brown, are "the theory-ladenness of perception and belief, the unavoidability of paradigmatic presuppositions, the centrality of conceptual change and scientific revolutions and the dialectical (as opposed to algorithmic) nature of scientific reasoning."[11]

D.L. Phillips notes that the new image of science represented by Kuhn, Polanyi, Feyerabend, Toulmin and others, "shares many characteristics with that part of sociology which is referred to as the sociology of knowledge".[12] Bernstein noted in 1983 that, "the dominant temper of our age is fallibilistic".[13] He also noted that even the hard sciences have not been able to escape the relativism that began as a trickly two hundred years ago and which "has swelled in recent times into a roaring torrent".[14] Rorty suggests that "epistemology proceeds on the assumption that all contributions to a given discourse are commensurable."[15] He states that "to suggest that there is *no* such common ground seems to endanger rationality [emphasis in original]."[16]

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Figure 1. Immanuel Kant. Richard Rorty notes that since Kant, the physical sciences have been viewed as the paradigm of knowledge.

Bernstein echoes Rorty when he suggests that the incommensurability thesis in science has threatened "the conviction of the universality of reason and the belief that there are universal standards and criteria of rationality."[17] D.C. Phillips notes that from some points of view in post-Kuhnian science, science is becoming less demarcated from art.[18] He also notes that in Kuhnian terms, paradigms govern the admissibility of evidence.[19]

What is remarkable about the new philosophy of science, given its developing profile over the last 50 years, is how little it has

influenced the practice of science or the prevailing image of science. In the creation/evolution debate, many vocal proponents of evolutionary science proceed as if the debates in philosophy of science in the last 50 years have never taken place. Creationists more often than not are confronted or met with crude scientism, whether from evolutionary scientists or from those who are in sympathy with them.

It seems unlikely that evolutionary scientists could be unaware of the debates over the nature and function of rationality that have raged in science over the past five decades. Yet, prominent evolutionary scientist and atheist, Richard Dawkins, claims that his own acceptance of evolution is based purely upon evidence.[20] This ignores the anomalies in evolutionary theory, which, according to Charlesworth, falsify the theory of evolution.[21] Charlesworth explains why the theory continues to be held, "there is evidence which, *prima facie,* falsifies the theory of evolution, but the explanatory value of the theory is so great and the alternatives to the theory so unthinkable, that the scientist holds on to the theory despite the apparent evidence against it [emphasis in original]."[21]

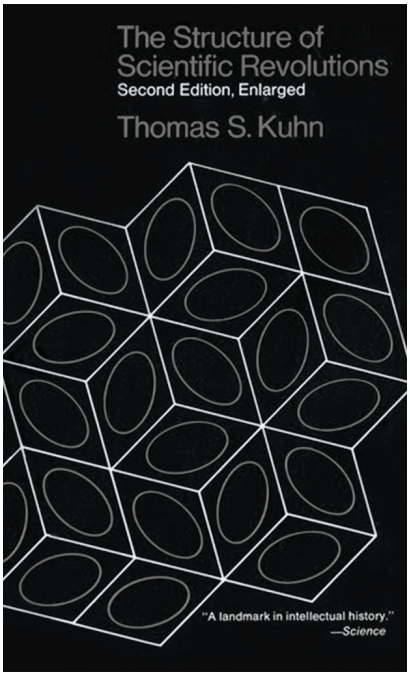

Figure 2. In his seminal work, *The Structure of Scientific Revolutions*, philosopher and historian of science Thomas Kuhn, called into question the depiction of science as the paradigm of rationality.

The debate over rationality in science is coextensive with the rationality debate in philosophy; philosophy of the social sciences and philosophy of education. Bernstein noted in 1983 that the single concern and focus of recent philosophical debates, whatever their subject and emphasis, is the nature and scope of human rationality.[22] He detects in the internal development of Anglo-American and continental philosophy in the twentieth century "increasing doubts about the project of grounding philosophy, knowledge and language."[23] It would seem from this that doubts about the nature and function of rationality are not limited to science, and therefore it is reasonable to assume that the nexus between science and rationality will prove problematic.

The creation/evolution debate is distorted when information relevant to the debate remains unacknowledged, so a discussion of the intellectual defensibility of rationalism and scientism is warranted in order to inform debate. Space limitations mean that it will be best to restrict discussion to the justification of rationalism and scientism. Accordingly, the following section will examine the justification problem in rationality and science. Then, a proposed solution, retrovalidation, will be evaluated. The final section will outline the implications of the discussion for science and rationality and the creation/evolution debate.

The justification problem

Conklin, in noting how the justification problem arises in rationality, provides a useful summary of a significant argument against the acceptance of foundationalist epistemology:

> "Every time a statement is justified by citing reasons, the reasons themselves must be justified, and these justifications must be justified, etc. This is the problem of infinite regress. If a regress actually is allowed to continue without end, then the absence of an end means that the justification is not completed. Hence, the original statement has not been justified. The only way to stop the regress is to make a commitment to some fact and value statements somewhere along the way, but these statements must be accepted *without justification* (since subjecting them to justification would re-open the infinite regress). Whether the regress goes on forever, or whether it is stopped at some point by an arbitrary commitment, the result is the same: The original statement has not been justified. Thus justification is impossible [emphasis in original]."[24]

A notion of rationality which makes reasons sufficient for the justification of knowledge claims is rationalistic. It appears, then, that rationalism is vulnerable to infinite regress in justifying the claim that all matters of knowledge, belief and attitude should be decided by exclusive appeal to reasons. As philosophical rationality is essentially philosophical rationalism because of its exclusive appeal to reasons in philosophical discourse, it follows that all philosophical reasoning that appeals exclusively to reasons to establish knowledge claims is subject to the problem of infinite regress.

Roger Trigg notes that "the problem of justifying any commitments apparently comes down in the end to the problem of whether commitment to rationality itself can be justified."[25] On this possibility, Trigg writes:

> "Any attempt to justify rationality must avoid the charge of merely laying down something by definition, and must also avoid any suspicion of invoking an arbitrary commitment. The trouble is that any justification which does more than

> say what is deemed rational must give reasons for rationality which are themselves subject to rational scrutiny. The circularity involved in this latter exercise seems inherent in any justification of rationality. It seems as if it is logically impossible to justify being rational. There is only a short step from this admission to the view that the rational man does himself make a non-rational commitment, and that he is in no position to criticise anyone else who makes any other kind of arbitrary commitment."[26]

Rationalism is therefore unjustified on its own premises. By making reason sufficient as well as necessary, the rationalist cannot operate in the realm of reason alone and creates a paradox. While a commitment to rationality cannot be justified by reason-giving alone, a question which seeks justification for rationality is already operating within the tradition of rationality. This paradox can be resolved only by viewing rationality or reason-giving as being a necessary, but not sufficient, condition to establish grounds for beliefs, actions and causes. Thus, rationalism, by insisting on reason alone, cannot operate consistently in the realm of reason. This is also true of philosophical rationalism or its empirical counterpart, scientism, which we will now observe.

Fogelin, in examining sceptical doubts about 'empirical knowledge' claims, concedes the sceptic's claim that "there is no theoretical way of placing a limit upon this potential infinite regress of reasons".[27] He notes that the demand for justification of empirical knowledge claims usually ends in the employment of an appearance statement.[28] An appearance statement is a statement in which an observer is forced to admit that an object only appears to be what it is described as.

Fogelin concludes: "The appeal to appearance statements as grounds for a factual judgment depend upon pragmatic considerations in at least two respects: (1) that certain independent information will be accepted without challenge; and (2) that at least some appearance statements will be accepted without challenge."[29] Fogelin's conclusion that pragmatic considerations are essential to the conduct of science implies that rationalism and scientism are not substantively different constructs.

If science is the ultimate intellectual ideal and paradigm case of rationality, science must be capable of providing a justification to this effect and be capable of demonstrating that it generates privileged representations of the world. Science must also be able to demonstrate that it is prior to rationality. If it is unable to do either of these things, then scientism is not superior to any other form of commitment. Philosopher Nicholas Rescher has recognized the dilemma about the justification of rationality and has attempted to deal with the problem by introducing the notion of retrovalidation.[30] Retrovalidation is the action of retrospective validation in the light of experience.[31] This concept will be evaluated in the next section.

Retrovalidation

Rescher, in examining the sceptical challenge to rationality, writes:

> "To be sure, if it is indeed the case that rationally justified belief must *always* be based upon rationally pre-justified inputs, then the sceptic is quite right. For, then the process of rationally validating our accepted beliefs can never get started. To all appearances, we here enter upon a regress that is either vitiatingly infinite or viciously circular. The rational justification of belief becomes in principle impossible—as sceptics have always insisted. But this sceptical challenge rests upon a false supposition. For the rational justification of a belief does *not* necessarily require pre-justified inputs. The idea that even as human life can only come from prior human life so rational justification can come only from prior rational justification is deeply erroneous. For the important distinction between *discursive* and *presumptive* justification becomes crucial here in a way that sceptics conveniently overlook [emphasis in original]."[32]

Rescher suggests that "the discursive justification of a belief lies in the fact that there is an already available, pre-justified belief which evidentiates it."[32] He suggests that "*presumptive* justification—unlike discursive justification—does not proceed through the evidential mediation of previously justified grounds, but directly and immediately through the force of a 'presumption' [emphasis in original]."[32] He further suggests that "a belief is justified in this way when there is a *standing presumption* in its favour and no pre-established (rationally justified) reason that stands in the way of its acceptance [emphasis in original]."[33]

For Rescher, "presumptively justified beliefs are the raw materials of cognition."[34] He notes that "presumptions determine our 'starter-set' of initial commitments, enabling us to make a start on whose basis further 'inferential' reasoning may proceed."[34] He also notes that "we cannot pursue the cognitive project—the quest for information of the world—without granting certain initial presumptions."[35]

On the question of the validation of particular presumptions, Rescher writes:

> "The validity of a presumption is not pre-established by some prior process of rational deliberation but emerges *ex post facto* through the utility (both cognitive and practical) of the results it yields. Legitimation is thus available but only through experiential *retrovalidation*, retrospective validation in the light of experience [emphasis in original]."[31]

Rescher's recognition that cognitive rationality is dependent upon the acceptance of presumptions or

presuppositions confirms that reasons are contingent and that there must be some foundation for the process of inferential reasoning. His acknowledgement that there must be a starter-set of initial commitments is a tacit acceptance of the a-rationality of a commitment to rationality, where a-rationality is a commitment to reason that is outside of or prior to reason. It is important to note that a-rationality does not imply irrationality. If an initial commitment is needed as a basis for inferential reasoning, no good reasons for accepting rationality can emerge until an a-rational commitment is made. This confirms that commitment is prior to rationality or reason giving.

This commitment is logical in that sound reasoning is contingent upon a-rational commitments. It is also logical in the sense that reasons can be adduced in favour of the contingency of reasoning. While a-rational commitments may be logical, it is also the case that a-rational commitments are psychological, in that they arise somewhat naturally from the mental characteristics of the individual.

Rescher's notion of retrovalidation also confirms that experience is prior to rationality. Good reasons emerge only from experience. Initial commitments are therefore a-rational in the sense that the commitment is prior to the process of inferential reasoning. The notion of retrovalidation therefore undermines Rescher's contention that rationality is a self-justifying, self-validating concept. However, this is not an argument against the notion of retrovalidation *per se*. Rational validation of a presumption, prior to experience, is untenable because of the contingency of reasons. Contingency leads to infinite regress. In order for reason giving to proceed, the problem of infinite regress must be circumvented. This can be accomplished only by breaking the contingency of reasons through granting, as Rescher suggests, certain initial presumptions.

A problem does arise with the notion of retrovalidation if retrovalidation is seen as a process that can rationally (by reasons alone) ground the initial commitment. Reasons for the veridicality of a particular initial commitment are within the ambit of rationality only if these reasons are able to defeat their own contingency. The process of giving reasons to support a particular commitment must begin by circumventing the problem of infinite regress. Rescher implicitly acknowledges this point when he uses the utility of results as the basis of retrovalidation.

Thus, the notion of infinite regress is not as easily defeated as Rescher suggests. As Hill asserts "reason is the servant of first-order commitments".[36] Presumptions and presuppositions can be evaluated only on the basis of some prior commitment to evaluative criteria. The necessity of a-rational commitment prior to reason giving seems unavoidable.

Rescher's attempt to defeat the sceptic's challenge, by trying to circumvent infinite regress and vicious circularity, and yet remain with the domain of reason giving, is thus vitiated by the a-rationality of the evaluative criteria which permit the process of retrovalidation to begin. All reasons are contingent and subject to infinite regress. All reason giving must rest upon some a-rational presumption. The unavoidability of a-rational presumptions should be acknowledged. Not to do so is to leave unimpaired the force of infinite regress and vicious circularity against all reasons, including those which are part of the process of justification or validation of rationality.

The a-rationality of commitments which circumvent the problem of infinite regress does not mean that reasons are redundant in human communication or that there is no way of overcoming the sceptic's challenge to rationality. Infinite regress is a problem only to a theory of rationality which makes reasons both necessary and sufficient conditions of rationality. If reasons are seen as necessary but not sufficient conditions of a defensible theory of rationality, infinite regress can be circumvented without vitiating the inferential process, which is necessary to a defensible theory of rationality.

If reason giving can proceed effectively only, i.e. defeat the problem of contingency in infinite regress, on the basis of a-rational commitments, reasons are not able essentially to call ultimate commitments to account. Reasons should therefore be assessed by ultimate commitments. Rationality is thus heteronomous, not autonomous.

A-rationality is therefore not necessarily equivalent to irrationality or the denial of reason. It does mean, however, the unavoidability of value commitments, including a commitment to rationality. Ultimate commitments may be outside the ambit of reason but this does not mean that they are necessarily antithetical to the use of reason giving in determining beliefs, actions or evaluations.

The unavoidability of presumptions in cognitive rationality, where the aims are to determine what to believe or accept, is similarly the case in practical rationality and evaluative rationality, where the aims are to determine what to do or what to prefer. In the case of the creation/evolution debate, what to believe or accept has significant implications for what to do or what to prefer. For this reason, it is important to highlight the importance of a standard of evaluation which is not contingent but which is accepted as a fundamental premise which neither admits nor requires reasons in its defence. There must be some evaluative standard which is not subject to doubt. This standard must be considered supra-rational.

This can be illustrated by reference to the problem of ends. While reasons are essential to means/ends reasoning, reasons are inadequate to evaluate ends. There must be some other criteria by which ends are evaluated. For example, having decided that genocide is a desirable end, Hitler set out to accomplish this desired end in an efficient manner. In the context of his ends, Hitler's methods of genocide were both logical and efficient. On the criterion of efficiency, Hitler's methods were rational.

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Figure 3. Michael Polanyi revealed the fiduciary rootedness of all rationality.

However, the moral outrage that resulted from Hitler's actions was not based upon algorithmic certainty but upon the assumption that Hitler's ends were evil. No ratiocination is adequate to condemn genocide that does not import an evaluative standard for deciding the merit of ends. Without this supra-rational standard, there is no basis for judging genocide to be irrational.

Dewey suggests that the ordinary dualism of 'means and ends' must be broken down and that means functions as ends.[37] Yet, dissolving the means/ends dichotomy, in terms of Hitler's actions, would not allow the judgement that Hitler's ends were evil. The evaluative standard required to make this judgment is not implicit in the means chosen by Hitler to accomplish his ends.

Michael Polanyi (figure 3), in discussing universal doubt, suggests that:

> "While we can reduce the sum of our conscious acceptances to varying degrees, and even to nil, by reducing ourselves to a state of stupor, any given range of awareness seems to involve a correspondingly extensive set of a-critically accepted beliefs. Thus the programme of comprehensive doubt collapses and reveals by its failure the fiduciary rootedness of all rationality."[38]

The fiduciary rootedness of rationality is clearly related here to a-critically accepted beliefs or non-rational evaluative criteria.

Sceptical doubt applied to all non-rational criteria for determining the merit of ends leaves no way in which to condemn genocide. Polanyi notes that "since the sceptic does not consider it rational to doubt what he himself believes, the advocacy of 'rational doubt' is merely the sceptic's way of advocating his own beliefs."[39] For Polanyi, "rationalism expressed in this form would renounce its illusory principle of doubt and face up to its own fiduciary foundations."[39]

Polanyi notes the peculiar consequences of radical doubt in a passage which is relevant to the evaluation of Nazism:

> "In propagating their own beliefs the early rationalists were opposing traditional authority on so wide a front that they could well regard themselves as radical sceptics. But the beliefs of rationalism have since been effectively called into question by the revolutionary doctrines of Marxism and Nazism. It is absurd to oppose such doctrines now on the grounds of scepticism. For they gained their present ascendancy only recently by a sweeping rejection of Western tradition, and it is rationalism which today relies on tradition—the tradition of the eighteenth and nineteenth centuries—against them. It should have become clear by this time that the beliefs transmitted by this now imperilled tradition are by no means self-evident. Modern fanaticism is rooted in an extreme scepticism which can only be strengthened, not shaken, by further doses of universal doubt."[40]

It appears that a strict adherence to rationalism undermines the notion of rationality by removing all non-circular evaluative criteria.

Radical doubt must be suspended in at least one area if rationality is not to be used to justify any kind of behaviour or belief. At some point, a non-contingent evaluative standard must be accepted as a basis for the evaluation of ends. Such a standard is supra-rational because it sets the parameters of what is to be considered rational.

Hill, in discussing the view that rationality is intrinsically moral, suggests: "It is possible, however, to entertain an alternative belief that rationality is but the tool of human commitment."[41] He also suggests that "a commitment to rationality must be undergirded by a prior commitment concerning the meaning and purpose of life."[41] This leads to the notion that in evaluative rationality, presumptions should be concerned with human interests in such a way that moral ends become part of the notion of rationality. Rescher acknowledges this when he writes "in assessing the rationality of actions we cannot look just to personal *motives*, but must invoke universally appropriate *values* as well [emphasis in original]."[42]

Hence it is not surprising that non-rational factors are accepted as part of science. Zuckerman acknowledges that value judgments need to be made when scientists are deciding which explanation most closely corresponds to objective truth.[43] Brown suggests that confirmation processes in science are unavoidably subjective.[44] Similarly, in relation to philosophy, Bernstein writes: "Perhaps, despite the self-understanding of many philosophers that they are

the defenders of rational argument, the positions they take are influenced more by social practices, metaphors, matters of temperament, and other non-rational factors than the arguments upon which they place so much emphasis."[45]

Discussion and conclusions

It seems clear that retrovalidation is not able to rescue rationalism from the regress argument. If a theory of rationality is to be a defensible theory, it must be a minimal theory, in which reasons are necessary but not sufficient to justify rationality. The implication of a minimal theory of rationality is that rationality and science are not substantively different concepts. They are heteronomous, not autonomous, concepts. Within the canons of rationalism and scientism, neither science nor philosophy can defeat their respective contingencies. So it can be asserted with confidence that rationality and science are not neutral, detached or objective activities.

This means that science and rationality function as tools of pre-existing commitments. An inferential process of reasoning is based upon presumptions or presuppositions which constitute the starter-set of initial commitments. These presumptions are a-rational in the sense that there can be no non-circular evaluative criteria for justifying them. Good reasons emerge only from within a commitment that is prior to rationality. Rationality is thus a bounded concept that functions consistently with its own presuppositions. Perception *is* theory-laden.

The creation/evolution debate is therefore not objective science versus irrational faith but rather two different sets of pre-existing commitments vying for public confidence. The language and authority of science is co-opted on the side of evolutionary science but, in terms of our discussion of the justification problem in rationalism and scientism, there are no compelling reasons why the presuppositions of scientism are to be preferred over the presuppositions of biblical creation. Science arose within a culture saturated with the Christian worldview. If Christian faith is somehow antithetical to the development or progress of science, it is strange that the history of modern science begins in Christian Europe.

There are also no compelling or even persuasive reasons why the presuppositions of scientism are to be preferred to those of fiat creation in terms of observed phenomena. Evolutionary science does not exclude alternative scientific explanations of the material world. Witness the vast numbers of anomalies in evolutionary theory and the constant overturning of theoretical perspectives in evolutionary science and it is clear that, as Charlesworth admits, the theory is held in spite of falsifying evidence.[21] This is hardly the sort of admission that compels acceptance of evolutionary theory.

It is not enough for a scientific theory to be suggestive. It must persuade and compel by excluding all other explanatory possibilities. Also, if fiat creation is so antithetical to science and so lacking in evidence, it is strange that the evolutionary community is so reluctant to allow any countervailing evidence to its perspective to be considered in education or in the court of public opinion. So much energy is expended in keeping the terms of the debate favourable to evolutionary science that it is hard to escape the conclusion that there is more at stake in the creation/evolution debate for the evolutionary community than meets the eye.

Creation and evolution have vastly different implications for society. Beyond the debates about what the observable evidence means lie two incompatible worldviews. A-rational commitments can and must be based upon the moral consideration of human interests, and it is here where the failures of scientism and rationalism are starkest. If a society rejects a supra-rational moral standard of human behaviour, which neither admits nor requires reasons in its defence, then the choice of scientism is a fateful one. Science, divested of the moral compass of biblical Christianity, played a significant role in establishing the political and social conditions in

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Figure 4. Evolutionary science, divested of the moral compass of biblical Christianity, led to the horrors of Nazism.

Germany that led to the horrors of Nazism (figure 4).[46] As a contingent concept, science cannot provide a moral basis for society. Observational science can be a wonderful tool for human advancement and social progress but cannot provide a reliable guide to human conduct. What is needed is an explanation of the universe that does not fall at the first rational hurdle and that is able to provide a basis for moral behaviour. On this basis, it is not unreasonable to prefer creation to evolution as an ultimate explanation of the universe.

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