British Journal for the History of Philosophy
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rbjh20

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Published online: 04 Jun 2010.

To cite this article: Efraim Podoksik (2004) The scientific positivism of Michael Oakeshott, British Journal for the History of Philosophy, 12:2, 297-318, DOI: 10.1080/0960780410001676502

To link to this article: http://dx.doi.org/10.1080/0960780410001676502

British Journal for the History of Philosophy 12(2) 2004: 297–318

ARTICLE

THE SCIENTIFIC POSITIVISM OF MICHAEL OAKESHOTT[1]

Efraim Podoksik

I

It is often argued that the British philosopher Michael Oakeshott (1901–1990) met science with suspicion, if not overt hostility. Thus, L. Susan Stebbing, in her review of Oakeshott's first philosophical book *Experience and Its Modes* (1933), found his treatment of science 'peculiarly unsatisfying'.[2] Noel Annan, referring to Oakeshott's attitude to the scientific education in universities, pointed out that 'Oakeshott distrusted science . . . His condescension is breathtaking; and to the scientists of his own university laughable. How scientists work and think seems beyond his comprehension'.[3]

Even the most sympathetic commentators have until recently almost completely neglected this aspect of Oakeshott's thought.[4] Today the state of research has somewhat improved and Oakeshott's philosophy of science has received more attention. Nevertheless, the main emphasis has usually been on Oakeshott's analysis of the human sciences and of social theory and not on his description of the natural sciences.[5] Even when this element of his thought is summarized, it is usually done under an implicit assumption that the important aspect here is the limits of scientific inquiry: not what science is, but what it is not.

This attitude to Oakeshott is unfair. He certainly did write much more about subjects such as history, education or politics. This is not surprising, given that these were the main themes of his interest. What is rather unusual

[1] A different version of this text appears in Efraim Podoksik, *In Defence of Modernity: Vision and Philosophy in Michael Oakeshott* (Thorverton 2003).

[2] L. Susan Stebbing, 'Review of *Experience and Its Modes* ', *Mind* , 43 (1934): 403–5; at p. 404.

[3] Noel Annan, *Our Age: Portrait of a Generation* (London 1990) pp. 396–7.

[4] There are some exceptions, however. Thus, W. H. Greenleaf briefly analyzes Oakeshott's philosophy of scientific experience, noticing similarities between Oakeshott's views of science and those of thinkers such as Russell. See W. H. Greenleaf, *Oakeshott's Philosophical Politics* (London 1966) p. 22.

[5] See an interesting study by Terry Nardin, *The Philosophy of Michael Oakeshott* (University Park, PA 2001) 101–40, who compares Oakeshott's ideas with those of neo-Kantians such as Windelband and Rickert.

British Journal for the History of Philosophy
ISSN 0960-8788 print/ISSN 1469-3526 online © 2004 BSHP
http://www.tandf.co.uk/journals DOI: 10.1080/0960780410001676502

about Oakeshott is that despite his educational background he dedicated much thought to modern science. He constantly insisted that science was one of the most important activities of the human mind and wrote a long chapter on the nature of scientific experience in his first major philosophical treatise. Oakeshott's philosophy of science is not merely a negative attempt to draw limits of scientific activity, but a positive inquiry, the conclusions of which correspond to the views and feelings of many of his contemporary fellow philosophers and scientists.

The subject of this article, therefore, is not Oakeshott's philosophy of science in the context of his general philosophy but his philosophy of science as such. I want to show in this article that he regarded science as an important autonomous voice of modern civilization and that his views were shaped under the influence of scientific positivism. I will concentrate on the analysis of Oakeshott's views in *Experience and Its Modes* (1933), simply because this is the only systematic and detailed exposition of his views of the character of scientific activity. However, I will also refer to his later works in order to show that the position outlined in his early philosophical book is preserved throughout his main writings.

II

In *Experience and Its Modes*, Oakeshott made 'experience' the basic concept of his philosophy. Experience meant for him 'the concrete whole which analysis divides into "experiencing" and "what is experienced"'.[6] Oakeshott rejected subject–object dualism and began his discussion by seemingly adopting the holistic approach of Absolute Idealism which repudiates the distinction between appearance and reality and sees the world of ideas as an interconnected whole.[7]

According to Oakeshott, every experience is thought, a world of ideas which constitutes an interdependent system. The criterion of truth is the inner coherence of this world of ideas, a lack of self-contradiction. As every experience is a world of ideas, there is no such thing as complete ignorance, or complete error. Everything is true to some degree and the aim in experience is to achieve what is absolutely coherent. The whole of experience is achieved when this is experience without presupposition, experience which is fully coherent in itself so that it does not require any further transformation.

Yet such completeness is rarely, if ever, achieved. Quite often experience is not pursued radically to the point of achieving full coherence but arrests

[6] Michael Oakeshott, *Experience and Its Modes* (EM) (Cambridge 1933) p. 9.

[7] On the influence of British Idealism on Oakeshott's thought, see David Boucher, 'The Creation of the Past: British Idealism and Michael Oakeshott's Philosophy of History', *History and Theory*, 23 (1984) No. 2: 193–214.

at a certain point. When an arrest occurs, a homogeneous world of ideas, limited by certain presuppositions may emerge. This is an abstract world of experience which falls short of grasping the whole of reality. This arrest 'modifies' experience and therefore Oakeshott calls it a 'mode'. It is a homogeneous but not complete form of experience. It is not a part of reality; it is the attempt to achieve the whole of reality but from a limited standpoint and therefore a failing attempt. It is dependent on the concrete experience which is the criterion of its coherence but does not contribute anything to it. No mode of experience is necessary in order to achieve what is satisfactory in experience and it must be either avoided or destroyed and superseded but not incorporated. Modes of experience are irrelevant to each other and they are also irrelevant to philosophy which is concrete experience.[8]

One such mode of experience is science. Oakeshott presents scientific experience as 'defective experience'.[9] Scientific knowledge is hypothetical knowledge, merely 'a world of supposals about reality'.[10] Science is the attempt to discover and maintain the real world but it is unable 'to achieve the end in experience'.[11] It constitutes an abstract and limited world and therefore 'the world of science and the world of reality are, as worlds, exclusive of one another'.[12] Science is unable to achieve what it claims to achieve – the totality of experience – and when philosophy enters the scene, 'scientific experience must either be avoided or pressed beyond the borders of science, carried out of itself and seen to be an abstract world of ideas'.[13]

It is tempting to conclude from this presentation that Oakeshott simply follows here the ideas developed by Absolute Idealists, or by such thinkers as Collingwood and Croce. Science was not among the central preoccupations of these Idealists, in contrast to many philosophers of the neo-Kantian persuasion such as Helmholtz or Riehl. Some, Bradley and McTaggart among them, explored mainly metaphysical questions; others, such as Croce and Collingwood, focused on other modes of understanding such as history, which they considered to be more coherent. This is not to say that they did not respect modern science or did not recognize its significance. Yet they saw in science an inherently contradictory form of experience, unable to withstand the scrutiny of philosophical investigation and bound to dissolve into higher forms of experience. Thus, they fell short of recognizing it as a coherent mode of knowledge. Croce, being influenced by pragmatism, recognized science as a legitimate activity, if it did not move outside its limits, but claimed that it was not a form of knowledge at all. Scientific activity originates in practical necessity and, although this

[8] EM, Ch. II.
[9] EM, 243.
[10] EM, 215.
[11] EM, 214.
[12] EM, 217.
[13] EM, 219.

does not necessarily mean that science pursues practical ends in the vulgar sense, it is still concerned with actions, not with the quest for truth. The natural sciences for Croce are 'not knowledge of will but will; not truth, but utility'.[14]

Likewise, R. G. Collingwood rejected the positivistic concept of scientific knowledge. In his chapter on science in *Speculum Mentis* (1924), a book with a structure similar to that of *Experience and Its Modes*, Collingwood described science as incoherent knowledge, because it claims to deal with general abstractions whereas, in effect, the scientist is always facing a particular event. When this incoherence between the abstract nature of scientific propositions and the historical nature of particular observed events is recognized, science is transformed into a higher mode of knowledge which is history.[15] Science, therefore, is unable to maintain itself and is only a stage in the process of human self-understanding.

By describing science as 'defective' experience, Oakeshott seems to concur with these views and, indeed, his analysis is usually perceived as an Idealist critique of scientific experience.[16] However, his attitude is, in fact, more complex. The term 'defective' is not used by him in the pejorative sense. Oakeshott also calls history a 'defective' mode, but one can hardly say that he 'distrusted' history. Certainly, Oakeshott denies that science achieves a satisfactory view of the whole of reality. However, unlike those Idealists, he does not think that science within itself is a contradictory mode of experience. On the contrary, he describes it as being able to achieve inner coherence and to maintain independence without being prone to dissolving into other forms of experience. For him, 'so long as scientific thought is engaged with what it can achieve . . . it remains sovereign and unassailable', and 'only scientific thinking can elucidate the world of science'.[17] Of the whole chapter on science in *Experience and Its Modes*, Oakeshott dedicates only seven pages to explaining why science is an abstract defective world. The rest of the chapter is concerned not with the negative but with the positive account of science, not with the scrutiny of the defects of scientific experience but with the elucidation of its character.

III

What, then, are the main postulates of scientific experience? When Oakeshott's view is analyzed carefully, it emerges that his approach lies far from what can be recognized as the neo-Hegelian criticism of science. There are

[14] Benedetto Croce, *Logic and the Science of the Pure Concept* , translated by D. Ainsle (London 1917) p. 343.

[15] Robin G. Collingwood, *Speculum Mentis or the Map of Knowledge* (Oxford 1924) p. 187.

[16] See, for example, Paul Franco, *The Political Philosophy of Michael Oakeshott* (New Haven 1990) pp. 43–9.

[17] EM, 217.

great similarities between Oakeshott's philosophy of science and the philosophical trend called 'scientific or 'mathematical' positivism with its neo-Kantian roots.[18] It is represented by such philosopher-scientists as Ernst Mach, Henri Poincaré, and Karl Pearson.[19]

Antonio Aliotta called this trend the 'new' positivism as distinct from the 'old' positivism.[20] The 'new' positivists believed in the basic principles which characterized positivism in general, subscribing to the claim of phenomenalism, that scientific knowledge could account only for what is actually manifested in experience and advocating the essential unity of scientific method.[21] But in contrast to the old positivism, the new positivists abandoned dogmatic scientism and attempted to purge science of anything reminiscent of metaphysics. Scientific positivists felt that the reputation of science was so high that they could throw away any metaphysical foundations of science and make it stand on its own two feet. This was the way to ensure the autonomy and integrity of scientific activity.

This programme of scientific positivism found its first expression in the publications of G. R. Kirchnoff's *Principles of Mechanics* (1874) and E. Mach's *The Science of Mechanics* (1893). It was characterized by a distrust of metaphysics and an attempt to formulate rules of scientific method which would not be dependent on extraneous presuppositions. Kirchnoff and Mach saw physics as the model for all the sciences or even as the science to which all others ought to be reduced. Physics, they implied, was able to achieve its status due to the use of mechanical explanation. Yet the old mechanics was in an urgent need of reformulation. Concepts such as 'force' or 'absolute space' were seen as remnants of old metaphysical entities. According to Kirchnoff, mechanics is the science of motion whose object is the complete description of motions in the simplest possible manner. Science does not explain 'why' things happen and the only explanation it provides is the description of the relations between phenomena.[22]

For Mach too, explanation means description and scientific laws are just an abridged form of description.[23] The most complete world picture of our sensations is a world picture of the greatest possible stability.[24] Mach

[18] See John Passmore, *A Hundred Years of Philosophy* (London 1966) pp. 322–9; John Losee, *A Historical Introduction to the Philosophy of Science* (Oxford 1993) pp. 166–82.

[19] Oakeshott explicitly mentions and quotes from works of Poincaré, Whitehead and a neo-Kantian philosopher Lotze (See EM, 155, 179 n., 198 n.).

[20] Antonio Aliotta, *The Idealistic Reaction Against Science*, translated by A. McCaskill (London 1914) p. 53.

[21] See Leszek Kolakowski's description of the central aspects of positivist philosophy in his *Positivist Philosophy: From Hume to the Vienna Circle*, translated by N. Guterman (Harmondsworth 1972) pp. 11–19.

[22] Passmore, *A Hundred Years of Philosophy*, p. 322.

[23] J. Bradley, *Mach's Philosophy of Science* (London 1971) pp. 180, 207–12.

[24] John T. Blackmore, *Ernst Mach: His Work, Life and Influence* (Berkeley 1972) p. 170.

abandoned the idea of strict causality in science, insisting that 'a "causal explanation" ... is nothing more than the statement or description of an actual fact or a connexion between forces'.[25] Furthermore, he rejected the idea that scientific laws were demonstrative. An economic description of connections does not apply to any particular event, for the nature of scientific law is always hypothetical.[26]

Henri Poincaré represents a less empiricist trend known as 'conventionalism', yet his approach to scientific method was similar to that of Mach. He saw scientific laws as hypothetical judgements, expressed through mathematic formulae. These laws are 'conventions' created by the scientist. 'Conventionalism' is sometimes held to be one of the expressions of the 'intuitivist' trend which became influential in France in the 1890s.[27] Yet Poincaré was by no means a relativist and recognized the importance of objectivity in science. He was a conventionalist in mathematics, arguing that, in any explanation, the choice between different mathematical systems (for example, Euclidian versus non-Euclidian geometry) was arbitrary. But he recognized that hypotheses in physics could be judged as true or false. Not only was Poincaré not a relativist, but his publications actually served to popularize and defend science in a French intellectual climate in which intuitivism, associated with the name of Bergson, became a fashionable current, largely as a reaction to the domination of scientism in the previous years.[28]

Poincaré responded to two charges against science. The first claim, put forward by Catholic scientists such as Le Roy, was that science had nothing to say about the real world. These thinkers did not dismiss science itself but denied to science any objective validity with regard to reality. Against them, Poincaré defended the idea of objectivity.[29] He felt he was able to do so because he maintained what can be seen as a coherence theory of truth.[30] For him, the objective world meant not a reality separated from human perceptions but a coherent world picture common to all human beings. Scientific theory is objective because it transforms 'brute' facts into 'scientific' facts, by enabling individual perceptions to be expressed through a general and unifying language which has a common

[25] Ernst Mach, *The Analysis of Sensations* , translated by C. M. Williams (London 1914) p. 335.
[26] Bradley, *Mach's Philosophy of Science* , pp. 186–8.
[27] Passmore, *A Hundred Years of Philosophy* , p. 326.
[28] On the French debates on science see Henry E. Guerlac, 'Science and French National Strength', in E. M. Earle, ed., *Modern France: Problems of the Third and Fourth Republic* (Princeton 1951), pp. 81–105; Harry W. Paul, 'The Debates Over the Bankruptcy of Science in 1895', *French Historical Studies* , 5 (1968) No. 3: 299–327.
[29] Henri Poincaré, 'Sur la Valeur Objective de la Science', *Revue de Métaphysique et de Morale* , 10 (1902): 263–93.
[30] David Stump, 'Henri Poincaré's Philosophy of Science', *Study in History and Philosophy of Science* , 20 (1989) No. 3: 339–49.

meaning for everyone.[31] For Poincaré, then, 'objectivity' stands for 'inter-subjectivity'.[32]

The second charge against science was presented by those who denied it any value because of its inability to serve as a guide to the good life. Poincaré, conceding that science could not serve as a guide to practice, vigorously defended the ideal of science for its own sake, pointing out that science and art were two achievements which gave value to a civilization.[33] Poincaré thought that the satisfaction of the mind had a more important value than considerations of utility and suggested that the highest satisfaction was implied in the ability to construct a harmonious and economical picture of the world.[34] This construction is the source of Beauty in which the mind of a scientist finds its pleasure.[35] The emphasis on Beauty is sometimes mentioned by commentators as an 'aestheticism' implied in Poincaré's view.[36] But for Poincaré, scientific 'Beauty' means something quite different from artistic Beauty, and science for him is an autonomous activity worth pursuing for its own sake.

Poincaré was not a revolutionary and, despite the emphasis on the mathematical nature of scientific language, he held empiricist convictions, trying to shore up conventional mechanistic physics.[37] Notwithstanding some superficial resemblance between him and later relativists such as Kuhn, his theory was very different. The idea that science was abstract and conventionalist in nature did not lead him to adopt relativism. Rather, it was the most sophisticated defence of the autonomy of science. Poincaré was a thinker of an essentially conservative mentality who emphasized that accumulation of scientific knowledge was a continuous process. He stood very far from anything similar to the theory of scientific revolutions later advanced by Kuhn.[38]

IV

Scientific positivism became one of the most influential trends in the philosophy of science at the beginning of the twentieth century. The ideas of Mach

[31] Ibid., p. 342.

[32] Kolakowski, *Positivist Philosophy* , 172. For example, in the following quotations: 'Le fait scientifique n'est que le fait brut traduit dans un language commode' (Poincaré, 'Sur la Valeur Objective de la Science', 272); 'ce qui est objectif doit être commun à plusieurs esprits et par conséquent pouvoir être transprits de l'un à l'autre' (288).

[33] Henri Poincaré, *La Valeur de la Science* (Paris 1908) pp. 274–6.

[34] 'La pensée n'est qu'un éclair au milieu d'une longue nuit. Mais c'est cet éclair qui est tout' (ibid., p. 276).

[35] Henri Poincaré, *Science and Hypothesis* , translated by W. J. Greenstreet (London 1905) pp. 22–3.

[36] Blackmore, *Ernst Mach* , pp. 195–6.

[37] Stanley L. Jaki, *Uneasy Genius: The Life and Work of Pierre Duhem* (The Hague 1984) p. 335.

[38] Andrew Pyle, 'Introduction', in Henri Poincaré, *Science and Method* , translated by F. Maitland (London 1996) pp. v–xxi; at pp. x–xi.

and Poincaré spread to England, where, according to Kolakowski, a trend had already developed which, under the influence of Mill and Spencer, was characterized 'by the belief that science is neutral on metaphysical questions and that it is possible to limit scientific knowledge to the symbolic record of experience'.[39] Scientists such as W. K. Clifford and Karl Pearson developed a theory of scientific method along lines similar to those of Mach. And Russell and Whitehead's inquiry in mathematics, though aiming in a somewhat different direction, contributed to the appreciation of the role of the quantitative element in science.

Oakeshott's concept of science in *Experience and Its Modes* is deeply influenced by this positivistic trend. He mentions the danger 'of accepting too readily what scientific writers tell us about the character of scientific experience' and presents himself to be analyzing science from the standpoint of a philosopher.[40] Yet his account of science follows the ideas developed by some practising scientists of his time and even quotes such authorities as Poincaré and Whitehead.[41]

Echoing Mach, Oakeshott claims that science's 'master-conception is *stability*'.[42] And like Poincaré he argues that quantitative understanding is what characterizes science. Oakeshott declares that the sole explicit criterion of scientific ideas 'is their absolute communicability'.[43] In order to achieve such communicability, or one could say intersubjectivity, the language of the mode of scientific experience must have an unambiguous meaning for everyone: it must be stable and impersonal. The language of the senses, then, should be abandoned in favour of the language of quantities because absolute communicability can be achieved only by adopting the quantitative form of expression. The world of science is 'a world conceived under the category of quantity'.[44]

Oakeshott rejects alternative ways of understanding science as the attempt to discover facts about an 'objective', 'material', or 'external' world. The reason for Oakeshott's unwillingness to use these expressions is that 'each of them introduces some notion extraneous to that of stability'.[45] Although the idea of science as discovering facts about an objective world is not completely incorrect, it is dangerous. Science can present only the quantitative description of the world, thereby leaving out what cannot be included in such a description. To claim that science represents an 'objective' reality may, therefore, either open the door to the rejection of the quantitative method, or lead to scepticism, to which Oakeshott is sharply opposed. He criticizes those scientists who, having understood science as the

[39] Kolakowski, *Positivist Philosophy* , p. 121.
[40] EM, 173.
[41] EM, 179n, 198n.
[42] EM, 171.
[43] EM, 170.
[44] EM, 171.
[45] EM, 172.

construction of a world of ideas, concluded 'that it is consequently debarred from a true knowledge of the world of reality. Naturalism has given place to a mild and unintelligent scepticism'.[46] Oakeshott denounces the scientist who

> takes over . . . what he can understand of Kant, not because his thought has followed Kant's mind to Kant's conclusions, but because the general point of view to be found in Kant's philosophy is congenial to his preconceptions.[47]

This claim signals Oakeshott's disagreement with the views advanced by the British astronomer, Arthur Eddington, whose philosophy of science was based on a Kantian epistemology that led him very close to extreme subjectivism. For Eddington, physical science represented the 'world of shadows'.[48] Several years before the publication of *Experience and Its Modes*, though, Oakeshott had found Eddington's account of the method and aim of modern physics 'altogether admirable' and saw it as 'applicable in principle to all the sciences'. He summarized Eddington's position as follows: 'the scientific conception of the universe is the most abstract of all conceptions, it is a universe consisting solely of physically measurable relationships, and physical science is a closed system created for the study of those relationships'.[49] This view is, indeed, in line with the main postulates of the scientific positivists.

Eddington's philosophy of science was, however, more complicated, and his attitude to positivism was ambiguous. On the one hand, he was attached to many positivistic ideas about scientific method, and his adherence to Kantian epistemology led him to distinguish between the transcendental and phenomenal worlds, claiming that science deals only with the realm of the phenomenal, and therefore science and theology cannot quarrel.[50] On the other hand, in some aspects of his thought, Eddington moved beyond positivism. Although he did not think that physics could provide us with the ultimate answers about the nature of reality, he denied that there existed strict boundaries at which physics had to stop. The world of physics was, for him, not the strictly determined world of the positivists. He discussed the idea of free will and was fascinated by new developments in physics such as the theory of relativity. Before Popper and Kuhn, Eddington argued that modern science develops through a series of revolutions which advance our knowledge, and that at each stage the ideas of what is available as scientific knowledge are likely to be reformulated. Therefore, scientific activity is open-ended and one cannot postulate finality to its development.[51]

[46] EM, 174.
[47] Ibid.
[48] Arthur S. Eddington, *The Nature of the Physical World* (Cambridge 1928) p. xvii.
[49] Michael Oakeshott, 'Review of J. Needham (ed.), *Science, Religion and Reality*', *Journal of Theological Studies*, 27 (1926): 317–19; at p. 318.
[50] Eddington, *The Nature of the Physical World*, pp. 351–2.
[51] Ibid., 353.

Oakeshott, in contrast, adhered to the positivistic view of science and rejected any attempts to introduce metaphysics into science through the back door, as they would lead to scepticism and relativism. Science for him was an activity in which progress was being made in elucidating the world under the category of quantity. He claimed that it was permissible to presuppose a final point in this undertaking, the possibility of the complete description of the world in these terms: 'it is not meaningless to speak of science approaching the stage when it will be complete'.[52] This does not mean that Oakeshott thought that reaching this condition was practically possible. What he meant was that the postulates of scientific experience presuppose the unity of the quantitative world as its logical ground.

In a later essay 'The Voice of Poetry in the Conversation of Mankind' (1959) the brief description of science is somewhat different. First, science is called not a homogeneous world of experience, but an activity, springing from an impulse, 'a way of imagining and moving among images'.[53] Second, Oakeshott insists that 'so-called "methods" of scientific investigation emerge in the course of the activity', and that 'in advance of scientific thought there are no scientific problems'.[54]

But one would be mistaken to suppose that Oakeshott adopts a view of science as a completely open-ended activity whose character is determined and reformulated every time scientific knowledge advances. For he repeats the familiar definition of science, according to which the world of science necessarily invokes exactness of communication and is understood independently of our practical desires. It excludes 'whatever is private, esoteric, or ambiguous'.[55] Methods of science may change and advance but the basic presupposition that science is one absolutely communicable world remains the same, and we can deduce from this that this world does not tolerate the existence of several conflicting paradigms.

Later, in *On Human Conduct* (1975) Oakeshott seems to qualify his insistence on the full reducibility of sciences into one quantitative world. He distinguishes between two incompatible 'orders of inquiry', one attempting to theorize those 'goings-on' which are themselves understood as being the 'exhibition of intelligence', such as human conduct, and the other concerned with those 'goings-on' understood not to be such an exhibition of intelligence.[56] Science obviously belongs to the latter. It understands events in terms of the determined process through such concepts as 'laws' and 'causality'. Yet, diverging from *Experience and Its Modes*, Oakeshott is aware here of the intrinsic plurality of this order of inquiry, recognizing that it consists of various 'idioms of inquiry' by which he means particular

[52] EM, 192.
[53] Michael Oakeshott, 'The Voice of Poetry in the Conversation of Mankind', in his *Rationalism in Politics and Other Essays* (RIP) (Indianapolis 1991) pp. 488–541; at p. 505.
[54] RIP, 506.
[55] RIP, 508.
[56] Michael Oakeshott, *On Human Conduct* (HC) (Oxford 1975) p. 13.

sciences. Each science is autonomous and 'is capable of its own conditional perfection'.[57]

Nevertheless, Oakeshott continues to believe in the basic unity behind this plurality. He stresses that the idioms of inquiry within the same order of inquiry are not exclusive of one another and may suffer reduction, and still seems to see unity as the logical foundation of science. Arguing in favour of scientific psychology, he makes the point that, like other sciences,

> it is also unable to resist hypotheses which ally it to what began by being somewhat different investigations . . . and thus to prefigure the 'reduction' of the terms in which its theorems are formulated to the categorially similar terms of chemistry and physics.[58]

In this, Oakeshott's views differ not only from those of Eddington, but also from the later gradual abandonment of scientific positivism by Popper in his theory of scientific activity understood as an evolutionary process, and from a more radical theory of Kuhn.[59] Oakeshott never mentions the works of Popper and Kuhn, and it is impossible to say what precisely he thought of their philosophies. Yet the inner logic of his view stands far from their way of reasoning and is much closer to that of scientific positivism. First, he did not regard science as an open-ended activity, as shown by his assumption that a complete description of reality in quantitative terms is possible. This certainly implies that scientific activity is grounded upon and directed towards the satisfaction of one unchangeable principle.

Second, Oakeshott did not see science as developing through paradigm changes. It is very tempting to compare Kuhn's theory of scientific revolutions with Oakeshott's philosophy of modes of experience. In some sense, as a pure analogy between Kuhn's theory of science and Oakeshott's *general* philosophy, this view can be accepted.[60] Yet, it would be completely misguided to compare Kuhn's and Oakeshott's theories of science. For, while Oakeshott recognizes the existence of different paradigmatic world views in general, he does not admit this plurality into the analysis *within* the modes themselves. On the contrary, he uses general plurality of modes in order to shore up unity within each of those modes. A pluralist when it comes to experience in general, Oakeshott is a monistic positivist in respect of the presuppositions of the particular modes of experience.

[57] HC, 17.

[58] HC, 21.

[59] See K. R. Popper, *The Logic of Scientific Discovery* (London 1959); T. S. Kuhn, *Structure of Scientific Revolutions* (Chicago 1970).

[60] But even here it should be qualified, for what is important for Kuhn is the process of change of dominating paradigms whereas Oakeshott's main preoccupation is the coexistence of varieties of experience.

V

After defining the main assumptions of the world of science, Oakeshott goes on to analyze in detail the postulates of 'nature' and of 'the scientific method' inherent in this world. 'Nature' and 'method' are, in fact, not two different elements of scientific experience but represent the same whole looked at from different angles. Thus, scientific experience presupposes a specific understanding of nature which does not admit any common-sense definitions. Nature is simply 'a uniform, mathematically integrated, self-contained world of ideas'.[61] This is a world of ideas 'which admits of universal agreement',[62] and it is always static, recognizing no change in time.

This concept of nature implies the quantitative method. This method includes observation and explanation where 'all scientific observation whatever is measurement of one kind or another'.[63] This purely quantitative world of ideas is achieved in physics and therefore 'all sciences not merely resemble physics in so far as they are genuinely scientific, but tend actually to become transformed into, or reduced to physics'.[64]

According to Oakeshott, the scientific method provides a mechanical explanation.[65] He follows here the familiar line of Mach and Poincaré. 'Explanation' is indistinguishable from 'description'[66] and a mechanical explanation is the best at providing a stable explanation for the five following reasons. It is the simplest or most economical explanation; it is a general explanation; it is a quantitative explanation; all changes are explained by reference to what is closest and not what is distant; and it is an explanation in terms of motion.[67] Oakeshott even insists that in so far as science pursues an absolutely communicable world, 'only a mechanistic view of the universe can succeed in satisfying it'.[68]

Scientific experience consists of several logical stages. It begins with a world of scientific ideas which is the world integrated in terms of the relations between its basic structural concepts, or 'categories' of scientific thought. This integration leads to the first type of generalizations which Oakeshott calls 'analytic'.[69] To these he relates such generalizations as proportionality of gravity to inertia, conservation of energy and momentum, indeed all the main concepts of mechanics.[70] These concepts are the foundations of science, they are definite and invariable and they are

[61] EM, 191.
[62] EM, 189.
[63] EM, 176.
[64] EM, 177.
[65] Ibid.
[66] Ibid.
[67] EM, 179.
[68] EM, 180 n.
[69] EM, 182.
[70] EM, 183.

distinct from other kinds of generalizations, termed statistical, which are based on received data.

Oakeshott's ideas here are similar to those developed by Poincaré and Eddington. Poincaré distinguished between three kinds of hypotheses: 'quite natural and necessary', 'indifferent' and 'real'.[71] Natural hypotheses are those conceptual constructions which our view of physics necessarily presupposes and without which physics would hardly be possible. Such is the theory of negligible influence between distant bodies or the idea that small movements obey a linear law. Indifferent hypotheses are those which are useful as a tool but whenever any of them is chosen, there is no way to disprove it. These include, for example, 'atomic' or 'aether' theories. The third kind are real generalizations. Physics is aiming towards the most stable formulations of real hypotheses on the basis of empirical observations.

Like Poincaré, Eddington distinguished between three kinds of scientific laws.[72] Identical laws are those which are imposed on the mind by the nature of subject matter, like the laws of conservation of energy and mass. Statistical laws relate to the behaviour of crowds, and their uniformity is the uniformity of averages. Transcendental laws are those which deal with basic concepts of the physical world such as atoms or quanta. Eddington realized that physics would not be able to penetrate the reality behind these laws but one can already see here a departure from positivism, as what for Poincaré were merely 'indifferent' tools of scientific research became in Eddington's vocabulary 'transcendental' laws.

By distinguishing between analytic and statistical generalizations, Oakeshott embarks upon a similar idea but with one crucial difference: he ignores the idea of the existence of 'indifferent hypotheses', or 'transcendental laws' and claims that 'all generalizations in science which are not merely analytic are statistical'.[73] Thus, he expels the last remnant of metaphysics from Poincaré's theory. The use of the word 'analytic' is hardly accidental. By stating that basic concepts can only be analytic, Oakeshott completely dismisses the possibility of a scientific a priori knowledge which is not analytic. This position is hardly distinguishable from that of logical positivism.

The stage which follows 'analytic' generalizations is hypothesis, and from hypothesis scientific thought proceeds to observation and experiment in order to achieve a statistical generalization. Experiments are 'limited and controlled by hypothesis'.[74] Every experiment is a measurement of one or another kind and it must be designed in such a way that it is able to contribute to a statistical conclusion. No single measurement is important. What is important is a significant statistical generalization achieved in the

[71] Poincaré, *Science and Hypothesis* , pp. 152–3.
[72] Eddington, *The Nature of the Physical World* , pp. 237, 244–5.
[73] EM, 186.
[74] EM, 184.

end. Such generalizations are invariable and precise because they do not refer to any particular observation and their uniformity is the uniformity of averages. No single event in a series should conform to this generalization: 'what is characteristic of the scientific method is not that it is inductive, but that it is statistical'.[75] This does not make such a generalization less precise because, with regard to the given series, statistical data is exact and invariable.[76]

The stage of statistical generalization is, however, not final, for scientific thought also seeks generalizations which will remain relevant beyond what is actually observed. This leads to the following stage, in which the observed statistical data is extrapolated to hypothetical events in the form of probability. The idea of understanding science in terms of probability was suggested by British scientist Karl Pearson. As editor of the journal *Biometrika* he belonged to a group of scientists who were developing statistical research methods on the questions of race, evolution and heredity. As a disciple of Mach, Pearson believed in the positivistic assumption of the basic unity of scientific method and wanted to extend the mathematical view of science to biology and the social disciplines, thereby transforming them into legitimate sciences. While the central problem with which social scientists struggled from the beginning was their inability to make good predictions, Mach's view of science seemed to point to a possible answer to that difficulty. We have seen that, according to Mach, scientific method means the economic description of perceived phenomena and not the formulation of categorical statements about what is not immediately observed. From this Pearson concluded that any scientific statement about the future may be formulated only in terms of probabilities.[77] Therefore, he and his colleagues placed particular emphasis on the theory of probability in statistical research, playing a significant role in the development of the quantitative method in the social sciences.[78]

Likewise, Oakeshott says that to apply the data of a statistical generalization to unobserved events is to extend it in terms of probability. Then, 'what is true categorically of the observed series . . . can be shown to be relatively true of any member of the series and of what may lie altogether outside the observed series itself'.[79]

This view has a crucial implication for the possibility of the social sciences. Because 'exact' sciences such as physics come up with almost deterministic generalizations, the question of the nature of their laws, whatever its theoretical importance, is not likely to halt their development or shake their self-confidence. For the social sciences, in contrast, the idea of probability

[75] EM, 185.
[76] EM, 187.
[77] Karl Pearson, *The Grammar of Science* (London 1911), pp. 139–42.
[78] Scott Gordon, *The History and Philosophy of Social Science* (London 1991), pp. 529–32.
[79] EM, 188.

became a window of opportunity. Social phenomena are characterized by relatively low uniformity but they can be described in terms of probability.

Thus, Oakeshott maintains that a scientific generalization is a statement of probability, that this probability is always quantitative, and that 'any specific probability is both definite and invariable'.[80] Therefore, from the point of view of scientific experience, it is absolutely unimportant what the specific predictability of any event is. The probability of, say, 0.3 (such correlation is regarded as quite a good result in modern sociology) is no less stable and exact a result than that of 0.99. The lack of high uniformity in the subject matter of a certain science does not make this science less 'scientific'.

This approach enables Oakeshott to defend the positivistic idea of the unity of all sciences, of which physics, which has achieved the highest level of quantitative abstractness, is a model. Though he does not call 'for the immediate reduction of sociology to physics', he insists on the logical unity of all sciences, which is 'the life and inspiration of every science'.[81]

Oakeshott recognizes that outside of physics his view of scientific experience seems to be contradicted by the reality of the scientific practice. Thus, some sciences are not sufficiently quantitative. For example, geology or zoology may have an appearance of being natural histories which study an actual change in the world of perception. But this 'arises from the fact that the present world of science is imperfectly scientific'.[82] Although there are many scientists who want to make an exception in favour of this or another particular science advocating 'vitalism in biology and philosophism in psychology', these approaches appear to be 'anachronistic, if not absurd . . . Instead of making these sciences less abstract compliance with these demands will succeed only in making them less scientific'.[83] Scientific theories are fruitful so long as they can be formulated according to scientific method and in terms of purely scientific abstractions. Thus,

> biological evolution refers to the phylogeny of the race, and the 'race' is not a historical fact, or something that can be seen, it is a scientific abstraction. The theory of evolution is, of course, insecure and unscientific in so far as it falls short of a statistical generalization expressed mathematically.[84]

Throughout his later writings, Oakeshott seems to have maintained this basic notion of science as the purely quantitative understanding of reality. Thus, in his review of Herbert Butterfield's *Origins of Modern Science* (1949), Oakeshott repeats his main idea of science as 'a body of knowledge which is in the highest degree communicable, not resting upon the personal idiosyncrasies of the individual scientist, but based upon the sure

[80] Ibid.
[81] EM, 246.
[82] EM, 192 n.
[83] EM, 180–1.
[84] EM, 192 n.

foundation of measurement and expressed in the impersonal language of mathematics'.[85] In 'The Voice of Poetry' he argues that in scientific activity, 'images become measurements according to agreed scales, relationships are mathematical ratios, and positions are indicated by numerical coordinates: the world of science is recognized as the world *sub specie quantitatis*'.[86]

In *On Human Conduct* Oakeshott seems to have retreated from the new positivistic approach to the basic Kantian position defining science with the notions of laws and causality. This impression is, however, illusory. Although Oakeshott evokes the vocabulary of 'process' and 'causality', it soon becomes clear that the mathematical nature of science is still its distinct characteristic. Thus,

> the notion that the categorial gap is narrowed or even bridged when relationships between identities are understood in terms of probabilities is, of course, an illusion. A relationship may be understood as a probability only when the identities concerned are already recognized as the components of ... a 'process'. A probability is no more 'uncertain' than the most determinate casual relationship.[87]

Further, while claiming that psychology has developed into a mature science, he says that it 'has acquired scales of measurement and its theorems are such that they may be plotted on graphs and displayed in diagrams or mathematical equations'.[88] Again, Oakeshott's emphasis on quantitative understanding in scientific research remains intact.

VI

So far, we have dealt mostly with the question of science in general. Now we must discuss how this view of science influences Oakeshott's position with regard to the possibility of the social sciences. He certainly disliked the form that the modern social sciences had acquired, believing that the circumstances of human affairs could be understood better and more interestingly in other ways. Yet he recognized that, in principle, the social sciences were possible and that they might provide a certain intellectual satisfaction.

The social sciences are 'scientific' if they acquire a quantitative character. In *Experience and Its Modes* Oakeshott agrees that psychology and economics are candidates for being regarded as legitimate sciences. In the case of economics, Oakeshott mentions the challenges that it is not an

[85] Michael Oakeshott, 'Review of H. Butterfield, *The Origins of Modern Science, 1300–1800* ', *Times Literary Supplement* , November 25 (1949): 761–3; at p. 761.
[86] RIP, 508.
[87] HC, 14 n.
[88] HC, 21.

'exact' science, that it is concerned with behaviour, that experiments are impossible in it, and so on.[89] But he does not face serious difficulties in dealing with these claims. Although economics has not yet achieved the same success as the natural sciences, it is already a developed science and is capable of reaching valid generalizations, in so far as it is concerned not with subjective motives of the behaviour of human agents, but with abstract scientific concepts such as supply, demand, price, utility etc. Only quantitative economics is a scientific economics.[90] This does not necessarily mean that such economics is more useful. 'This interest in practical life is not ... illegitimate; it is merely dangerous from the standpoint of scientific thought'.[91]

Psychology is a less developed science than economics, yet there is nothing that would prevent it from becoming a fully legitimate science, in so far as it limits itself to measurable phenomena such as stimuli and reactions. Although Oakeshott criticizes the founder of behaviourism, J. B. Watson, for what he sees as an attempt to reduce psychology to physiology,[92] this is a criticism from an even more positivistic view. Such reduction presupposes the distinction between mind and matter where the mind is conceived as an unobservable entity so that the only thing that a psychologist can do is to observe physiological phenomena. But for a consistent positivist there are no unobservable phenomena in principle. This is why Mach was opposed to Watson's behaviourism.[93] According to Oakeshott, if such concepts as 'imagination' or 'memory' can be conceived quantitatively they will be completely legitimate. Nevertheless, it is clear from Oakeshott's discussion that if any approach has any chance of becoming a scientific psychology, it is the behaviouristic approach, and not Freudian or 'cognitive' psychology. Such psychology, indeed, 'has nothing to offer us in the way of a knowledge of human life',[94] for human life is by definition beyond scientific knowledge.

In his chapter on history, Oakeshott also evaluates anthropology as a possible science but his conclusions are less optimistic. He does not deny that scientific anthropology is possible in principle, for one can try to work out a purely quantitative model of man, society, civilization, moral development and religion. But, first, it would be difficult to form a scientific conception of man or society sufficiently different from that of biology, psychology or economics, and, second, there would be relatively few measurements to take. Thus, 'a scantiness of data will certainly render

[89] EM, 223–8.
[90] EM, 232.
[91] EM, 233.
[92] EM, 236.
[93] Blackmore, *Ernst Mach* , p. 70. Today behaviourism is usually recognized as denying the distinction between mind and matter. Mach and Oakeshott can be seen as criticizing Watson for not being consistent enough in his behaviourism.
[94] EM, 241.

scientific generalizations insignificant' and therefore such a science 'would be relatively unimportant'.[95] No anthropologist will actually be willing to accept this scientific mode of explanation. This is why anthropology, so long as it is a serious discipline, is none other than a historical inquiry. For Oakeshott, a scientific study of society is not impossible, but simply uninteresting.

Oakeshott denies that the social sciences can combine features of both natural sciences and humanities and deal both with quantitative data and with the interpretation of meaning. So long as the social disciplines intend to become real sciences they should purge themselves of everything that contradicts their scientific nature. This leads Oakeshott to advocate a view of the social sciences as value-free disciplines, based purely on the quantitative methods of research, which is the only valid method of reaching scientific knowledge.

Oakeshott adheres to the same view in later works. Thus, in his review of Butterfield he claims that the social sciences are not intrinsically impossible. The main thing which impedes their development is the lack of 'a scientific opinion'.[96] This idea of the importance of existing 'scientific opinion' emerges later (1958) in Oakeshott's review of Michael Polanyi's *Personal Knowledge*. He seems to have adopted this idea from Polanyi's previous publications.[97] This stress on a community of scientific opinion, however, does not lead to subjectivism. In 'The Voice of Poetry' he still emphasizes the value of science as an independent activity, speaking about it as entailing an 'emancipation from the authority of practical imagining'.[98] Science exists only when the impulse for rational understanding is 'cultivated for its own sake', and when 'the products of this engagement . . . are what is valued, and are valued only for what can be contrived from them'.[99]

In *On Human Conduct*, again, Oakeshott is not opposed to the human sciences *per se*. He admits that they are a legitimate form of inquiry in so far as they are 'truly scientific' and concern themselves only with what is understood as a part of the process. Earlier he suggested that psychology would develop into a fully legitimate science. Now he says that it has actually achieved this stage. It should just be cautious enough to recognize its own limits and understand reality in such terms as 'instinct, drive, reflex, valence, latency, threshold' and not 'wanting, believing, playing' and so on. In other words, a truly scientific psychology is a kind of behaviourism which does not pretend to achieve knowledge about human conduct, understood as a meaningful interaction of human agents. Oakeshott also discusses sociology in terms similar to his earlier analysis of anthropology. According

[95] EM, 163.
[96] Oakeshott, 'Review of Butterfield', p. 762.
[97] See reference to two publications of Polanyi in Michael Oakeshott, 'Science and Society', *Cambridge Journal* , 1 (1948), No. 11: 689–97; at p. 692n.
[98] RIP, 507.
[99] RIP, 506.

to him, 'whether or not a "general sociological theory" is made to emerge from the engagement to understand "social processes", it is remote from anything recognizable as an engagement to theorize human conduct'.[100] Again, he does not deny that scientific sociology is possible, but only doubts that such a discipline would have any value.

VII

Thus, in his analysis of science, Oakeshott adopts the most rigid norms advanced by scientific positivism. In this positivistic outlook, he differs significantly from other Idealists. Thus, Collingwood argues that the view of science as hypothetical is partial and self-contradictory, and claims that 'a tissue of hypotheses cannot be a self-contained and autonomous organism'.[101] Contrary to him, Oakeshott completely agrees with scientific positivists who insist on the hypothetical nature of science. He maintains that because the end product of science is generalizations in terms of probabilities, 'all scientific generalizations are hypothetical, and not categorical statements about the real world'.[102] Although Oakeshott also holds the view that the hypothetical component of scientific experience presupposes its abstract character, he claims that this world of hypothetical quantitative judgements is a self-contained and autonomous world of ideas.

Furthermore, Collingwood denies the possibility of the unified science, or the reduction of all sciences to an ordered whole, saying that 'there cannot possibly be a system or world of the sciences'.[103] In contrast, Oakeshott insists that such logical unity is both possible and necessary. Scientific experience is 'a single, specific mode of experience'.[104] It achieves 'a homogeneous and coherent world of experience'.[105] When seen within itself, this mode of science is not in danger of disintegration. It is self-contained, absolutely non-contradictory, and has very rigid limits. Science can be seen as an incoherent mode only when it is investigated from outside, but a dedicated scientist would hardly need to worry. As his world is completely self-contained, there is no urgent logical need to supersede it.

Thus, on the one hand, Oakeshott inserts the scientific mode into an Idealist framework, yet, on the other hand, he uses this framework to assert the absolute integrity of scientific method. He insists on the complete separation of science from practice and is not bothered by the fact that science cannot explain everything or be a guide to life. Science merely

[100] HC, 25.
[101] Collingwood, *Speculum Mentis* , p. 183.
[102] EM, 211.
[103] Collingwood, *Speculum Mentis* , p. 191.
[104] EM, 243.
[105] EM, 214–15.

provides us with knowledge of reality from a certain standpoint. This knowledge is stable and impersonal and it is what we can call objective knowledge.

By subscribing to scientific positivism, Oakeshott affiliates himself with the view which, more than any other approaches, symbolizes the influence and popularity which science achieved in the consciousness of modern civilization. In the beginning of the twentieth century, scientists felt confident enough to expel all remnants of metaphysical justifications and present their activity as being completely independent, and subject to a rigorous method of its own. At the same time, positivistic methodology made it possible to separate science from other forms of experience. In the positivistic period, religion, if it wanted to defend itself against the claims of science, somewhat paradoxically had to adopt the far-reaching conclusions of positivism about the irrelevance of metaphysics to science.[106] Then, no finding of science could be seen as contradicting religious truth, for science and religion were regarded as two mutually irrelevant spheres of understanding. Many religious scientists of this period such as Pierre Duhem or Ivan Pavlov readily embraced positivistic methodology as a way to reconcile their scientific pursuits and religious convictions.

For Oakeshott too, the description of scientific experience as an experience limited by the category of quantity served to leave other forms of experience free from the dictates of science. But one should not be tempted to say that Oakeshott analyzed science only in order to say what it is not. This would be almost as absurd as arguing that Pavlov and Duhem were rigorous scientists just in order to vindicate their religious beliefs. For Oakeshott's view is also an attempt to defend the integrity of scientific activity and its purposeless character. Oakeshott valued science as an important intellectual activity, insisting it to be 'the creation of the scientific mind for the sole purpose of satisfying that mind'.[107] Moreover, Oakeshott was always at pains to stress that his criticism of 'rationalism', and especially of 'rationalism in politics', was not directed against modern science. Contrary to the myth that Oakeshott was a critic of modern scientific civilization, he never missed the opportunity to emphasize his respect for scientists. Thus, in his famous essay 'Rationalism in Politics' (1947), Oakeshott denied that 'we owe our predicament [that is, the prevalence of the rationalist mode of thinking] to the place which the natural science and the manner of thinking connected with them has come to take in our civilization'. Although some scientists were infected with the rationalistic way of thinking, 'the influence of the genuine natural scientist is not necessarily on the side of Rationalism'.[108] The trouble starts only when 'the scientist steps outside his own field', and the prestige of the rationalist disposition of mind

[106] Blackmore, *Ernst Mach* , p. 167.
[107] EM, 193.
[108] Michael Oakeshott, 'Rationalism in Politics', in *RIP*, pp. 5–42; at p. 34.

'is the work, not of the genuine scientist as such, but of the scientist who is a Rationalist in spite of his science'.[109]

In another essay (1947), Oakeshott defends scientific inquiry from the accusation of Hans Morgenthau that it brought about attempts to introduce 'scientific politics'. The pursuit of scientific inquiry and a belief in the omni-competence of scientific understanding are not the same thing. In fact, '"scientism" is a superstition about scientific inquiry'. The problematic belief in the modern world is

> not the faith that the natural scientist has in his own methods of inquiry, nor even the belief (in Mill's words) that 'the methods of physical science are the proper model for political', but the belief that the problems of practical politics are, in the strict sense, scientific problems.[110]

In yet another publication, 'Science and Society' (1948), Oakeshott goes further, claiming that

> a well-ordered society may be supposed on occasion to use its customary or legal authority of control, not merely by way of limitation but also by way of the promotion of the application of scientific discovery to human affairs.[111]

This shows that Oakeshott's attitude towards modern science was respectful, the attitude that we would expect from a Cambridge scholar. Moreover, far from being 'laughable' to the scientists of his own university,[112] this view seems to have been widespread among Cambridge scientists of his time. At least, this can be inferred from C. P. Snow's famous lecture *The Two Cultures*. Snow can hardly be called an admirer of Oakeshott's Idealism, and Oakeshott would have regarded him as a 'Rationalist'. Yet, referring to his experience as a young scientist in Cambridge in the early thirties, Snow claimed that pure scientists of that time had been isolated from industry and tended to see their research as an intellectual activity: 'We prided ourselves that the science we were doing could not, in any conceivable circumstances, have any practical use'.[113]

This sentiment, which rejects the instrumental approach to science, underlies Oakeshott's entire view. And the scientific mathematical positivism of the beginning of the twentieth century remained for him the best intellectual statement in defence of modern science as an independent activity existing for its own sake.

To conclude, Oakeshott did not write much about science, but he was very

[109] RIP, 35.
[110] Michael Oakeshott, 'Scientific Politics', in *Religion, Politics and the Moral Life* (New Haven 1993), pp. 97–110; at p. 99.
[111] Oakeshott, 'Science and Society', p. 693.
[112] See note 3.
[113] C. P. Snow, *The Two Cultures* (Cambridge 1993), p. 32.

interested in this form of human activity, and considered it to be of value. He was opposed to science's attempts to present itself as the dominant world view, but he also wanted it to preserve its own integrity. His Idealistic framework of thought did not lead him to reject science or to adopt a form of relativism. On the contrary, it enabled him to present a view which emphasized the values which modern science itself preached at the peak of its influence, such as objectivity and detachment. Oakeshott's view developed under the influence of scientific positivism of the beginning of the twentieth century and he pushed these positivistic claims to their extreme.

Oakeshott regarded science as a legitimate voice of the modern age. His rejection of the claims, which presented science as the dominant activity, did not lead him to reject modernity, for he thought it would be wrong to equate modernity with the hegemony of science. As he pointed out,

> the Scientific revolution did not in fact succeed in shouting down the voices of religion and poetry, and its repercussions in the minds of men such as Pascal, Lichtenberg, Blake and Goethe . . . are a significant part of the history of the impact of the scientific revolution upon European history.[114]

All these personalities succeeded in sharing their scientific interests with literary activities, without confusing them with each other.

For Oakeshott, a truly scientific mind is one that rigorously adheres to the presuppositions of scientific knowledge but recognizes their limits and is able to combine scientific thought with a wider humane outlook, understanding that there are questions which science cannot and should not ask.

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[114] Oakeshott, 'Review of Butterfield', p. 763.