

Lecture 5.The Self-Destruction of Objectivism.

In my previous Lecture I have urged on grounds of precision that we cannot regard a sentence as a complete representation of an allegation of fact. I have said that declaratory sentences like 'it rains' or 'Napoleon is dead' or 'planets move on elliptic orbits' ~~were said to be~~ <sup>are</sup> incomplete symbols, which can be made to express allegations only when converted into a fiduciary form. I ~~suggested~~ <sup>urged</sup> in effect that a declaratory sentence should be regarded as invalid in the same way as an unsigned cheque and have insisted that <sup>like cheques or receipts,</sup> all factual statements ~~must be provided with the signature of the person issuing them,~~ <sup>in particular</sup> ~~as much as an anonymous cheque.~~

I have argued that all sentences sincerely uttered by myself as a statement of fact should be completed at least mentally by the prefix 'I believe'.

I have suggested that the philosophical justification of science, and of statements of fact in general, has been ~~hampered~~ <sup>foxed</sup> in the past by our acceptance of bare declaratory sentences, as <sup>anonymous</sup> expressing an allegation, <sup>to be</sup> which ~~is~~ ascribed to no particular person. If we believed <sup>such an</sup> the allegation, we said the sentence was true and if we believed its contradiction, we said the sentence was false. In this way sentences were invested with the properties of being true or false and we found ourselves with the task on our hands of discovering how this came about. Just as we enquired what makes green leaves green and found that it is their chlorophyll content which causes it, we expected to find some characteristic ingredients the presence of which makes some sentences true and the lack of which makes them false. Such enquiries are chasing a phantom and are bound to remain fruitless, and it seems reasonable to expect that we might have a better chance of achieving the purpose of philosophic reflection if we asked ourselves instead why we do believe this or that statement of fact, and why we do believe certain classes of statements, such as those of science. I said that I cannot hope to fulfil this expectation until later when I shall build up my conception of commitment. I feel impelled to postpone this in order ~~first~~ <sup>first</sup> to show more clearly what is implied in my

decision

to re-cast declaratory sentences in the fiduciary mode. I should like in the first place to fill in today - however sketchily - the historic background against which my banning of self-speaking sentences and their replacement, at least in principle, by fiduciary declarations should be seen.

This reform would seem to obliterate the traditional purpose of critical philosophy which has been to discriminate between personal conviction and objectively established knowledge, rejecting the former as merely subjective. The difference between the two which the new usage would force us to disregard, seems to have appeared so obvious to Kant that he refused even to discuss it. In the section on Opining, Knowing and Believing he writes " If our holding of the judgement be only subjectively sufficient, and is at the same time taken as being objectively insufficient, we have what is termed believing. Lastly, when the holding of a thing to be true is sufficient both subjectively and objectively, it is knowledge. The subjective sufficiency is termed conviction (for myself), the objective sufficiency is termed certainty (for everyone). There is no call for me to spend further time on the explanation of such easily understood terms." (Doctrine of Method, II. Chapter, 3. Section. <sup>B. 850.</sup>) And he proceeds to declare that " Hence it is absurd to have an opinion in pure mathematics; either we must know, or we must abstain from all acts of judgement. It is so likewise in the case of the principles of morality, since we must not venture upon an action on the mere opinion that it is allowed, but must know it to be so".

Yet the dubious character of this demand is revealed a few paragraphs later in reference to the certainty that God exists. (B 857) "My conviction (he writes) is not logical, but moral certainty; and since it rests on subjective grounds (of the moral sentiment) I must not even say, "It is morally certain that there is a God, etc." but I am morally certain, etc." This closely resembles the kind of personal parlence which I suggested should be used not only in religion, but in all kind of affirmation.

The great work of Kant is indeed full of tensions of this kind, and this is why I have chosen it for my first illustration. For it seems to me that he felt for the first time the

desperate difficulty involved in justifying impersonal assertions. Of this he was rudely made aware <sup>by</sup> Hume who, Kant says, "awoke him from his dogmatic slumber". The loss of adequate grounds for such assertions threatened in his eyes to cast out along with dogmatism the entire rational life of man. His purpose is throughout to resist the overthrow of reason by a general scepticism; if he limits knowledge to appearances, "in order to make room for faith", he also holds faith in abeyance in order to preserve on the one hand pure theoretical and impersonal knowledge, and on the other purely rational and equally impersonal morality. Thus in each area he attempts to assert his beliefs - or what appear to us to be his beliefs - in a form which offers no target to scepticism. Yet in each area he is driven to the kind of paradox we have just noticed. Some of his basic beliefs about nature are declared to be a priori categories of thought by which the mind legislates for experience. Most prominent among these are the foundations of mathematics and geometry, and the law of cause and effect in nature. <sup>while</sup> But other beliefs are described as mere 'regulative' ideas by which we guide our investigations of nature even though we do not know them to be true. The assumption of a first cause for example, or for a teleological interpretation of living organisms are to be used only as if they were true. Since it is not affirmed that they should be so used even though they <sup>may</sup> be actually false, it appears that they are in fact believed to be true, but this is to be suggested without having said so. And similarly in the moral sphere, we possess objective though only 'practical' certainty with respect to our freedom, as the indispensable presupposition of a rational moral law: the 'postulates' of God and immortality should, strictly, not be needed to prop this objective and independent knowledge of right - yet we do, Kant says, feel a need "Indissolubly united with duty"; to submit to such support.

By the use of the fiduciary mode which I am recommending for all manner of affirmations, I hope to keep in check the ravages of scepticism <sup>without making any</sup> while ~~avoiding both the~~ exaggerated claims of possessing incontestable knowledge a priori and ~~the~~

(also avoiding)

*the* disingenuous practice of putting one's beliefs on record without affirming them. While this will involve a less severe attitude against dogmatism than Kant professed, it will, in my view, merely reveal a more candid and resolute toleration of uncritically accepted elements than Kant in his desperate pursuit of impersonal necessity was prepared openly to acknowledge. It should be clear at any rate that the suggested fusion of belief and knowledge - resulting in the assimilation of the latter by the former - does not so much express a sceptical attitude towards knowledge as a new respect for belief. \*

*St. Augustine*

2. The first decisive move of the dialectic which evolved the modern division between <sup>un-heralded</sup> supernatural belief and <sup>scientificly tested</sup> scientific knowledge was made by St. Augustine in the fourth century A.D. on behalf of belief. Astronomy, the show piece of such observational science as had emerged by that time, Augustine scorned as unprofitable. Instead of preening themselves on their exact prediction of eclipses, astronomers should gain enlightenment by humbly reflecting on the origin of their intellectual gifts. Augustine was no sceptic who rejected observation as delusive, but he turned away from empirical science as a diversion from the true purpose of thought which is the pursuit of salvation. Philosophy, though insufficient for man's supreme endeavour he accepted at least as an ally in the search of God. He claimed that from Plato he could derive the opening verses of the Gospel of St. John: "In the beginning was the Word and the Word was with God; . . . In him was life; and the life was the light of men. And the light shineth in the darkness; and the darkness comprehended it not". But this was not enough. The decisive sequel: "And the Word was made flesh and dwelt among us . . ." could be perceived only by faith in divine revelation, which was a gift of divine grace. Here the Christian philosophy, inaugurated prophetically by St. Paul three centuries before, claimed to establish a system which would supersede Greek science and Greek philosophy. It denied that any knowledge that is essential to man could be achieved either by experience or pure reason and challenged the critical method which guides both empiricism

and rationalism. Instead it said that faith was the key to all deeper knowledge. Those who entrusted themselves to observation and rational argument were but shrouding their minds in the darkness of intellectual pride; they should seek enlightenment through humility. Socrates had taught that the recognition of our fundamental ignorance was the threshold of wisdom; Christianity demanded further the recognition of our guilt before God and our complete surrender to God's will, as the premiss of all understanding of God. Only by such humility could we rationally relate our search for understanding to the infinite perfection of true knowledge. This pattern is extended by St. Augustine also to natural knowledge. He regards this as a gift of divine grace and teaches that everywhere belief is logically anterior to his knowledge. This is fides quaerens intellectum.

During a thousand years after St. Augustine his teachings ruled the minds of Christian scholars: for even when, under the influence of Aristotle, philosophy won a status independent of theology, it was in fact the ineradicably Augustinian heritage of the Christian Aristotelians that enabled them to maintain a precarious balance between reason and faith, knowledge and revelation. Reason and faith harmonized only as long as faith was really dominating both: as soon as they were honestly accepted as independent, ~~as by the 13th century Averroists or later by the Occamites,~~ they began to fall apart.

Kant's rigid separation of belief from knowledge correctly reflects this attitude in the modern scientific mind. The change from Augustine to Kant took place during the two centuries preceding Kant which saw the emancipation of speculative thought from religious authority. There arose a new passion for scientific knowledge which became the dominant drive in man's thinking about nature and about himself.

The <sup>leading</sup> dominant figure in this history was Descartes, with his resolve to build clear and distinct ideas out of a system of strictly indubitable natural knowledge. He was, he said, "convinced of the necessity of undertaking once in my life to rid myself of all the opinions I had adopted, and of commencing anew the work of building from the foundation, if I desired to establish a firm and abiding super-structure in the sciences." (Med. I). This task he hoped

to accomplish by separating the doubtful from the certain: at the same time keeping the higher certainty of revelation also safely segregated from the intuitions and inferences of natural reason. He accepted without question the Thomistic division between reason and faith: and though his account of knowledge looks more like Augustine's than Aristotle's - stressing inner certainty rather than sensation, intuition rather than induction - the 'light' by which he discovers his "firm and abiding super-structure" is natural, not divine light. Even the proof of the Existence of God, though it used Augustinian concepts, (and appealed to the Jansenists as an Augustinian proof), was meant to be a purely rational argument - and was in fact only instrumental to the establishment of clear and distinct ideas as their own guarantors of their own truth. Once these questions had been disposed of, he could go on, by turning his mind successively to one clear and distinct idea after another, to the solution of all the principal problems that had formerly puzzled the human mind. Though Descartes was firm in his own faith (why, he asked, should I doubt the religion of my King and my nurse ?), he had come a long way from Augustine's view that the agent of all knowledge was "Christ the teacher teaching within" - and once the impoverishment he had effected in the complex, hierarchical medieval cosmos began to take hold of man's imagination - in separation from the Augustinian instruments he had used in effecting it - the place of faith even alongside reason was bound to decline.

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We see this in Protestant England in Locke's use of the distinction between science and faith: "How well-grounded and great soever the assurance of faith may be wherewith it is received; but faith it is still and not knowledge; persuasion and not certainty. This is the highest the nature of things will permit us to go in matters of revealed religion, which are therefore called matters of faith; a persuasion of our own minds, short of knowledge, is the last result that determines us in such truths." (A Third Letter on Toleration). Belief is here no longer the

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higher power that reveals to us knowledge lying beyond the range of observation and reason, but a mere personal acceptance which falls short of empirical and rational demonstrability. The two Augustinian levels of knowledge are still recognised, but their mutual position is inverted. At any rate, if divine revelation continues to be venerated, its functions - like those of the King and Lords of England - are gradually reduced to that of being honoured on ceremonial occasions. All real power goes to the nominally Lower House of objectively demonstrable assertions.

3. Here lies the great break by which the critical mind repudiated one of his hitherto most prominent faculties and became completely dependent on the remainder. Belief was so thoroughly discredited that apart from specially privileged occasions, as were granted to the holding and expression of religious beliefs, modern man entirely lost his capacity consciously to commit himself to a belief as a belief. In response to this condition, modern man adopted a variety of alternative positions, which, while widely divergent in content, are but several expressions of the same fundamental deficiency. The first of these positions is scepticism. Once man's claim to responsible belief is abandoned, there is no distinction left between belief and illusion. Man's participation in the shaping of his beliefs is reduced to the status of a subjective factor, and hence any expression of his beliefs becomes merely something that he says of himself, making no claim to universality.

This position, known in antiquity as Pyrrhonism, was first re-stated by Descartes who rescued himself from its predicament by placing his confidence on divine guidance. Hume accepted Pyrrhonism as logically unassailable, and disdaining Descartes' method of escaping from it, simply declared that so long as we live we must continue to believe in the reality of observed facts. Both observational science and mathematics were accepted by Hume in spite of admittedly unanswerable sceptical objections, as a

concession to common sense. By thus limiting his affirmations to beliefs which in his time no one would ~~seriously~~<sup>ser</sup> challenge, Hume could avoid the necessity of declaring any of his beliefs as his own. Instead, he could make common sense say in an impersonal voice what he himself believed. ~~He could~~<sup>At the same time he</sup> interposed his sceptical ~~argument~~<sup>process</sup> to stop this voice at any point he thought fit; for example if common sense accepted the reality of miracles in which Hume himself did not believe, he could make his sceptical argument discredit such alleged common sense as mere superstition.

X I have mentioned Kant's method of upholding science without offering any target for scepticism, by postulating one part of its foundations as a priori categories and stating the other parts as mere regulative principles. While both these devices of Kant have continued to be employed in the period after him, the tendency was to shift from deductions a priori to the cloaking of scientific belief in various 'regulative principles'. The Euclidean axioms of geometry had lent the most firm support to the existence of immutable knowledge a priori. When these were called in question by the rise of Non-Euclidean geometries, the self-evident status of mathematical axioms was altogether shaken. It became apparent that in mathematics we can never prove any theorem except to the extent of showing it to be implied in other unproven statements, which though still called axioms, were no longer said

*Conventionalism  
Nathaniel  
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to be self-evident. In the field of empirical science a parallel critique went on which eroded and eventually exploded the status of Kant's a priori categories. Consequently, both in mathematics and the empirical field, the conviction that science expressed something objectively valid was cast with increasing preference into the form of 'regulative principles'. By the process of axiomatisation the claims of mathematics were reduced <sup>in appearance</sup> to that of a conventional game. The axioms, undefined terms and rules of inference were regarded as assumptions possessing no other standing than was apparent by their yielding new theorems, which in their turn had no other claim to acceptance than that they were derived from these particular assumptions. The status of empirical generalisations was also reduced to that of mere recommendations. Natural laws were said to be no more than convenient descriptions of observed facts, or at the most, provisional hypotheses which we were ready to abandon as soon as any of their predictions failed to be confirmed. No certainty was claimed for them, but merely some degree of probability. ~~and~~ Entities like atoms and electron which science postulated, were said to be mere logical constructs, possessing no reality.

*in fact*

Scientists could well afford to minimise their claims in theory as long as they could demand and expect to receive <sup>unqualified</sup> ~~absolute~~ recognition in practice. This critique of science was never meant to reduce the authority of science <sup>for example in relation to supernatural revelation;</sup> and its effect was actually to strengthen it. For if scientists ~~could~~ disclaimed any responsibility for the beliefs expressed in science, these beliefs became <sup>in a sense</sup> unassailable. Whoever would attack them <sup>betrays</sup> could be told that nobody held them, even while they <sup>never ceased to do so and indeed</sup> who denied to hold them <sup>continued</sup> sweeping them on the minds of their contemporaries. <sup>Moreover, by</sup> the pretence which thus <sup>concealed</sup> ~~shielded~~ their beliefs, scientists invested themselves with an appearance of absolute objectivity and this justified them in claiming a unique position for science and in condemning the more severely, as dogmatic and arbitrary, the expression of any other beliefs which candidly confessed to their own fiduciary nature.

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4. Yet this position was inherently unsound. It is true that during <sup>the</sup> three centuries since Newton, while natural science ~~was~~ produced, an organised body of scientists and an ever widening public instructed by scientific opinion, the enthusiasm for science was such that any internal contradictions underlying the professed philosophy of science were readily disregarded. Science could go on denying its fiduciary nature while practising its beliefs unchallenged; happily eating its cake and having it too. And this could have continued perhaps much longer but for the outbreak of a series of great revolutions in this century, which challenged the position of all established institutions and called in question the beliefs underlying them.

*Self destruction via scientific conception of man.*

In this turmoil the objective status of scientific affirmations was severely attacked, but not so much by a sceptical dissection of their foundations as by the application of an objectivist approach to the re-assessment of science itself. <sup>It was</sup> The kind of futile regress outlined in my last Lecture, which attempts to justify the methods of natural science by a scientific observation of these methods which engendered in the milieu of the modern revolutionary movements the principal danger to the status of science.

I shall not try to trace here the first origin of this scientific approach to science. It may be found in Locke's attempt to account for knowledge in terms of what we would today call psychology, or alternatively in mechanical determinism which became current after Newton's discoveries. Laplace's formulation of all conceivable problems in terms of a calculus of mechanics may be taken to include the behaviour of scientists themselves in pursuing their discoveries, writing out and publishing their reports.

However, the consciously declared programme of a scientific theory of science was conceived only in the second half of the 19th century as a rebellion against Kant's transcendental analysis, which had been shaken by the advent and eventual acceptance of

Non-Euclidean geometry. Among the first to formulate this programme was W. K. Clifford, who saw the critique of knowledge in the study of the physical facts which accompany sensation and of the physical properties of the nervous system.  $\mathcal{Z}$

Today this approach is frequently expressed in behaviouristic terms which I believe were most consistently formulated by the late Otto Neurath. From the point of view of a scientific observer, science may be considered as consisting in the fact that certain people have made a set of marks on paper. In a less rigorous analysis we may allow that these marks are sentences and that in them the persons writing them down are recording facts observed by them. The self criticism of the scientist producing science will then take the form of a description of himself in the third person, as making a reading on various instruments and putting down the results in a series of 'Protokoll sentences'. In this case the regress is flagrant. Supposing that the observations made on the scientists' activities are successfully carried through, they will merely add yet another scientific observation to those already in existence and contribute nothing to the justification of such observations.

But in spite of its intrinsic futility, this kind of approach may tend to invalidate the status of science and thus produce a dangerous crisis which demands with new and unprecedented urgency a true philosophic justification of science.

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A successful behaviourist analysis of empirical science would lead to a mechanical or neural model of empirical inference which would eliminate the scientist's person from the process of discovery and ~~verification~~. Science would cease to be regarded as something believed in or indeed thought of by anyone and be reduced to a part of the material universe (consisting of marks on paper or of sentences in text-books) the configuration of which is determined by that of a previous state of the Universe. The Laplacean 'Universal Mind' would have achieved a representation of science without the intellectual participation of any scientist or indeed any other human being, while the Universal Mind <sup>alone</sup> ~~itself~~ would go on practising science outside the scope of the critical analysis it had performed.)

(Neo-Behaviourist theories of learning, supported by the claims of modern cybernetics, represent in principle this approach to observational science. <sup>P</sup> But by far the most important embodiment of it is ~~formed by~~ <sup>or more precisely, the Stalinist</sup> the Marxist view that science is a response to social needs, and that hence the value and indeed the validity of science ought to be judged by the degree of its serviceability to the ends of society. This demand for the subordination of intellectual aims to the material advantage of society and of their identification with the pursuit of this advantage readily follows from a scientifically detached examination of society, but it was originally applied only in respect to other systems than science, such as religion, law and political opinion. In this form it goes back to Hobbes who demands the subordination of all opinions to the Sovereign responsible for upholding Peace and Concord. In Chapter 18 of 'Leviathan' Part II, he writes: "And though in matter of Opinion, nothing ought to be

regarded but the Truth; yet this is not repugnant to regulating the same by Peace. For Doctrine repugnant to Peace can no more be true, than Peace and Concord can be against the Law of Nature... It belongeth therefore to him that has the Sovereign Power, to be judge, or constitute all Judges of Opinions and Doctrines, as a thing necessary to Peace; thereby to prevent discord and Civil War".

For a short period in history, which however was decisive in paving the way to modern dictatorial regimes, the Jacobins established the first revolutionary government which, reflecting the theories of Hobbes, identified its own will with the very principle of rightness. "All factions", taught St. Just, "constitute a division of power in that they weaken the State and are therefore treasonable combinations". (Acton, 'The French Revolution', p.280). It has been shown that Jacobinism exercised a guiding influence on Lenin's conception of revolutionary dictatorship. The Jacobin conviction (as formulated by Acton) "that a government truly representing the people could do no wrong" was adopted by the Communist Party in the exercise of its own power. Indeed, the Jacobin claim of being truly representative of the people had meanwhile been enlarged to that of embodying the forces of history, which had decreed the elimination of all social divisions and their assimilation to a completely centralised classless society. This novel claim of fulfilling an inexorable historic necessity which drapes modern Communism in the cloak of an inevitable and pitiless destiny, was first formulated by Marx in the Communist Manifesto. It was based on a scientific approach to politics which combined the influences of Comte and Hegel to a materialistic interpretation of history. Within the framework, the tentative theories of Hobbes which identified truth with the public interest and hence with the will of the Sovereign, were given much deeper and more far-reaching interpretation. Within a conception of society which claimed to derive all historic action from impersonal economic interests,

the thoughts of men from which these actions appeared to proceed were reduced to mere epiphenomena. Expressed in the terminology of modern operationalism, as it has been applied to human consciousness by the behaviourist school of psychology, all intellectual processes were mere "intermediate variables" which could be eliminated from an overall picture of the events in which they participated.

This treatment was originally intended to apply only to ideologies like religion, law, morality, which had no scientific status, while science itself was accepted as the agent of this revaluation remaining unaffected by it. After the Russian Revolution of 1917 some Marxist scientists with a group of rather crude disciples among non-scientists, founded a Communist Academy where Dialectical Materialism was applied to natural science. But this movement gained little support from the Soviet Government and was eventually altogether disowned by it. Not until about 1930 did the Soviet Government begin seriously to apply a Marxist point of view to the organisation of scientific research. Since then this movement has advanced unceasingly. The principle that all science is class-science has become generally accepted. There followed first in genetics, and subsequently throughout the biological sciences a sustained series of attacks on various theories proscribed as bourgeois science. Lately the long simmering hostility of Marxism to modern physical theory has made an effective attack on Quantummechanics, which forced a scientist of distinguished authority in the field (J. Frenkel) to withdraw some of his published views which the ruling official philosophy had condemned as 'idealistic' and hence hostile to the revolutionary interest.

It may seem a paradox that the attempt at an impersonal analysis of scientific procedure tends to invalidate the claim of science to impersonal validity. Such a result may be difficult to predict, for the whole procedure of analysing

science - which is something we believe in - in terms of a mechanism in which our beliefs play no part, is nonsensical. But the result is not incomprehensible, for once we formed a picture of science in which our scientific convictions play no part, we may well abandon the claims of science as hitherto accepted in favour of a new science which offers to reveal the hidden forces by which all intellectual activities (except its own) are determined. If we persist in representing science in terms which pre-suppose that science is not what it in fact is, we can hardly be surprised if we arrive at a picture of science which appears to prove that science is something which in fact it is not.

5. How can we rescue science from this situation? Gone are the times when science, in its supremely secure position could eat its cake and have it too. 'Regulative principles' which with false modesty claimed to be respected only as if we believed in them, can offer no hold against the fundamental onslaughts science is exposed to ~~in~~ today. Indeed, such self-abasement of science is readily accepted by totalitarianism as a justification for the subordination of science to the requirements of public policy. Of this I could give you vivid instances.

At the moment I only wish to show that these regulative principles which are said to be the pre-suppositions of science are ambiguous descriptions of science, which are made to sound like detached statements but hide in fact a fiduciary commitment.

Axiomatisation is an example of a regulative principle. We ~~recognise~~ <sup>accept</sup> the existence of mathematics as a body of knowledge if we believe that we understand mathematical statements and appreciate their mutual implications. <sup>Axiomatisation is the</sup> ~~We may try to sum-~~

<sup>attempt to sum</sup> up all the assumptions underlying this knowledge in a set of symbols, axioms and rules of inference. But these would in themselves be almost unintelligible and if understood, may fail to be convincing or in the least interesting. ~~The~~

~~though this may seem odd, since mathematics is based on the inverse rule that inferences must rely for their acceptance on their being deducible from their premises. The fact is that Mathematics can claim acceptance only as a systematic whole and ~~that~~ when a series of axioms etc. is exhibited, this must be taken as a recommendation for acceptance of the kind of implications they are known to have and of any future implications yet to be derived from them. The ~~brief line of stark statements produced by axiomatisation commands respect not in itself but as an indication of an indeterminate range of unknown or half-known commitments, which comprise, however vaguely, our whole acceptance and admiration of the deductive system derivable from them.~~~~

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When the axiomatisation of a branch of mathematics or geometry is stated, as is usual, in a set of declaratory sentences which are apparently self-speaking or even said to be mere marks on paper, the process disguises its own fiduciary intention; but the pretence is easily exposed by a critique *the extent to which mathematics can be said to exist only to which* which insists on it that the truth or beauty of mathematics *there lives a passion for its truth and beauty in those who accredit* cannot be missing from its foundations and that it must be *mathematics. Unless we declare our share in this passion* stated as something we believe in, for it cannot be said to *we cannot be said to have stated the foundations of* exist otherwise *mathematics.*

6. Passing on to the empirical sciences, we find it even easier to expose a similar ambiguity in the principles which have at one time or another been suggested as formulations of the scientific method, safeguarding it against sceptical criticism. Take Mach's principle of 'mental economy', which reduces the claims of science to be merely the simplest description, or a convenient summary of the facts. This definition of science contains the word 'simple' which is a term of personal appraisal; let me examine the way in which it functions in this context. Take the controversy about Rhine's experiments on card-guessing. Extra-sensory perception is the simplest

explanation for them if you are prepared to believe in extra-sensory perception. Yet most scientists to-day would prefer some other explanation, if only it would lie within the scope of known physical interactions. To them this would appear as the simpler explanation, for they do not believe in extra-sensory perception. To them it appears more 'economical' not to introduce a new principle if we can possibly manage with those already accepted and they are prepared to disregard Rhine's observations until such time as these can be fitted into the existing framework of natural laws. The question of simplicity of description in the ordinary sense of the word 'simple' plays no part whatever in the controversy, nor has it entered into any of the other great controversies which have roused scientific opinion in the past. Think of the violent discussions that have raged around Pasteur's theory of fermentation, or around Mesmerism; round electrolytic dissociation, psycho-analysis, relativity or quantum theory. Never did any side argue in these battles that its view would be simpler in the ordinary sense of the word; that for example it would be simpler to memorise or to teach in schools, or that it could be written down in a smaller or more idiomatic vocabulary. What the opposing schools were urging against each other was that on the evidence their own view was true and ought to be believed, as against the contradictory view which was false and ought not to be believed. But of course the interpretation which is felt to be more convincing will also be regarded as the more straightforward one and in this sense also as the more simple. And no theories deemed to be untenable will in this sense be ever regarded as simple, but will always be felt to be far-fetched. The meaning of the word "simple" is thus made to coincide with that of "accepted as valid in science."

To sum up. The definition of science as "the simplest description of the facts" relies on the ambiguous use of the word 'simple', avoiding the affirmation of the true scientific

convictions held by the person using the definition, without actually abandoning any of the claims of his scientific convictions; but even so he cannot avoid using expressions such as 'simple' or 'economical', which entail an element of personal appraisal. Stripped of their ambiguity such predicates reveal the fiduciary character of empirical science.

This criticism applies with equal force to the pragmatist position. To say that science is true only in the sense that it is 'useful' or that 'it works', is open to the same objections as calling it the simplest description of the facts. Naturally, any view about nature that is believed to be valid will also be regarded as 'useful' and 'practical' in contrast to false views which as such are necessarily deemed useless and unworkable. But the inverse of this holds only if we re-fashion the connotation of 'useful', 'workable', etc. from that which is attached to these attributes in their usual context, so as to make their meaning coincide with that of "accepted as valid in science". And again, in spite of the disguise in which we thus cloak our beliefs in order to avoid having to affirm them by using expressions like 'useful' or 'practical', we reveal an element of personal appraisal as part of our definition of science.

7. Finally, let me return to the ~~regulative principles~~ originally introduced by Kant. A number of these - like the search for a first cause and the indivisibility of matter - have since lost their significance altogether, others have been retained but in a slightly modified function. The teleological interpretation of living beings and the law of causation (which Kant in some places includes among his regulative principles, though it is listed in the first place as as an a priori category) are still accepted to-day as fundamental rules of the scientific method. But modern logical analysis has made it increasingly clear that such rules are the pre-suppositions of empirical science which are implied as true

whenever we rely on the scientific method and more particularly on the process of induction. Moreover, these basic rules have been re-stated in a variety of new forms. For example, J.S. Mill postulated as such a rule the fundamental uniformity of nature and J.M. Keynes the principle of limited variety.

When stated as pre-suppositions of empirical inference, these principles gain a position in relation to the natural sciences closely similar to that held by a set of axioms and undefined terms in relation to the branch of mathematics that can be derived from them. What these postulates say is not in itself convincing nor indeed clearly comprehensible. Such convincing power as they possess is entirely due to the fact that we believe the body of science, which is supposed to be inferred from them, to be true. It is not true therefore that we believe the teachings of science because of our anterior acceptance of any postulates which are the pre-suppositions of science. The position is rather that as we become imbued with the knowledge of science and learn to apply its methods to new problems, we implicitly come to rely on the validity of certain general rules which may be regarded as the logical antecedents of the scientific method. (*maxims of the scientific arts*)

To describe these logical antecedents as the pre-suppositions of science is therefore ambiguous. For first we do not accept these rules as valid before we accept science as valid, as we would have to accept the rules of chess before we may start playing chess. Secondly, since these pre-suppositions are not regarded as a priori inescapable, it is implied that our acceptance of them is either a matter of unreasoning habit or due to an equally unaccountable act of deliberate preference. Any such account of our relation to the pre-suppositions of science is grossly misleading. The discoveries of science have been achieved by the passionately sustained efforts of succeeding generations of great men, who overwhelmed by the power of their convictions the whole of modern humanity. Thus has the scientific

outlook been moulded of which these logical rules give a highly attenuated summary. It is true that fundamentally this outlook cannot be accounted for either from experience or by pure reason, but this does not signify that we are free to take it or leave it but reflects the fact that this outlook is a belief to which we are committed and which cannot be resolved without confusion into non-committal terms. When certain rules are laid down as the pre-suppositions of the scientific method, this confusion is covered up by describing them ambiguously as pre-suppositions, or postulates, or regulative principles, etc.; it being left open whether the writer had pre-supposed or postulated these, and if so when and in what circumstances, or whether they had just pre-supposed or postulated themselves of their own accord in a universal manner outside of time and space.

In leading up to this position the logical analysis of science decisively reveals its own limitations and points beyond itself in the direction of a fiduciary formulation of science. By refusing to accord self-evident status to the logical antecedent of the scientific method, it implies - even if it does not declare it - that science must be regarded ultimately as something we believe in.