

Seventh Lecture.

The Doubting of Explicit Beliefs.

I have stated in the previous Lecture that I propose to abandon the ideal of strict objectivism and have declared that what I shall tell you here will be nothing more than a reasoned declaration of my own beliefs. I have given it as my conviction, which I have tried to substantiate in the previous Lecture, that this is the utmost that a writer of philosophy can strive for. Unfortunately, when I had said this it transpired that this admission threatens to destroy any grounds for claiming objective validity for what I am saying.

I shall try to ~~it~~ resolve this dilemma when I come to speak of commitment. But before that I have yet to meet an important criticism which is bound to ~~be made~~ ^{arise} against my programme of openly declared beliefs. It has been taken for granted throughout the critical period from Descartes to Bertrand Russell that the acceptance of unproven beliefs was the broad road to darkness, while truth was approached by the straight and narrow path of doubt.

~~We were warned that a host of~~ ^{We were warned that a host of} unproven beliefs were instilled in us from earliest childhood. Religious dogms, the authority of the ancients, the teaching of the schools, the maxims of the nursery, ^{was unit} ~~formed~~ to a body of tradition which we tended to accept, merely because these beliefs had been previously held by others who wanted us to embrace them in our turn. ^{are} ~~The struggle for objectivism~~ ^{We urged to resist this} opened with an ^{pressure of} ~~attack on~~ ^{indoctrination} traditional beliefs by pitting ^{it} ~~against them~~ ^{philosophic} the principle of doubt. ~~Doubt, as~~ ^{I have quoted before} Descartes defined it, ^{declared} ~~was the negation of belief.~~ ^{that universal doubt} Its rigorous application ^{his} ~~should~~ ^{should} purge ~~our~~ ^{his} minds of all opinions held merely on ~~the~~ ^{trust}

~~Handwritten scribble~~

and open his mind ~~to~~ it to
of authority of ~~our elders and close the~~ ideas firmly
grounded in reason. ^{In its strict formulations,} The principle of doubt forbids us ^{altogether}
to indulge in ^{any} desire to believe and demands that we should
keep our minds empty, rather than allow ^{but} any irrefutable beliefs
to take possession of them. When Kant says that in mathematics
there is no room for mere opinion but only for real knowledge,
he adds that short of possessing knowledge we must refrain
from all judgement. Personal belief is upheld - says Pascal
in his Esprit Geometrique - with the assistance of the
believer's will and lacks therefore complete objectivity.
The method of doubt consists in ferreting out and counter-
acting these voluntary components of belief, in the expectation
that this ^{will} leave behind unassailed a residue of objective
knowledge, ^{that is knowledge completely determined by the evidence.} Critical thought placed supreme confidence in
this method as a means of avoiding error and discovering
the truth.

2. I do not say that during the period of critical
thought this method has been always or indeed ever rigorously
practised - which I believe to be impossible - but merely
that its practice has been avowed and emphatic, while its
relaxation has been largely unconscious and unacknowledged. ^{see Descartes about religion}
Admittedly, Hume was ^{fairly} quite frank in this respect; he openly
chose to brush aside the conclusions of his own scepticism
at such points where he did not think he could honestly follow
them. But even so he failed to acknowledge that by so doing
he was expressing his own personal beliefs, which ^{would have} meant that
he was claiming his right and accepting his duty to declare
such beliefs, even when this involved the silencing of doubt
and the abandonment of strict objectivity. The efforts of

Kant made a superhuman effort to meet the situation
exposed by Hume's critique without admitting any relaxation
of doubt. "The root of these disturbances" he wrote in
respect to such difficulties "which lies deep in the nature
of human reason must be removed."
~~human reason, must be removed.~~ But how can we do so, unless we give it
freedom, nay, nourishment, to send out shoots so that it may discover
itself to our eyes, and that it may then be entirely destroyed? We must,
therefore, bethink ourselves of objections which have never yet occurred
to any opponent, and indeed lend him our weapons, and grant him the
most favourable position which he could possibly desire. We have nothing
to fear, but much to hope for; namely, that we may gain for ourselves a
possession which can never again be contested. "

assistance of the
will also discredits
moral judgment in
J. Butler's view.

But Kant's hopes of an incontestable estate of reason ~~was~~ proved too high. I have shown in a previous lecture how in the succeeding period

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~~of~~ the setting up 'regulative principles' and the process of axiomatisation covered up the weaknesses of the objectivist position by a system of ambiguous statements. ~~Which~~ ^{How} less

subtly ~~and indeed rather blatantly~~ ^(or rather ignored) was this weakness concealed,

by another line of writers, rising to influence ^{later} in the 19th Century, who ~~practically ignored it and~~ ^(taking their cue from natural science) ~~sumptuous~~ declared with complete

assurance ~~and no lack of self-righteousness~~ that they accepted

no belief whatever that had not passed the test of unrestricted doubt. As a distinguished example for a thousand lesser ones,

take this eloquent declaration of the principle of doubt by ^{(Mill:} J.S.)

"The beliefs which we have most warrant for have no safeguard to rest on, but a standing invitation to the whole world to prove them unfounded. If the challenge is not accepted, or is accepted and the attempt fails, we are far enough from certainty still; but we have done the best that the existing state of human reason admits of; we have neglected nothing that could give the truth a chance of reaching us; if the lists are open, we may hope that if there be a better truth, it will be found when the human mind is capable of receiving it; and in the meantime we may rely on having attained such approach to truth as is possible in our own day. This is the amount of certainty attainable by a fallible being, and this the sole way of attaining it".

No proclamation of intellectual integrity could be more sincere and yet its words ~~are~~ are devoid of any definite meaning and their ambiguity conceals precisely the kind of personal convictions which they so loudly repudiate. For we know that J.S. Mill and other writers standing in the Liberal tradition of philosophic doubt held - or hold today - a wide range of beliefs in science, ethics, politics, etc., which are by no means unquestioned. If they regard these as not having been 'proved unfounded', this merely reflects their decision

to reject the arguments which are or were advanced against them. At no time could the belief of Liberalism be regarded as irrefutable in any other sense. But in this sense all fundamental beliefs are irrefutable as well as unprovable. The test of proof or disproof is in fact irrelevant for the acceptance or rejection of fundamental beliefs and to claim that you strictly refrain from believing anything that could be disproved is merely to cloak your own will to believe your own beliefs behind a false pretence of self-critical severity. This picture is not reduced, but elaborated even further by humbly acknowledging the uncertainty of our own conclusions. When admitting that the proofs on which our beliefs are supposed to be founded may conceivably be incomplete, we effectively conceal the brute fact that we can have no proof whatever to warrant them. Indeed the frank admission of our fallibility only serves to reaffirm our claim to a fictitious standard of intellectual integrity, while it brings out fully the shining qualities of our open mind in contrast to the hidebound attitude of those who openly profess their beliefs as their final personal commitment.

However, at the moment our main concern with the writings of this school is their affirmation of the principle of doubt as a beneficent agency, which dissolves our error and leaves truth purified behind for us. Its picture of the human mind as perennially tempted to embrace beliefs without sufficient proof and restrained only by the opposing principle of philosophic doubt has been deeply imprinted on modern thought and will have to be dealt with in detail.

3. Mill had inherited from Locke the belief that philosophic doubt would ^{appease} ~~remove~~ religious fanaticism and establish universal tolerance, and this belief is still vigorously alive in our own day. Its most influential representative Earl Russell expressed it eloquently many times, as for example in this passage:

G. Gover humbly acknowledges his abundant tentative character of his totally Reissian babies, thus assuming he does up extreme caution to cover up his extravagances.

to reject the arguments which are or were advanced against them. At no time could the beliefs of Liberalism be regarded as irrefutable in any other sense. // But in this sense all fundamental beliefs are irrefutable as well as unprovable. // The test of proof or disproof is in fact irrelevant for the acceptance or rejection of fundamental beliefs and to claim that you strictly refrain from believing anything that could be disproved is merely to cloak your own will to believe your own beliefs behind a false pretence of self-critical severity. This complacency is not lessened, but only further concealed by humbly acknowledging the uncertainty of our own conclusions. For when we admit that the proofs on which our beliefs are supposed to be founded may conceivably be incomplete, we effectively cover up the brute fact that we can have no proof whatever to warrant them. Indeed the emphatic admission of our fallibility only serves to reaffirm our claim to a fictitious standard of intellectual integrity, and brings out fully the shining qualities of our open mind in contrast to the hidebound attitude of those who openly profess their beliefs as their final personal commitment.

But I must not further anticipate my critique of this school of thought; it is enough to recall here that it has powerfully extolled the merits of doubt as a beneficent agency, which dissolves error and leaves truth purified behind. It has drawn a picture of the human mind as perennially tempted to embrace beliefs without sufficient proof, restrained only by the opposing principle of philosophic doubt, which has become deeply imprinted on modern thought.

3. Moreover, doubt has been acclaimed not only as the touchstone of truth, but also as the safeguard of tolerance. The belief that philosophic doubt would appease religious fanaticism and bring about universal tolerance goes back to Locke and this belief is still vigorously alive in our own day. Its most influential representative Earl Russell expressed it eloquently many times, as for example in this passage:

"Arians and Catholics, Crusaders and Muslims, Protestants and adherents of the Pope, Communists and Fascists, have filled large parts of the last 1600 years with futile strife, when a little philosophy would have shown both sides in all these disputes that neither had any good reason to believe itself in the right. Dogmatism . . . in the present age as in former times, is the greatest of the mental obstacles to human happiness".
(University Quarterly, 1, (1946), p.38).

The logical weakness of such statements may seem transparent, but that does not dispose of them. For it remains deeply ingrained in the modern mind - as for example in my own mind - that though doubt may be sometimes destructive or even nihilistic, to refrain from belief is always an act of intellectual probity as compared with the resolve to hold a belief which we could abandon if we decided to do so. To accept a belief by yielding to a voluntary impulse, be it my own or that of others placed in a position of authority, is felt to be a surrender of reason. You cannot teach the necessity for doing this without incurring - even in your own heart - the ^{suspicion} ~~apprehension~~ of obscurantism. ^{At every step} Pascal (in the

in quest of a post-critical philosophy the warning of the passage I quoted before) called it base to accept any belief on the critical age, as formulated by Kant, will echo in

our minds. Reason must in all its undertakings subject itself to criticism; should it limit freedom of criticism by any prohibitions, it must harm itself, drawing upon itself a damaging suspicion. Nothing is so important through its usefulness, nothing so sacred, that it may be exempted from this searching examination, which knows no respect for persons. Reason depends on this freedom for its very existence. ["] ~~For reason has~~

~~Pascal's exception.~~ (I shall not feel reassured in advocating

and *for this purpose I shall firstly examine in this and the next lecture the claims made* an attitude of uncritical belief unless I have first fully faced ^{(this warning} the claims of ~~this~~ principle of doubt which have such a tenacious ^{the} ~~the~~ ^{Pascal (in the} ~~the~~ ^{in quest of a post-critical philosophy the warning of the critical} ~~the~~ ^{passage I quoted before) called it base to accept any belief on the} ~~age, as formulated by Kant, will echo in our minds~~ support of our will, with the exception of divine truth. We

still feel this repulsion today and include in this now even Pascal's exception. I shall not feel reassured in advocating an attitude of uncritical belief unless I have first fully faced the claims of the principle of doubt which have such a tenacious hold on our minds.

1. Kant, "Kritik der Reinen Vernunft". Chapter: Die Disciplin der reinen Vernunft im polemischen Gebrauch. "Die Vernunft muss sich in allen ihren Unternehmungen der Kritik unterwerfen und kann der Freiheit derselben durch keinen Verbot abbruch tun ohne sich selbst zu schaden und einen ihr nachteiligen Verdacht auf sich ziehn. . . Auf diese Freiheit beruht sogar die Existenz der Vernunft, die kein diktatorisches Ansehen hat." (see Extracts 1945-47; 3, 9, 47.)

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4. The first point in my critique of doubt will be to show that the doubting of any particular belief merely implies an attempt to replace the belief in question by other beliefs which are not doubted for the time being. Most of this Lecture will be given to the demonstration of this thesis.

1. Kant, "Kritik der Reinen Vernunft". Chapter: Die Disciplin der reinen Vernunft im polemischen Gebrauch. "Die Vernunft muss sich in allen ihren Unternehmungen der Kritik unterwerfen und kann der Freiheit derselben durch keinen Verbot ebruch tun ohne sich selbst zu schaden und einen ihr nachteiligen Verdecht auf sich ziehn. . . Auf diese Freiheit beruht sogar die Existenz der Vernunft, die kein diktatorisches Ansehen hat." (see Extracts 1945-47; 3, 9, 47.)

Between p and not- p there is no other difference than that they refer to different matters of fact. 'I believe not- p ' could stand for the allegation that planets move along orbits which are not elliptical or that some men are immortal etc. If these allegations be false or, if true, be difficult to prove, they would still be allegations of the same type as that which they contradict. Doubt, in this form, merely replaces one belief by another belief. There is no difference between sentences of the form p and not- p which could not be eliminated by a simple re-wording and hence the expression of contradictory doubt is not distinguishable from any other allegation of fact. / Such an affirmation may express an ultimate belief, unsupported by proof; or it may claim to be demonstrable, in which case it will imply the acceptance without proof of the premises on which its demonstration rests.

The history of science offers many illustrations for the logical equivalence of affirmation and contradiction. In mathematics a problem may be set for a time in the positive form and then turned round into its opposite, namely to prove the impossibility of finding a solution for it. The squaring of the circle and the trisection of an angle by aid of ruler and compass were both inverted after a time in this sense; these constructions have been proved to be impossible. In mechanics, centuries of misplaced ingenuity having been spent on solving the problem of perpetual motion, eventually the impossibility of constructing such a machine was established as a fundamental law of nature. In all these cases the difference between a positive statement and the denial of a positive statement is merely a matter of wording and it is apparent that the acceptance or rejection of either form of allegation is decided on exactly similar criteria.

5. Agnostic doubt is somewhat more complex, as it is composed of two halves of which the second is not always clearly implied. ~~conjoined to the first~~ ^{stet} The first half of an agnostic doubt is a contradictory doubt which can be either temporary or final. A temporary agnostic doubt ('I believe p is not proven') leaves open the possibility that p may yet be demonstrated in future; while ~~already~~ ⁱⁿ its final form ('I believe p cannot be proven') agnostic doubt denies that p can ever be demonstrated. But neither of these denials alleges anything definite concerning the credibility of p; which shows that they represent only a first and so far inconclusive part of agnostic doubt.

There are various instances in which the first half of agnostic doubt is raised without prejudice to the credibility of the affirmation that is called in doubt. There is a standard problem in mathematical logic which illustrates this very clearly. Suppose we want to consider the possibility of forming a deductive system with p as one of its axioms. For this it would be necessary that p should be consistent with the other axioms and independent of them; which means that neither p nor not-p should be provable within the proposed system of axioms when set out short of p itself. If this has been successfully demonstrated, we are at liberty to include p as one of our axioms, or ^{else} reject it, depending on reasons which in general will be quite independent of the demonstration in question. There is one famous case in mathematical logic in which the demonstration of the impossibility of proving a statement within an existing system of axioms is immediately followed by the acceptance of that statement without such proof, as true. I am referring to the Gödelian sentence which affirms its own undecidability within a given formal system and emerges as true, once its undecidability has been demonstrated. On the other hand the proof given by Gauss that the Fifth Postulate of Euclid cannot be derived from his first four Postulates served as a justification for considering the Fifth Postulate as optional and replacing it at will by non-Euclidean alternatives.

It may happen - as we shall see exemplified in a moment - that the question of the credibility of p is left scrupulously undecided without any preference for or against it, exactly where the first half of agnostic doubt had left it. So that we may honestly say: 'I believe neither p nor not- p '. But such extreme impartiality should be regarded as exceptional, and we should altogether reject the view expressed by Kant in the passage quoted ~~by~~ in Lecture 5 where he condemns ^{it} as absurd to have an opinion in pure mathematics and demands that unless we know, we must abstain from all acts of judgement.

For in the first place, such a maxim would strike at the foundations of agnostic doubt itself which, in its first half ('I believe p is not proven' or 'not provable') must rely on the acceptance of some ^{not} strictly indubitable framework within which p can be said to be proven or not-proven, provable or ~~not~~-provable. Kant would not have recognised this contradiction since he held that the foundations of mathematics, including the axioms of Euclid were indubitable a priori; but this view has proved to be mistaken.

Secondly, the whole practice of mathematical research is contrary to Kant's maxim and it seems obvious that its strict observance would bar the way to all mathematical discovery. Generations of mathematicians have laboured to find a general proof of Fermat's theorem and by doing so have succeeded step by step in proving increasingly extensive parts of it. These efforts were all guided by the assumption that Fermat's last theorem, though hitherto unproven, was true and may therefore be capable of proof. Indeed, all heuristic procedure in mathematics which seeks to establish a proof ~~or~~, more generally, seeks to construct something which fulfils certain mathematical conditions ~~or~~ starts off from the assumption that something that is not proven may yet be proven, which implies that it is believed to be true in spite of its not being proven. Far from being banned from mathematics, such beliefs are indispensable to its progress and mathematicians spend their professional lives in holding such beliefs and pursuing their lead.

6. In the natural sciences we meet with another broad field for the cultivation of unproven allegations. Scientists spend their mental lives on the shores of the unknown, trying to guess at yet hidden knowledge, from such glimpses as they may catch of it from time to time. Were they precluded from indulging in surmises, they would instantly cease to be scientists. They might continue to teach, but would even teach badly, since their cut and dry texts would no longer echo the questionable depths below them nor point towards the vague horizons beyond them. It is the profession of scientists to entertain unproven beliefs concerning matters of fact and to transmit beliefs of this kind to ^{their} pupils.

This function of the scientist is usually represented as a readiness to keep an open mind and to try out any suggestion that has not yet been proved false. ^{But} Nothing could be further from the truth. To try out an experimental suggestion will as a rule take years of persistent labour and involve thousands of pounds in expenses. If the work is allocated to a student, his entire future may be at stake in such a venture. If he spends his first years of research on a wild-goose chase he may never get another chance to prove his ability. The pupils of Ehrenhaft who were given the task to search for the sub-electron or those of Barkla who were entrusted with the investigation of the Y-rays, paid heavily for the extravagance of their teachers' surmises. A scientist who would set out 'to try everything once' would have an infinitesimal chance of ever trying anything worth ^{while. Such a} ~~and his practice would~~ ^{be a} public mischief. The professional scientist owes his position to the confidence placed by the appointing authorities in the quality of his unproven surmises. It is his duty to economise stringently with his own efforts and those of his pupils, as well as with the money entrusted to him, by using to the full his powers of surmising ~~for the~~ selection of the most profitable directions of enquiry.

In the natural sciences we rarely have the same kind of proof as in mathematics. This makes it as a rule impossible to distinguish in the natural sciences between the unproven state of an assertion and our ^{personal} disbelief of it. We may hold it to be unproven merely because we disbelieve in it though we are unable to prove our contradictory belief. Most scientists today hold that extrasensory perception is unproven, though ~~they would find~~ the evidence presented for its reality ^{would be found} amply sufficient for the purpose of proving some physical effect, which lies within the range of hitherto accepted phenomena. They feel so sure of their disbelief that they would even regard it as a waste of time to test the alleged proof of these novel phenomena; they are satisfied to ignore it. It is possible that these scientists are mistaken in this particular case, but scientists cannot in general dispense with this type of selective reaction. A scientist must react responsibly to any important claim put forward within his field of knowledge. If he ignores the claim he does in fact imply that he believes it to be unfounded. If he takes notice of the time and attention which he diverts to its examination and the extent to which he ~~will~~ take account of it in guiding his own investigations ^{are} ~~will~~ a measure of the likelihood he ascribes to its validity. Only if a claim lies totally outside his range of responsible interests can the scientist assume an attitude of completely impartial doubt towards it. It would seem indeed that he can be strictly agnostic only on subjects of which he knows little and cares nothing.

7. The procedure of the law-courts prescribes the observance of strictly impartial agnostic doubt in respect to a specified range of topics. There are a number of matters which would be normally considered relevant to a criminal charge, into which a law court hearing that charge may not enquire. If I have seen my next door neighbour killing his wife with an axe and I describe

antecedent likelihood of hypothesis resumed in chapter on chance

In the natural sciences the proof of an allegation is rarely as rigorous as it normally is in mathematics. This makes it as a rule impossible to distinguish in the natural sciences between the unproven state of an assertion and our ^{personal} disbelief of it. We may hold it to be unproven merely because we disbelieve in it though we are unable to prove our contradictory belief. Most scientists today hold that extrasensory perception is unproven, though ~~they would find~~ the evidence presented for its reality ^{would be found} amply sufficient for the purpose of proving some physical effect, which lies within the range of hitherto accepted phenomena. They feel so sure of their disbelief that they would even regard it as a waste of time to test the alleged proof of these novel phenomena; they are satisfied to ignore it. It is possible that these scientists are mistaken in this particular case, but scientists cannot in general dispense with this type of selective reaction. A scientist must react responsibly to any important claim put forward within his field of knowledge. If he ignores the claim he does in fact imply that he believes it to be unfounded. If he takes notice of the time and attention which he diverts to its examination and the extent to which he ~~will~~ take account of it in guiding his own investigations ^{are} ~~will~~ a measure of the likelihood he ascribes to its validity. Only if a claim lies totally outside his range of responsible interests can the scientist assume an attitude of completely impartial doubt towards it. It would seem indeed that he can be strictly agnostic only on subjects of which he knows little and cares nothing.

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*N.B. dying deposition
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this five minutes later to a party of 10 people having tea in my sitting room, after which I collapse and die from a heart attack due to over-excitement, the murderer may go scot free without any of those to whom I described his deed being allowed to testify to what I told them. For this is regarded as 'hearsay' and hearsay is 'not evidence'; just as much as other information *for example evidence of a bad character of the accused, that would normally be that is normally thought to be relevant is excluded from notice* by the court. Indeed, if any such information is inadvertently brought up the jury are directed to forget about it. They also are strictly forbidden to discuss the problems of the case with anybody outside their fellow-jurors, though normally they would not take any important decision without talking the matter over with their wives or trusted friends. By the enforcement of such rules which restrict the usual range of interest to which the members of the court would respond in connection with the case before them, the law succeeds in keeping out of their minds a certain number of allegations p and their contradictories not-p which they would otherwise entertain. By rigorously suppressing the voicing of either of these alternatives a strictly agnostic attitude is achieved in respect to them. This is equivalent to the establishment of the first half of agnostic doubt in respect to the p's in question, without any subsequent decision as to the credibility of these p's. In such a case the range of beliefs entertained is effectively reduced, but only to the extent to which we are prevented from knowing of the matters to which they refer.

On the other hand, the questions which are admitted in court must be decided one way or another. If, after the evidence is exhausted it is found that both p and not-p ^{are} consistent with it, the presumptions laid down by law decide in favour of one of the two alternatives. The most widely known legal presumptions are perhaps those which grant the benefit of the doubt to the accused in criminal proceedings. If the allegations p and not-p are both consistent with the evidence, the court will as a rule

presume - i.e. believe - that alternative which does not prejudice the innocence of the accused. But there is no sweeping presumption in this respect. A defence based on a plea of insanity will be rejected unless the evidence excludes the possibility that the accused is sane; in the absence of proof to the contrary an accused is presumed sane although this weighs against him. There are numerous legal presumptions of a particular kind which prevail both in civil and criminal suits and bear no relation to the distinction between the two contesting sides. A child born in wedlock will be presumed to be by the husband; if a married couple are drowned together it is presumed that the wife died first, etc. ^{wide range} ~~As entire system~~ of detailed presumptions is accepted in order to avoid a deadlock on matters which lie within the court's responsibility. ^{Such matters} ~~These~~ must be decided one way or another and agnostic doubt cannot be maintained in respect to them.

8. These conclusions seem to run counter to the claims made by agnosticism in respect to the belief in God. Under the principal influence of Bertrand Russell who devoted numerous writings to the apologia of agnostic doubt, the view has become widespread that agnosticism offers a tenable middle ground between atheism and the belief in God. If 'God exists' is p, atheism asserts not-p, but the truth is - it is suggested - that both p and not-p are unproven and there the matter should rest. This position has lately been criticised by Sir Walter Moberley and defended against him by Barbara Wootton. The former pointed out that agnostics do in fact not pray to God, attend no religious worship and live altogether without God. The latter replied in general terms comparing the agnostic attitude with that of a person who goes out for a walk with an open mind as to whether it will rain or not, which need not prevent him from taking an umbrella with him on the chance that it might rain. Mrs. Wootton is right in pointing out that agnostic doubt of p does not decide at

within a framework ^{established by our} ~~of~~ anterior beliefs and our belief or disbelief in God will be decided in effect on this anterior level.

pause →

10. The difficulty which we find of reducing the volume of our beliefs by a deliberate exercise of doubt points to a deep-seated disposition in the process of life itself. We have eyes and ears and many other organs of perception, which during all our waking hours are incessantly at work to make sense of the impressions they receive from our surroundings. We do not get to know separately the impressions which are comprised in the seeing of an object, ~~for~~ for example, ^{of} a crow flying over a field. ^{Physiology} ~~Psychology~~ tells us that while we see the crow, two rapidly changing ^{complex} patterns of light are projected on the retine of our two eyes, the two series being slightly different from each other in a characteristic manner and that at the same time we have feelings within the musclea, ~~which~~ ^{which} adjust ^{the} convergence of our eyes and ~~which~~ ^{which} adapt ^{our} lenses and pupils.

Our manner of seeing the crow will be further affected by a whole system of messages from all our joints and skeletal muscles, and from the labyrinth of the internal ear, which reflect the posture of our body relative to the ground. These impressions which we do not know in themselves are represented to us by the sight of the flying crow, as a single object moving through successive positions, at a certain distance from ourselves and at a certain speed and at a certain elevation above the ground. We see the crow as an object of a definite and constant size and colour, changing its shape, yet retaining its structure. Our eyes are trained to present us with this finished picture without informing us of the vast array of elements on which its formation relies.

^{There are} ~~These~~ overwhelming ~~but~~ bodily urge decides to make sense of our impressions without consulting our conscious control.

hold and which historically has become characterised by its antagonism to previously accepted beliefs. Since the spread of anti-religious Enlightenment in the 18-th century, the word 'believer' has in fact come to mean in Europe a believer in God and the doctrines of Christianity, while the word 'unbeliever' has been used to describe people who believed instead in a purely scientific or naturalistic interpretation of the Universe.

^{Once} ~~If~~ these two rival conceptions of the world are ~~to be~~ given equal status as two alternative beliefs, ^{the description of} ~~then to say that one~~ ~~is~~ the expression of doubt ^{can have} ~~would have~~ no more than historic significance. ^{It would be similar to is like} ~~The same applies to~~ the use of the terms 'Protestantism' or 'Nonconformity' as names for religious doctrines, which at one time emerged by protesting against and dissenting from a prevailing dogma, but have long since become ^{securely} ~~quietly~~ established as orthodoxies.

12. Against this the advocates of the principle of doubt ^{sometimes} ~~would~~ claim that what they believe in - and especially the body of science on which they principally rely - is always left open to doubt by its adherents themselves and can therefore never be said to form an orthodoxy. I believe this claim to be unjustified, for those who believe in the universal sufficiency of scientific explanations do not in fact habitually expose this belief to periods of doubt. They only allow doubt to be practised within science, as between one scientific explanation and another. And even so, the scientific belief which prevails at any particular time as to what lies within the bounds of natural phenomena, tends to establish a rigid orthodoxy which will persistently ignore the most striking facts if these do not conform with its conception of nature.

^{Indeed} ~~and~~ Such a position is rendered wellnigh ^{impervious to doubt} ~~impregnable~~ by the fact that those holding it exercise their obscurantism in the name

~~Euclid's postulate of parallels had been often recognized as~~

of scientific scepticism. ~~Such scientific~~ scepticism ~~could~~ ^{has} discredited for centuries the evidence for the fall of meteorites. Ordinary people did not fail to be convinced when an incandescent mass struck the earth with a crash of thunder sometimes only a few yards away from them, but scientific committees managed to explain away these facts and were not convinced until eventually in 1803 the French physicist Biot published a detailed account of the fall of ^{some} 2000 stones. It was again scientific scepticism which brushed aside all the instances of hypnotic phenomena that occurred in the ~~form~~ of miraculous cures and spellbindings and which, even in the face of the systematic demonstrations of hypnosis by Mesmer and his successors, denied for another century the reality of hypnotic phenomena. When the medical profession ignored most such palpable facts as the painless amputation of human limbs performed before their own eyes in hundreds of successive cases, they acted in a spirit of utmost scepticism, convinced that they were defending science against imposture.

I have pointed out already that all scientific discovery is due to the fact that, contrary to the maxims of scepticism, scientist do not ignore unproven beliefs but spend their lives relying for guidance precisely on such beliefs. I may add that the history of science shows little evidence that the habit of doubting has in itself played an effective and beneficent part in the progress of science. Scientists, who would apply themselves to discrediting randomly selected statements from current textbooks would waste their time at thousands of nonsensical tasks before meeting with any success. Moreover, if they eventually established some doubts here and there they would still not be much nearer to discovery. Euclide's postulate of parallels had been often recognised as

Proclus

dubitable since ~~Plein~~, but it was not until Lobatshevskj and Bolysi succeeded in constructing an alternative system of geometry that the questioning of this axiom produced new discoveries. Suppose that some physicist of the nineteenth century had declared that he doubted the validity of classical mechanics for atomic processes. He would have chanced on a true doubt, but so far there would have yet been nothing to distinguish it from any other doubts that could be raised with as much justification. And even ^{if} though by some further chance this particular doubt were pursued further, the probability of discovering quantum theory by speculations on possible alternatives to classical mechanics in atomic processes would have been negligible.

Moreover, the progress of science often depends on the judicious neglect of doubts which cannot be resolved for the time being. The Greeks were unwise to be deterred from pursuing algebraic studies when they discovered that the hypotenuses of most right angled triangles could not be measured by natural numbers or fractions of such numbers. Algebra was later taken up and successfully cultivated by the Arabs and post-classical Western mathematicians for a considerable time, who forgot or disregarded the intellectual scruples which had restrained the Greeks. Their difficulties were in fact not fully disposed of until the latter part of the 19th century by Dedekind's concept of real numbers. (H. Weyl, "Philosophy of Mathematics and Natural Sciences".) The example shows that even well founded doubts may be sterile in science and may indeed hamper its *progress*.

Thus ~~the~~ doubts raised by the phenomenological ^{qualit} school, which at the close of the 19th century called in question the reality of matter, such as atoms, electrons, molecules, would have completely prevented the development of modern twentieth century physics, had they not been ignored by scientists in practice. The most forceful statement of these philosophic doubts came from Ernst Mach in Vienna and for some time their influence was profoundly

felt in Austria and Germany. It so convinced W. Ostwald, the leading master of the new physical chemistry, that he wrote an account of stoichiometry without reference to atoms, thus abandoning the ground gained by John Dalton 100 years earlier. It discouraged for a time the acceptance of Maxwell's and Boltzman's kinetic theory of gases. Fortunately it was soon swept aside by the rapid advances of atomic physics, and by 1906 the tide had completely turned. Though philosophic doubt continued to be entertained in respect to the reality of atoms and other such particles which were described as 'logical constructs', 'intermediate variables' etc., this critique no longer affected the actual beliefs of physicists and chemists, even though many continued ^{- and still ~~would~~ continue -} to give lip-service to it.* But it is no exaggeration to say that had Mach's doubts been taken seriously and generally shared since 1900, ~~there~~ ^{we} would have ^{had} ~~been~~ no quantum theory, no electronics, ~~no~~ theory of radioactivity, in fact no modern physics at all. One has to ^{recall} ~~go~~ ~~back~~ to the extravagances of astrology and witchcraft, or turn to the pronouncements of the Soviet authorities on genetics, to find beliefs as misleading to science as these sceptical teachings could have proved to be, had scientists acted upon them.

13. This brief series of case histories seems to bear out the result of the previous logical analysis, which showed that doubt ^{cannot} ~~could not~~, in general be distinguished from belief. Doubts can have all the characteristics of other beliefs. They may be true or false. False doubts can be as narrow, ^{as} obstructive and blindly obstinate, as bigotted or wantonly perverse, as any other beliefs.