LECTURE EIGHT.

The Doubting of Implicit Beliefs.

1. My examination of doubt has been so far restricted in three respects. I have analysed (1) only the doubting of explicit allegations and (2) envisaged only one such doubt at a time, while (3) the process of doubt was left to operate throughout within a previously fixed framework of reference. I have shown that this form of doubting may lead to a diminution of belief only if the agnostic doubt of an allegation p which declares p to be 'not proven' is followed up by leaving p strictly undecided. Except in mathematical logic and in ~~certain stages of~~ legal procedure where both p and not-p are excluded as evidence, such agnostic detachment does not seem practicable. With such exceptions, doubt has not so far proved to be antagonistic to belief as such, but merely to involve the replacement of certain beliefs, held to be questionable by other beliefs hitherto undoubted. There has not yet come to light any procedure which could be justly recognised as a principle of doubt, as opposed to belief in general.

2. I shall now try to grasp more fully the heart of the matter by abandoning the restrictions within which I have so far viewed the process of doubt. I shall extend this enquiry in the first place from the doubting of articulate affirmations to the doubting of implicit beliefs. Our most deeply ingrained convictions are never stated in the form of articulate affirmations, but are embedded in our conceptual framework. Such fundamental unformulated convictions are implied in the terms in which we apprehend or seem to apprehend the things on the existence of which we rely. Our explicitly formulated beliefs are held to be true in the last resort only because of our anterior acceptance of a system of interpretations in the light of which we have constructed our own picture of reality.

I have mentioned already the physiological urge inherent in our sense organs which keeps them on the alert and impels them to comprehend rationally the impressions received by them. The perceptive interpretations practised by our sense organs are largely common to the human race and apparently even to humans and animals alike so far as their senses are similar. But there exist conceptual differences between people which primarily determine their several ways of comprehending the world and we find these reflected in the variety of languages in which they express themselves. Language of course manifests a belief only if we use its words with the implied acceptance of their appositeness. People who do not believe in oracles, witchcraft or magic may yet speak of oracles, witchcraft and magic, but they mean so called oracles, witchcraft and magic, putting these words mentally in inverted commas. The use of a language expresses belief in a conceptual framework only if its words are used confidently, without any implied qualifications of unbelief, such as the quotation marks would stand for. The language may then be said to form an idiom of belief.

3. The fact that primitive people hold distinctive systems of beliefs by practising peculiar modes of interpretation which are inherent in their conceptual framework and are reflected in their language, has been first stated with emphasis by Levy-Brühl earlier in this century. The more recent work of Evans-Pritchard on the beliefs of Azande has borne out and has given further precision to this view. The author is struck by the intellectual force shown by the primitive African in upholding his belief against evidence which to the European seems flagrantly to refute them. An instance in point is the Zande belief in the powers of the poison-oracle. The oracle answers questions through the effects on a fowl of a poisonous substance, called benge. The oracle-poison is extracted from a creeper gathered in a traditional manner, which is supposed to become effective only after it has been

addressed in the words of an appropriate ritual. Azande - we are told - have no formal and coercive doctrine to enforce belief in witch-doctors and their practice of the poison-oracle, but their belief in these is the more firmly held for being embedded in an idiom which interprets all relevant facts in terms of witchcraft and oracular powers. Of this Evans-Pritchard gives various examples.

~~Take the case~~ Suppose that the oracle in answer to a particular question says 'Yes' and immediately afterwards says 'No' to the same question. In our eyes this would tend to discredit the oracle altogether, but Zande culture provides a number of ready explanations for such self-contradiction. Evans-Pritchard lists no less than eight secondary elaborations of their beliefs by which Azande will account for the oracle's failure. He relates further how he often asked Azande what would happen if they were to administer oracle-poison (benge) to a fowl without delivering an address, or if they were to administer an extra portion of poison to a fowl which has recovered from the usual doses. The Zande - he says - does not know what would happen and is not interested in what would happen; no one has been fool enough to waste good oracle-poison in making such pointless experiments which only an European could imagine. Indeed, were an European to make a test which in his view proved Zande opinion wrong they would stand amazed at the credulity of the European. If the fowl died they would simply say that it was not good benge, the very fact of the fowl dying being proof of this.

This blindness of Azande to the facts which to us seem decisive is not due to stupidity, on the contrary Evans-Pritchard is impressed by the great ingenuity displayed by them in explaining away the failures and inequalities in the poison-oracle. Within the limits set by their patterns of ritual behaviour and mystical belief they show great intellectual ingenuity and experimental keenness, but their intelligence cannot operate beyond these limits.

"They reason excellently (says Evans-Pritchard) in the idiom of their beliefs, but they cannot reason outside, or against, their beliefs because they have no other idiom in which to express their thoughts."

4. With this illustration in mind, we may try to analyse more closely the powers of language to embody and firmly to uphold a system of not explicitly asserted beliefs. A language may be defined as a collection of recurrent utterances which every time carry the same or a similar meaning. We may estimate that of the 2-3000 English words in common usage today, each occurs on the average a hundred million times in the daily intercourse of people throughout Britain and the United States. In a library of a million volumes using a vocabulary of 30,000 words the same words will recur on the average more than a million times. A particular vocabulary of nouns, verbs, adverbs and adjectives thus appears to constitute a definite theory of all subjects that can be talked about. It postulates that these subjects are all constituted of comparatively few recurrent features, to which the nouns, verbs, adverbs and adjectives refer. The theory is somewhat similar to that of chemical compounds. Chemistry alleges that a million of different compounds are all composed of a small number - less than a hundred - of always identical chemical elements. Since each element has a name and characteristic symbol attached to it we can write down the composition of any compound in terms of the elements which it contains. This corresponds to writing down a sentence in terms of a certain language.

So long as we use a certain language, all questions that we can ask will have to be formulated in it and will thereby confirm the theory of the universe which is implied in the vocabulary and structure of the language. It follows that we cannot state without self-contradiction within any language any doubt in respect to the theory implied by the language. The only way to dissent from the

theory of the universe implied in a language is to abandon some of its vocabulary and to learn to speak a new language instead. This does in fact happen when primitive people who believe in witchcraft, etc. are gradually converted to the European conceptions of universal causation.

The resistance of an idiom of belief against the impact of adverse evidence which would impel it to modify its conceptual framework in favour of alternative conceptions, may be regarded under three headings, each of which is illustrated by the manner Azande retain their beliefs in the face of situations which in our view should invalidate them.

The stability of Zande beliefs is due in the first place to the fact that objections to them can be met one by one. The power of a system of implicit beliefs to defeat valid objections one by one is due to the circularity of such systems. By this I mean that the convincing power possessed by the interpretation of any particular new topic in terms of such a conceptual framework is based on past applications of the same framework to a great number of other topics not now under consideration; while if any of these topics were questioned now, their interpretation in its turn would similarly rely for support on the interpretation of all the others. Evans-Pritchard observes this for Zande beliefs in mystical notions. "The contradiction between experience and one mystical notion is explained by reference to other mystical notions." The circularity of the theory of the universe embodied in any particular language is manifested by the existence of a dictionary of the language, If you doubt for example that a particular English noun, verb, adjective or adverb has any true meaning, an English dictionary dispels this doubt by a definition using other nouns, verbs, adjectives and adverbs, the meaningfulness of which is not doubted for the moment.

So long as each objection is defeated in its turn, its effect is to strengthen the fundamental convictions against which it was

raised. "Let the reader consider (writes Evans-Pritchard) any argument that would utterly demolish all Zande claims for the power of modes of oracle. If it were translated in Zande modes of thought it would serve to support their entire structure of belief". Thus the circularity of a conceptual system tends to reinforce itself by every contact with a fresh topic.

To the stabilising power of circularity we may add the capacity of a well developed interpretative framework to supply secondary elaborations to its beliefs which will cover almost any conceivable eventuality, however embarrassing it may appear at first sight. Scientific theories which possess this capacity are sometimes described as epicyclical, in allusion to the epicycles that were used in the Ptolemean and Copernican theory to represent planetary motions in terms of uniform circular motions. All major interpretative frameworks have an epicyclical structure which supplies a reserve of subsidiary explanations for difficult situations. The epicyclical character of Zande beliefs was shown above by the ready availability of eight different subsidiary assumptions for explaining a point-blank self contradiction in two consecutive answers of an oracle.

Thirdly, the stability of Zande beliefs is seen to rest on the fact that any new alternative conception would have to be built up on a series of supporting facts which can only be adduced one by one. A new conception like that of natural causation would require numerous relevant instances for its proper understanding. But these instances cannot accumulate in the minds of people if each of them is disregarded in its turn for lack of the concept which would lend significance to it. The behaviour of Azande whom Evans-Pritchard tried to convince that benge was a natural poison which owed none of its effectiveness to the incantations customarily accompanying its administration, illustrates the kind of contemptuous indifference with which we normally regard things of which we have no conception. "We feel neither curiousity nor wonder" writes William James "concerning things so far beyond us that we have no

concepts to refer them to or standards by which to measure them". The Fuegians in Darwin's voyage, he recalls, wondered at the small boats, but paid no attention to the big ship lying at anchor in front of them. (Principles of Psychology, Vol. II, p.110). This third defence mechanism of implicit beliefs may be called the principle of suppressed nucleation. It is complementary to the principle of circularity. Circularity protects an existing system of beliefs against doubts arising from any adverse piece of evidence, while suppressed nucleation prevents the germination of any alternative concept, on the basis of any single new piece of evidence.

Circularity combined with a readily available reserve of epicyclical elaborations and the consequent suppression in the germ of any rival conceptual development, lends a degree of stability to a conceptual framework which we may describe as the measure of its completeness. We may speak of the completeness of comprehensiveness of a language and the system of conceptions reflected by it - as we do in respect to Azande beliefs in witchcraft - without in any way implying approval of the system as a true belief.

5. We do not share the beliefs of Zande in the power of poison-oracles and we reject a great many of their other beliefs, by discarding mystical conceptions and replacing them by a naturalistic explanation. But we may question whether our rejection of Zande superstitions is the outcome of any general principle of doubt. If such a principle exists, it should be possible to detect it in the first place within science which the adherents of the principle of doubt regard as the best example for the operations of this principle. I shall now resume therefore in the light of our widened conceptions of belief, the question how far a tendency to doubt plays a consistent part in the advancement of science.

Every important discovery affects the existing interpretative framework of science. It strengthens some hitherto accepted

scientific beliefs by confirming them, and weakens, modifies or entirely replaces others, by the incorporation of new matter which contradicts or lies outside the scope of hitherto accepted conceptions. Thus science may advance by the assimilation of fresh topics within its existing system or by the adaptation of its existing system to the nature of fresh topics; the first is a conservative act, the second a process of reform.

Looking back on the past centuries of progress in natural science, it is clear that every great discovery entailed processes both of the first and the second kind. Fundamentally, every scientific discovery is conservative in that it maintains and expands the system of science as a whole, and to this extent confirms the scientific view of the world and strengthens its hold on our minds; but no major discovery can fail also to modify the outlook of science, and some have changed it profoundly. A number of revolutionary discoveries, like those of gravitation or the circulation of the blood, or like those of the genes, quanta, radioactivity, relativity, come readily to mind. Might it not be true to say then that the assimilative process merely conserves science, while the true innovations consist in the adaptive process by which the framework of science is reformed? This sounds plausible, but it is not true. The power to expand hitherto accepted beliefs far beyond the scope of hitherto explored implications is an eminent force of discovery. It is this force which sent Columbus in search of the Indies across the Atlantic. His genius lay in taking literally and as a guide to practical action that the earth was round, which his contemporaries held vaguely and as a mere matter for speculation. The ideas which Newton elaborated in his Principia were widely current in his time; his work did not shock any strong beliefs held by scientists, at any rate in this country. But again his genius was manifested in his power of casting these vaguely held beliefs into a concrete and binding form. As another example we may take the atomic theory of matter which was

first introduced into modern science by John Dalton in 1805 for the explanation of the laws of chemical combination. The theory was soon universally accepted; yet 80 years later Van t'Hoff met with considerable opposition by deriving from it the assymetrical arrangement of the four different substituents attached to a carbon atom. Though he had thus merely envisaged in concrete terms what was implicit in notions generally accepted at his time, he was jeered at by the great Wislicenius for having borrowed Pegasus from the stables of the Veterinary Academy at which he was then an instructor. The advent of modern atomic physics, starting with the discovery of the electron by J.J. Thompson, was due to repeated flights of scientific imagination which derived new aspects of Dalton's theory, far beyond its previously apparent perspectives. One of the greatest discoveries of this age, that of the diffraction of X-rays by crystals (in 1912) was conceived by a mathematician, Max von Laue, by the sheer power of believing more concretely than anyone else in the current theories both of crystals and X-rays.

The assimilative power of an existing scientific framework thus appears no less creative and offering no less scope for the application of scientific genius, than its capacity to sprout into new and entirely unexpected forms. Indeed the conservative and the reforming aspects of discovery are always combined. We have assimilation to the extent to which new conceptions form an extension of the old and innovation insofar as the new stands in contrast to the old. The two principles are but two aspects of any creative advance in natural science.

What room does such a picture leave for the operation of a principle of doubt? Is doubt a true guide to scientists in choosing whether to lean more towards 'assimilation' or 'innovation'? Does not the proverbial scientific caution teach scientists to be harder to convince than are other people?

The opinion is widespread. But the exercise of special caution is not peculiar to the scientist. The practice of every

art must be restrained by its own form of caution. The precision of the lawyer, the poet's fastidiousness, the sculptor's touch, are as many restraints by which these various professions are guided. Naturally, the scientist is also trained to exercise his own manner of restraint, as part of his distinctive art, which is the art of discovery.

Caution is commendable in science, but only insofar as it does not hamper the boldness on which all progress in science depends. But there is no rule to tell us at the moment of deciding the next step in research what is truly bold and what merely reckless, and we can therefore have no rule either how to distinguish at such a moment between doubt which will curb recklessness and will qualify as true caution, and doubt which cripples boldness and will stand condemned as unimaginativeness or dogmatism. We call 'caution' only that kind of doubt which we consider to be, or to have been reasonable. Hence 'doubt' described as 'caution' acknowledges our appreciation of a successful operation of doubt, without telling us how to achieve such success. We call it true boldness on the part of Einstein that he accepted uncompromisingly Mach's critique of the concept of absolute motion while we praise his caution in rejecting Mach's critique of the reality of atoms. But no principle of doubt could have told him to accept the one and reject the other. 'Caution' is a form of approval, masquerading as a rule of procedure.

There is one instance on record - by which I may demonstrate this point - of a scientist who tried to apply the principle of doubt in an explicit form. This was the Swedish professor Cleve to whom Svante Arrhenius, then a student, first presented his theory of electrolytic dissociation. Arrhenius has told the story how Cleve said "This is very interesting" and then "Goodbye". Later Cleve explained that there were so many theories formed and these were almost certain to be wrong, for after a short time they disappeared and therefore by reasoning on statistical lines

he concluded that Arrhenius' theory would not exist long either. (E.N. da C. Andrade, Enc. Brit. 14th Ed., article on Arrhenius).

Resistance against the conceptual reform suggested by Arrhenius was widespread and violent among chemists, who thought it absurd to assume that free particles of highly reactive metals like sodium or potassium could float about in water without instantly decomposing it. Yet in a few years' time electrolytic dissociation became so firmly accepted, that its further history offers an excellent example for the extraordinary stability of scientific conceptions in the face of invalidating factual evidence. Arrhenius had postulated a chemical equilibrium between the dissociated and the undissociated forms of an electrolyte in solution. From the very start the measurements showed that this was true only for weak electrolytes like acetic acid, but not for the very prominent group of strong electrolytes, like common salt or sulphuric acid. For more than 30 years the discrepancies were carefully measured and tabulated in textbooks, yet no one thought of calling in question the theory which they so flagrantly contradicted. Scientists were satisfied with speaking of the 'anomalies of strong electrolytes', without doubting for a moment that their behaviour was in fact governed by the law that they completely failed to obey. I can still remember my own amazement when around 1919 I first heard the idea mooted that the anomalies were to be regarded as a refutation of the laws postulated by Arrhenius and to be explained by a different theory. Not until this alternative conception (based on the mutual electrostatic interaction of the ions) was successfully elaborated in detail, was the previous theory generally abandoned.

Contradictions to current scientific conceptions are often disposed of by calling them 'anomalies'. This is among the most handy assumptions in the epicyclical reserve that is available for the adaptation of any theory, in the face of adverse evidence.

We have seen how Azande make use of similar adaptations to meet the inconsistencies of poison-oracles. In science this process has often proved justified by subsequent re-interpretations of the original theory which explained the anomalies.

Another example may illustrate the reverse case, namely when a series of observations which at one time were held to be important scientific facts, were a few years later completely discredited and committed to oblivion, without ever having been disproved or indeed newly tested, simply because the conceptual framework of science had meanwhile so altered that the facts no longer appeared credible.

During the first three decades of this century numerous observations were reported on the power of rigorous drying to stop chemical reactions and even to change the boiling point of such wellknown substances as benzene - raising it by as much as 30°C. Some very striking experiments of this kind were publicly demonstrated in England, while other no less curious instances were described by very distinguished scientists in Germany. There was little doubt at the time that these observations were substantially correct and they were hence quite naturally, considered of great interest to science. Today these experiments are almost forgotten. The published data are still there and some textbook still carry them, for example Thorpe's Dictionary of Chemistry, published in 1932, still reports them as well-established facts. But it is generally understood now that these findings are not true, as the conception of chemical reactions that has since gained acceptance no longer leaves room for such phenomena. This being so, our attitude towards these experiments is similar to that of Azande towards Evans-Pritchard's suggestion of trying out the effects of oracle-poison without an accompanying incantation. We shrug our shoulders and refuse to waste our time on such obviously fruitless enquiries. The process of selecting facts for our attention is the same in science as among Azande, but I believe that science is more often right in its application of it.

6. A system of implicit beliefs can be effectively impaired only by adopting a new language which implies a different set of beliefs. The examples which I have just given from the history of science show that even in science, controversial questions are not decided within a fixed system of pre-suppositions, but that their settlement usually involves some modification of the existing interpretative framework. This is true with much greater force for the major movements of thought outside science, including the rise of science itself, which should be classed among these movements. The people who partook in the great religious revivals of the Reformation and Counter-reformation saw themselves surrounded by evidence of supernatural forces. The Christian revelation; the miracles performed by the saints; the manifest intervention of Providence; the apparitions and tricks of the devil and his exorcisation by sacred rites; the great scheme of salvation and retribution in after-life; witchcraft wielding black magic; astrologers reading the influence of the stars and revealing the portents carried by comets; such appeared to be the most striking and important features of the universe to the normal religious person about the middle of the 16th century. He thought and spoke in terms which implied their reality. Yet the rise of rationalism, inaugurated by the publication of Montaigne's essays, was soon to call in question the whole of this system of conceptions and re-interpret the evidence which had hitherto supported it, in terms of natural causes. Rationalism adopted the framework of natural science which was developing at this time and generalised into a world view from which the supernatural was eliminated. By the middle of the 18th century the French Encyclopaedists had completed the new framework which expressed everything in terms of natural causes. It denied by implication, as its adherents also denied explicitly the reality of all supernatural phenomena. The new logical situation is summed up in Laplace's postulate of the determinability of all future and past events from a complete knowledge of the relevant mechanical data which, as he said, leaves no room for God in the universe.

Similarly, the great conflict dividing the world today is expressed in the rival claims of two different languages. It began when the language of the Declaration of Independence was challenged by that of the Communist Manifesto. In our own days the influence of Wilson's and Briand's European appeals were defeated in Eastern and Central Europe by a new Marxist and National Socialist terminology, which denied reality to the ideals embodied in the vocabulary of Eighteenth and Nineteenth Century liberalism and replaced them by modern materialistic conceptions of man, history and politics. These are the two alternative conceptions of human affairs to which E.H. Carr in his 'Twenty Years' Crisis' gave the names of Utopianism and Realism.

The current form of Realism is the Marxist doctrine which since the Russian Revolution has developed into a comprehensive system applicable to every topic. Arthur Koestler tells on "The God that Failed" how completely the interpretative framework of Marxism - which he had accepted during his Communist period - covers any conceivable contingency, so that no events could possibly refute it. George Orwell embodied this fact in his fantasy of a totalitarian utopia (1984) in which the ruling party makes its position impregnable by a suitable linguistic reform. They reduce the permitted vocabulary in such a fashion that subversive ideas can never again be given verbal expression.

7. The examples which I gave in the previous Lecture of the hide-bound resistance of scientific scepticism to such facts as meteorites and hypnotism can be perhaps better appreciated now in the terms of the present analysis. The conceptual system of natural causes, of which natural science forms part, had matured by successfully denying reality to a large variety of phenomena which were hitherto interpreted in supernatural terms. It disregarded for centuries a great mass of data which it could not fully interpret in its own terms. Lecky tells in his History of

Rationalism in Europe how rich was the factual evidence collected by the end of the 16th century for the prophetic character of comets. It was quite sufficient, he says, to convince even somewhat reluctant minds, had not the supernatural character of such an interpretation been strictly repudiated beforehand. Glanvil who was among the founders of the Royal Society, violently attacked rationalists for disbelieving in witchcraft, though on their own principles of relying on factual testimony they must have recognised that the evidence for the power of witchcraft was overwhelming. In these and many similar cases the firm refusal of science to accept the facts in question at their apparent value had soon been fully justified. When Halley predicted the revolution of the comets, they were at once absorbed by the domain of natural causes and belief in their prophetic powers was overthrown Within half a century of Glanvil's writing the prosecution of witches was made illegal in England. Such triumphs firmly established the tradition of rationalism to ignore any facts which seemed to call for a supernatural interpretation.

The reality of meteorites and of hypnotism were accepted only when the facts could be fitted into the scheme of natural causes. This could be done easily enough for meteorites by extending the range of existing planetary bodies to include swarms of small stones which flared up in passing through the terrestrial atmosphere. A considerable conceptual reform was needed in order to grant a legitimate standing to hypnotic phenomena in science. But in either case the facts once accepted were stripped of any supernatural implication.

It is indeed obvious that if a miraculous performance - like the conversion of wine into water or the resuscitation of the dead - could be experimentally verified, its miraculous nature would be strictly disproved. Similarly (though this may not be so obvious) any evidence of a supernatural event which would satisfy the standards of observational science, would necessarily destroy

our belief in the supernatural quality of the event. For to the extent to which an event can be observed in the terms of natural science, it belongs to the natural order of things. Once it is wholly recorded in observable terms, the event, however monstrous and surprising it may be, has been wholly accepted without recourse to a belief in the supernatural and has in fact ceased to be regarded as supernatural. Observation may give us clues which nurture our belief in God; but any scientifically convincing observation of God would be an affirmation of idolatry, since it would tell us to worship a mere object or natural person.

8. I have mentioned in Lecture 5 the paradox that the proof by which any particular theorem of a deductive system is established seems to depend on the previous acceptance of a set of axioms which often do not have in themselves any greater and maybe even less convincing power than the theorems derived from them. This paradox points towards a fallacy. It is an error to assume that we accept the theorems of a deductive system only because they can be proved from the axioms. The division of the asserted sentences of such a system into axioms and theorems is largely conventional, for we can replace some or all of the axioms by theorems and derive from these the previous axioms as theorems. Since such a transformation transfers our unproven beliefs from one set of statements to another, we can see that it is not our acceptance of any particular set of axioms without proof that lends force to the derivative parts of the system but that we give our acceptance to the system as a whole, irrespective of which part of it is to be derived from the other. A set of axioms ~~which~~ is accepted because it appears to imply a convincing set of theorems and we accept theorems because they can be derived from acceptable axioms; the two kind of acceptances are mutually determined and jointly comprise the acceptance of the theory as a whole.

The paradoxity of this procedure is eliminated by recognising deductive systems as embodiments of implicit beliefs, which cannot properly be given explicit expression. The stability of interpretative systems embodying implicit beliefs rests on their circularity. If the system is consistent and complete any particular allegation of it can be proved by deriving it from other allegations of it that are not doubted for the time being. Such a process relies at every step on the deductive system as a whole and our every use of the process affirms therefore by implication our acceptance of the system.

Deductive systems are set out in symbolic terms which constitute their language. Certain elements of this language, which can be chosen in different alternative ways, are accepted as undefined terms. The scope of the system increases with the range of the undefined terms. The propositional calculus and elementary geometry are two comparatively narrow systems. In the propositional calculus you can speak of the logical relation between affirmations but can never actually affirm a particular sentence such as 'cats have whiskers'. In elementary geometry you are restricted to demonstrations by ruler and compass. In this idiom you cannot define numbers. This situation represents in an elementary fashion the limitation imposed on our universe of discourse by the adoption of any particular idiom. Every language necessarily ignores the domains that it cannot interpret.

9. Yet our beliefs, even when deeply embedded in the very wording of anything that we can say, are not entirely stable. The natural sciences are ever in a state of tension in search of new discoveries by which science is continuously trying to improve its idiom towards greater precision, coherence and appositeness to the facts. Mathematics are kept in turmoil by similar endeavours, the searching for more rigorous standards of proof, the discovery of inconsistencies and efforts to eliminate them, the undertaking of ever new interesting constructions. The tensions which give

rise to changes in man's general outlook have their origin within the whole sphere of human intelligence. Articulation always remains incomplete and unsatisfying. The forces which primarily actuate human articulation will therefore continue to struggle for new forms of articulation. This is the process by which our implicit beliefs are continuously challenged.

But in the transition from one idiom to another we are never left without any idiom. Indeed, never is man more vividly articulate than in such periods as, for example, the rise of rationalism, when a new conceptual framework is created. Nor do people suddenly start speaking in an entirely new vocabulary. The remoulding of language is carried on within the existing language. The gradual renewal of conceptions is reflected by a modified usage of existing terms by the obsolescence of some expressions and the invention of some new ones, so that the language retains its overall identity during every phase of its renewal. The process of doubting the implications of a language goes on within the very language which is being reformed by doubt.

10. The doubting of implicit beliefs involves therefore no reduction in the volume of beliefs but is an acceptance of new beliefs in place of those previously held. A similar conclusion was reached in the last lecture in respect to the doubting of explicit beliefs. We may now say therefore that it holds for all manner of belief. But so far we have only examined the doubting of particular beliefs, and not what Descartes set out to do when he proposed to call in question all his hitherto accepted beliefs. In the next Lecture I shall complete my critique of doubt by passing from the examination of particular doubts to that of a comprehensive or universal doubt.