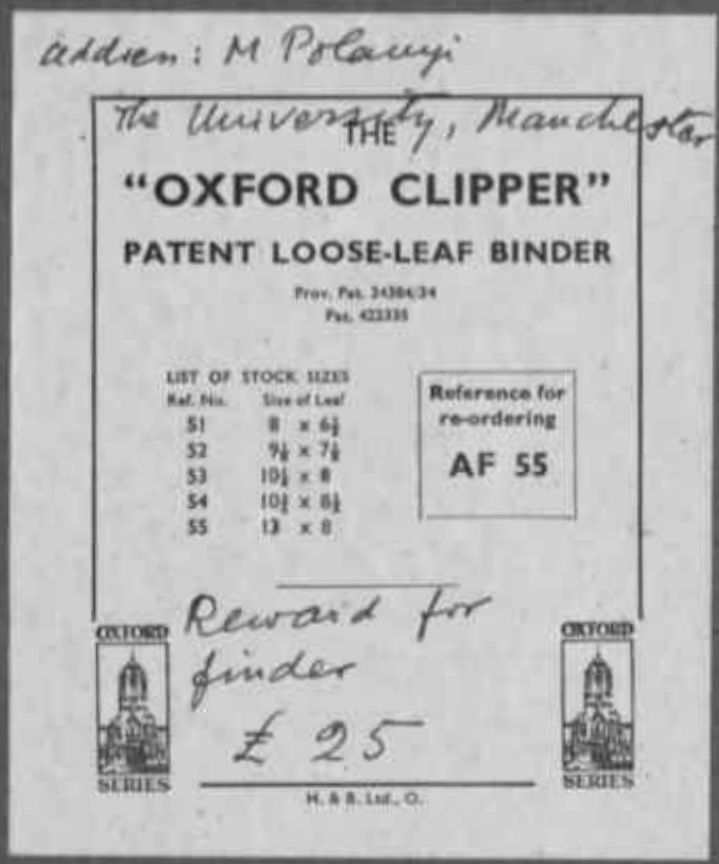
To Marjorie, in grateful memory of our wonderful partnership: 1950 – 57

May 1957 Michael



7 May 1951.

GIFFORD LECTURES.

Lecture 1.

The Necessity of Philosophy. a.) Forms of Intelligence.

1. Fifty years ago philosophy seemed to be passing under the same kind of shadow under which religion has gone since the French Enlightenment. Comte's positivism had taught that philosophy was to be replaced by science and by the turn of the century this view had gained wide popularity which persists up to this day. These lectures are largely concerned with declaring that this was a mistake. I shall urge that philosophy is indispensable and must be emphatically reaffirmed today. It is perhaps what matters most to us just now. The pretensions of science must be curbed; religion is not, or perhaps not yet again, our main source of convictions; philosophy must voice to-day our decisive beliefs.

2. There exists a plausible argument that philosophy as distinct from science and logic cannot exist. It points out that philosophy consists of declaratory statements and goes on to say that all such statements are either analytic or empirical. The first kind (which are sometimes described as tautologies) have their place in mathematics or - what is the same thing - in logic; also in dictionaries. The second are about facts and say that these are such and such. 'It rains' 'Napoleon is dead'. It is pointed out that Neither kind of statement is philosophic, and hence philosophy cannot be meaningful. But it may be asked whether this ~~conclusion~~ argument itself is either analytic or empirical. If 'declaratory statements' are by definition either tautologies or references to fact, then analytically we could not go beyond saying: there is a class the elements of which are either tautologies or references to fact and philosophy is not in this class. From which the condemnation of philosophy does not follow and would follow only if we could add that only elements of this class are meaningful; but this is not entailed in the definition of the class. Indeed, such

force as this argument against philosophy might possess can only spring from the premiss that all forms of speech which are neither tautologies nor references to fact are illusory and ~~this~~ such a premiss ~~is~~ would not be a tautology. Nor can ~~it~~ such a premiss be said to be derived from experience, since according to some people, namely the philosophers, experience points to the contrary. An argument which purports to show that their experience cannot be authentic cannot appeal to experience, without begging the question at issue, which is now whose experience is to be relied on. Thus the statement that all declaratory statements are meaningless unless they are either analytic or empirical discredits itself and this self-contradiction proves that it is not true. It presents therefore an example of a class of declaratory statement that is neither analytic nor empirical and is yet not without meaning. We shall see later that philosophic statements ~~actually do belong to such a class~~ ~~though by that time we shall no longer describe it in these terms.~~

3. However, this self-betrayal of the philosophy-to-end-all philosophy, by which it is revealed to be itself a philosophy, gives little satisfaction. It still leaves us with the task of defining the true place of philosophy. With this in mind I propose to ~~We must~~ draw up a map of man's intellect and go forward with its guidance towards this aim. In doing this we shall have to bear in mind that the performance of this mapping must eventually be found to conform to the implications of our map. Any attempt to represent on a map the process by which the map is being drawn up must lead to an infinite regress. But such a regress can be broken off by a realisation of its scope, so long as this realisation does not claim anything that would demand confirmation by further reflection. We see here regress can be ...

provided that this realisation is not of such a nature that it requires confirmation by further reflection. We see here adumbrated a basic dilemma of philosophy. It must claim enough justification for the conclusions of human thought ~~so as~~ to avoid discrediting its own performances, while avoiding to claim such demonstrability for them that its pronouncements when considered critically ~~seen in their own light~~ would demand an infinite regress for the purpose of their own confirmation. At every stage of these Lectures I shall labour at

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3. However, this self-betrayal of the philosophy-to-end-all-philosophy, by which it is revealed to be itself a philosophy, gives little satisfaction. It still leaves us with the task of defining the true place of philosophy. With this in mind I propose to draw up a map of man's intellect and go forward with its guidance to find the true place of philosophy within the orbit of our mind. In doing this we shall have to bear in mind that the performance of this mapping - which is itself a feat of intelligence - must eventually be found to accord with our map. While any attempt to represent on a map the process by which the map is being drawn up must lead to an infinite regress, such a regress can be broken off by a realisation of its own scope, provided that this realisation is not of such a nature that it requires confirmation by further reflection. We see here adumbrated a basic dilemma of philosophy. It must claim enough justification for the conclusions of human thought ~~so as~~ to avoid discrediting its own performances, while avoiding to claim such demonstrability for them that its pronouncements when considered critically ~~seen in their own light~~ would demand an infinite regress for the purpose of their own confirmation. At every stage of these Lectures I shall labour at

the attempt of establishing a position which avoids this dilemma. If I succeed in this, the performance of my mapping of the human mind will indeed be found in the end to conform with the picture of the human mind indicated by my map.

4. The map which I shall first draw up will not claim to be definitive. For my first draft will inevitably have to ~~express~~ imply some of the philosophic ideas which it will be my purpose to establish in the end; and naturally, these ideas will not appear ~~in their final form to start with, so that as they come to maturity~~ in the course of the whole argument. What has been said at the present stage provisionally will have to be re-interpreted and expanded in conformity to the position which I shall reach in the end. We may recall that while Columbus relied on Toscanelli's map of the world in support of his project, his discoveries eventually ~~changed this map beyond recognition.~~

5. It is an important fact that without the use of language there could be no philosophy. And it is also true ~~in consequence~~ therefore that the errors of philosophy could never have been committed except in the idiom of language. Animals, however intelligent, never seem to perform anything that could be called philosophising and hence are superior to humans in that they fall into no philosophic fallacies. This accounts for the linguistic movement in philosophy which sets out to control the formation and use of language so as to prevent philosophic error - with more than a suspicion that there ~~would be little left of philosophy after its linguistic purification.~~ The natural immunity of animals from philosophic error may serve as a guide in marking out the region of intelligence which shall be represented in the first place on our map. It should lie safely above the level of sub-intellectual processes and yet be equipped with no verbal instruments. This points to the ~~intelligent performances of animals.~~

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To this I shall yet revert; for the moment I shall accept the natural immunity of animals from philosophic error as my guide in marking out the region of intelligence which

shall be represented in the first place on our map. It should lie safely above the level of innate sub-intellectual processes and yet be equipped with no verbal instruments. This points to the intelligent performances of animals, achieved by trainin-

~~6. The field of inarticulate intelligence which can be new safely studied by the observation of animals may be divided into three parts. The performances which are observed in this connection are not necessarily carried out intelligently. They can be considered intelligent only if they are (or to the extent to which they are) learned and not innate. We shall refer to three classes of learned performances of an inarticulate kind.~~

after a red light is flashed in its sight, has grasped a sign-event relationship. A rat which knows how to acquire a food pellet by depressing the lever of an apparatus which delivers it, has invented a manipulation. Another rat which has learned a maze and takes a short cut when it finds a path open which is usually closed to him, has acquired a mental map of the maze by which it knows its way about the place. In describing these cases I have deliberately chosen the language I employed, including terms like expectation, invention, knowledge, etc. This use of the vernacular will have to be justified later against the charge of unnecessarily and perhaps unjustifiably introjecting mental processes which are not open to direct observation. Meanwhile I shall carry forward the threefold division of inarticulate intelligence as the cognition of (1) sign-event relations, (2) means-ends relations and (3) alternative part-relations.

7. The logical distinction between these three divisions will be sharpened if we pass on from the field of inarticulate to that of articulate intelligence. The latter falls readily into three great provinces, each of which has its own inarticulate foundation. I shall designate the three forms of articulate intelligence as (1) observation (2) invention (3) interpretation. ~~To make~~

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6. The feats of inarticulate intelligence acquired by training are of three kinds.
(1) Recognition of a sign-event relationship. (2) Invention of a successful manipulation. (3) Getting to know one's way about a place, or as between the parts of an intricate object. At this stage it should be enough to illustrate each class by one example. A dog which is trained to expect an electric shock immediately after a red light is flashed in its sight, has grasped a sign-event relationship. A rat which knows how to acquire a food pellet by depressing the lever of an apparatus which delivers it, has invented a manipulation. Another rat which has learned a maze and takes a short cut when it finds a path open which is usually closed to him, has acquired a mental map of the maze by which it knows its way about the place. In describing these cases I have deliberately chosen the language I employed, including terms like expectation, invention, knowledge, etc. This use of the vernacular will have to be justified later against the charge of unnecessarily and perhaps unjustifiably introjecting mental processes which are not open to direct observation. Meanwhile I shall carry forward the threefold division of inarticulate intelligence as the cognition of (1) sign-event relations, (2) means-ends relations and (3) alternative part-relations.

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~~clearer what~~ These terms shall ~~mean let me restrict their bearing~~ for the moment ~~so as to~~ exclude any reference to human affairs. Subjects like Education, Law and History are thereby set aside. Thus 'observation' is restricted here to the kind of things an animal may be concerned with in a conditioning experiment. At the highest articulate level 'observation', even when so restricted, includes the whole of the natural science. For experimental conditioning amounts from the animal's point of view to a process of inductive reasoning, ~~similar in kind to that on which all inductive science is based.~~ and an animal recognising a sign-event relationship is producing therefore a primitive form of observational science. Next I define the term 'invention' so that it ~~includes~~ applies ~~but does not exceed in scope~~ at the highest level to the type of ingenious and useful manipulations which are described in patents. ~~This~~ We exclude~~s~~ once more the field of human affairs which would bring in such 'inventions' as the Constitution of the United States. ~~It should~~ We shall also exclude such 'inventions' as language or numerals, which will come up presently under the heading of articulation. ~~This delimits~~ The term 'invention' ~~to apply accordingly to all comprising in it acquired skills, which in their higher ranges include the whole of man's technical proficiency, while at their lower end is illustrated by primitive dexterities like swimming or the use of simple tools.~~ comprises such as is equivalent to all aspects of material technology.

While the two classes of articulate intelligence, Observation and Invention, appear fairly homogeneous and readily identifiable (at least in a provisional manner) the meaning of the third class, Interpretation, is less easy to construct. If the first two ~~correspond to empirical~~ culminate in scientific discovery and ~~manipulative~~ technical invention, what is the characteristic ~~is the distinctive character~~ achievement of the third? I suggest that an animal which establishes intellectual control over a state of affairs, as when it gets to know its way about in a maze or discovers how to uncoil a rope slung around a pole, has gained access to a set ~~an indefinite range of novel~~ of true inferences. It can evaluate its knowledge of the maze for example in an indefinite number of ways deriving from it a wide range of practical

implications. The ~~scope~~ array of these is described in the behaviouristic language as a "habit-family hierarchy". ~~These~~ Such a set of implications emerge in a manner essentially similar to that by which an indefinite range of theorems is derived within a deductive system. We may compare in particular the implications drawn out by an animal possessing the knowledge of a maze to the tracing of new itineraries on a map. Essentially, such itineraries are the solutions of geometrical problems. ~~For~~ A road map is a network of lines passing through a number of dots representing towns and the tracing of useful itineraries amounts to the finding within this network of the shortest lines which connect any particular two dots. Thus the higher equivalent of the kind of alternative part-relationship that is acquired by an animal by running a maze, may be found in geometry or more generally in the deductive sciences. The process of inference carried out within these sciences represents indeed at least part of the meaning which I shall attach to the term 'Interpretation'. I shall supplement this meaning further after carrying out a survey of the process of articulation by which the lower tacit forms of intelligence are transformed into their higher explicit equivalents. To this survey I shall now turn.

8. There are many intellectual performances which inevitably rely on the use of symbols. Unless you are a prodigy in mental arithmetics you cannot multiply 765439 by 5.37249 except by manipulating the symbols representing these two figures according to a definite set of rules. The manipulation may be done by a machine, run by an electric motor. It may be doubted whether an intellectual performance may ever be wholly carried out by operations on symbols, and ~~on the other hand symbolic functions can be detected or at least construed within apparently quite inarticulate feats of intelligence. The nature of these limiting cases will have to be carefully studied at a later stage. Meanwhile~~ I shall come back to this question in a moment; but meanwhile we may continue to use the broad division on which we have hitherto

relied between the inarticulate and the articulate domain of intelligence and enquire with this in mind to which of these two domains the process of articulation itself belongs.

A glance at the salient facts of the case readily yields the answer to this question. Whenever we introduce a symbol by explicit definition, for example when i multiplied by itself yields -1, we are performing a feat of articulation by the aid of an articulate operation. But articulation can obviously not be based wholly on explicit definitions. In fact articulation is fundamentally inarticulate. A Hungarian dictionary in which each word is explained in Hungarian will convey no meaning whatever to a person who does not know any Hungarian. The forming of artificial signs and the establishing of their meaning is necessarily based in the last resort on intellectual processes which make no use of signs. We realise this if we imagine each term of a language - say each symbol of mathematics - successively replaced by its definition, given in the same language. We may thus reduce the vocabulary of our language up to a point, but presently we will have to stop, for the definition of the still remaining terms would require the re-introduction of those already eliminated. Thus one arrives at a minimum vocabulary of undefined terms, forming a kind of basic language. In mathematics and logic, and in the formalised deductive sciences in general, this reduction of the vocabulary has been carried out carefully and it appeared that any given language can usually be reduced to a number of different alternative sets of basic undefined terms. So long as this is kept in mind we may call any of these sets <u>the</u> basic language, without suggesting that it is the only such language.

The fundamental achievement of articulation lies therefore in the acquisition of a minimum vocabulary forming the basic language. This is the primary task of a child learning to speak. It relies on the imitation of adults whose capacity to speak the child guesses or senses by virtue of its own latent powers of speech.

The child guesses the nature of articulation and guesses the meaning of various parts of speech from the circumstances in which they are uttered, aided particularly by the gestures which accompany their utterance. This guesswork is done by the infant while it is still inarticulate, and hence it falls clearly within the province of inarticulate performances. It is indeed obvious from every angle that the trunk which connects the inarticulate roots of intelligence with its articulate crown itself bears predominantly the character of the roots. I shall now show that articulation involves a peculiar combination of all three basic inarticulate performances.

9. In referring here to the process of articulation I am trying to define its logical nature rather than describe its psychology. I feel free therefore to choose as my example any system of artificial signs, be they words, numbers, maps or even paintings, representing some recognisable objects. Nor do I need to cover at this stage all kinds of articulation, but only such as link inarticulate intellectual forms to their articulate descendants. Articulation in this sense consists in the first place in the doing of certain things which either leave a permanent trace, like a notch on a particular tree trunk, or else can be recognisably repeated, like the beating of a drum, the uttering of a brief sequence of sounds, or the tracing of a simple figure. All these actions and their traces will be referred to as "utterances".

The identifiability of a thing at consecutive moments of time, as well as the repeatability of an action and the reproducibility of identifiable signs of any kind, involve an important range of philosophic problems which shall be dealt with within a general inquiry into the nature of our references to gestalt. For the moment I shall simply assume that identifiable utterances can be produced. Utterances constitute articulations only if they have an interest beyond themselves. A tune whistled for the fun of it or a purely decorative visual pattern is not an articulation, for

 See however Lecture 2. p. 13.

its interest lies wholly in itself. An articulation is an identifiable utterance which functions as a sign. It must stand for something which otherwise would remain inarticulate and may ~~stand~~ in particular for a refer to objects, actions, qualities or relations between these. This implies a consistent relation between the utterance and that which it stands for or more particularly that to which it refers. ~~I shall~~ We may call this a semantic relation and call ~~and~~ the establishing of this relation ~~I shall call~~ a semantic function. Our conception of the consistency of the semantic relations which the user of a sign sets up between his own utterances and the things they mean to him, again raises philosophic questions which will have to be set aside until later. For the moment we ~~shall accept it~~ may limit ourselves to accepting that utterances may be established, which refer to all manner of things (and relations between things) which animals can be trained to anticipate in the sequel of an appropriately conditioned stimulus. The semantic function thus defined may be called <u>denotation</u> or <u>designation</u>. We shall say that an utterance can perform ~~or stand for a designation~~ if it is consistently used for referring always to the same or similar designates.

Accordingly, the act of establishing a new denotation may be regarded as a process of self-conditioning. A man who invents a new symbol, performs a repeatable action in a manner which conditions it to the occurrence of a particular thing, and so the action comes to stand for that thing, as its symbol. L.G. Humphreys observed that subjects trained to shut their eyes when the light was switched on, reacted in the same manner to the word 'light' though the room remained dark. Intensive training can even establish pupillar contraction in response to the spoken word 'light' or even to its mere recollection by the subject. Designation may be regarded therefore as a distinctive combination of a means-ends performance with the establishment of a sign-event relationship.

This description reveals directly a remarkable property

possessed by symbols in contrast to other signs, which makes them so very useful in the service of human intelligence. They can be handled at will. We need not wait for ~~them~~ these signs to appear in the course of nature or by the action of other people, but can reproduce them ourselves and handle them in various ways.

This possibility gains its full importance when we exploit it for the performance of processes of inference based on the handling of symbols. Indeed, the chief purpose of denotation (apart from its use for communication to which I shall turn later) lies in supplying the tools for symbolic operations. The tremendous advantage of the modern denotation of numbers over the Roman numerals in facilitating arithmetic calculations illustrates how essential it is for a symbol to be shaped for effectiveness in symbolic operations. A more detailed demonstration of this advantage will be given in a moment.

The operation of symbols is itself of course not carried out by the operation of symbols, but is again an inarticulate performance. It transforms the symbolic representation of something into another partly or wholly equivalent symbolic representation of it; so that the latter representation can be said to be implied by the former. It embodies a sustained effort for the recognition of alternative aspects of the same comprehensive state of affairs and is thus essentially germane to the kind of intellectual performance involved in learning one's way about a maze or in realising how to uncoil a rope. It demonstrates a practical knowledge of alternative part-relationships.

The intellectual fruitfulness of symbolisation followed by symbolic operation, may be illustrated in an elementary fashion by the process of mapping and map-reading. This example will also lend support to what I have said about the relationship of symbolic operations to maze-learning.

The first principle of all symbolic operation consists in the setting out of a state of affairs in a manner which makes it

possible to 'know one's way about it'. The geography of a country can be represented for this purpose by the process of mapping. This is not the only possible symbolic representation of a country's geographic features, but it is the only one which can be readily used for symbolic operations. Suppose you are given a list of the most important 200 place names in England with their exact longitudes and latitudes, which could be set out in close type on one ~~double-size~~ octavo page. The page would represent a complete symbolic designation of the positions of the main habitations of England, but the labour of finding one's way by it - for example of deriving from it the shortest itinerary from Shrewsbury to Newcastle - would be prohibitive. If instead we mark by their position on a sheet of paper the geographical position of the 200 places, we have a map in which any required itinerary will be recognisable at a glance. Roughly speaking, the original 400 positional data (200 longitudes and 200 latitudes) will yield by the process of mapping $\frac{200 \times 200}{2} = 20000$ itineraries. The total information thus derived will in fact be much ampler since each itinerary will comprise on the average ~~perhaps~~ about 50 place names. We might perhaps estimate the output of the derived information at a million items which would be 2500-times the input. When such vast powers are generated by as crude a thinking machine as our map would be, we realise the immense scope of intellectual force gained by articulation. Moreover, the contrast between the relative uselessness of the printed list of place-names and positions, as compared with the effectiveness of their designation on a map, illustrates once more how much the power of articulation depends on a suitable choice of symbolism.

10. Let me now briefly illustrate how articulation helps to expand the several fields of inarticulate intelligence and gives rise to the articulate performances which I have called Observation, Invention and Interpretation.

The supreme example of systematic observation is natural science. Though we may acquire much knowledge in life which is not expressed in words or figures, the process of articulating our thoughts is indispensable to the achievement of any systematic body of knowledge, such as science. Articulation enables us to collect material for systematic surveys which could otherwise not be carried out. By taking notes we greatly expand our memory and cast it in a form which can be rearranged at will. Certain more formal operations lead to the exact sciences. By certain manipulations called measurement we ascribe numbers to events or objects - for example the elevation and time of transit characterising the position of a star - and these numbers are then represented as points on graphs or as the values of mathematical functions. Measurements mapped out mathematically are the very substance of exact science.

Inventiveness is also much aided by articulation. The inventor's sketchbook is his laboratory. There is a standard experiment to test inventiveness in which a person is confronted with two ropes hanging from the ceiling and almost reaching to the floor, the points of suspension being so far apart that while holding the end of either rope in one hand you cannot reach the other rope as it hangs straight down. The task is to tie the two ends of the ropes together. People who failed to discover how to do this, readily found the solution when they drew a picture on paper of the arrangement set up in front of them. In this case articulation does not assist memory but pictures the essentials of a situation on a reduced scale, which lends itself more easily to imaginative manipulation than did the rather ungainly original.

Mathematics is of course pre-eminently the knowledge embodied in symbols. Indeed there has been a notorious attempt by Hilbert - to which I shall later return - to reduce mathematics to nothing but a handling of symbols. However, Hilbert's attempt failed and we may take it therefore that mathematics is about things that

are meant by its symbols. That being the case we may regard as essential in mathematics the enhancement of our powers of reasoning by the symbolisation of a problem in mathematical terms. Here is an example. If we are told that Paul is 1 year less than twice the age of Peter, while the difference between their ages is 4, we cannot tell the ages of Paul and Peter without first setting out the situation in symbolic terms: "age of Paul x, age of Peter y, $x = 2y - 1$ and $x-y = 4$", and then operating on these symbols according to the rules of a calculus. Thus we obtain $x = 9$, $y = 5$, which we re-translate into: Paul is aged 9, Peter is aged 5. While all symbolic operations are designed to assist our powers of inference, mathematical operations do this most effectively provided the case can be properly represented as a mathematical problem. While the science of mathematics is concerned with setting up and solving mathematical problems, without paying any attention to the question whether there exist any practical problems which could be represented in these terms, it has often happened that mathematical conceptions originally established for their own sake and mathematical theorems derived in terms of them have later found quite unforeseen applications in practice. I shall only mention the calculus of complex numbers, Riemann's geometry and the theory of 'space groups' are three instances of originally quite abstract and indeed abstruse mathematical speculations, which have since turned out to be indispensable for the solution of important scientific or technical problems. We may accordingly regard all mathematics as potentially solving problems in respect to conceivable states of affairs, on the same lines as the setting up of two equations for the age of Paul and Peter yield the age of the two. It may appear far-fetched to include the process of problem solving under the heading of 'Interpretation'. My choice of this name is admittedly influenced by systematic prospects which will only be developed later. But the designation is not untrue: a mathematical problem is solved by transforming one

symbolic representation of a situation into another. The transformation - which may be a proof, a construction or a computation - reveals a new aspect of what we had known before. In the light of this new interpretation our ~~earlier~~ previous state of knowledge ceases to be a problem: it is no longer puzzling.

11. Natural science, engineering and mathematics, and more generally Observation, Invention and Interpretation, are thus seen to represent a consolidation and expansion of inarticulate performances of intelligence by the process of articulation. They transpose informal intelligence into a firm framework the use of which characterises 'discursive' thought. This subject will be extensively examined later: at the moment there is only a brief comment to be made on it.

Discursive thought always involves the two inverse processes of coding and de-coding. The first is what I called denoting before. It is carried out articulately when we define a new symbol - as when we let x stand for the age of Paul. De-coding is the re-translation of the result 'x = 9' into 'Paul is aged 9'. In other cases the coding-decoding is tacit. When you find your way with the aid of a map, you start by identifying your immediate neighbourhood with a point on the map (coding), then having traced on the map your intended itinerary, you proceed to identify this itinerary with the corresponding features of the surrounding landscape, and finally you put your conclusions into practice (de-coding) by setting out to walk in a particular direction. All explicit forms of coding and decoding rely in the last resort on the use of the 'basic language' the coding and decoding of which must of necessity be tacit. All formalised thought relies ultimately on inarticulate coding and decoding.

We see that articulate intellectual processes are essentially threefold: the act of ~~denotation~~ articulation is followed by symbolic operations the results of which are eventually made available by decoding. The semantic functions of a symbol which I have here divided into

coding~~coding~~ (denoting) and decoding are often maintained throughout the process of formal thought. During the course of a verbal argument we are - or at least should be - always aware of what we are talking about. Accordingly, our formulations will be constantly readjusted to fit the matter to which they refer and when we come to express our conclusions we do it with a view to the meaning they convey. This is so during speech but is hardly the case during a complex mathematical calculation and is certainly absent during the time a calculation is carried out by a machine. The indispensable part played by tacit coding-decoding in any intellectual performance, however formalised it may be, plainly answers in the negative the question raised earlier on as to whether completely formalised processes of thought are conceivable. All formalised operations depend for their intellectual significance on unformalised semantic functions.

12. None of us - not even the greatest innovators - starts speaking by inventing their own words. All men acquire speech first by ~~receiving communications~~ listening to addresses of which they guess the meaning. We start by learning to decode - in which we do not yet distinctly surpass the animals - but concurrently we also proceed to imitate the utterances which we are trying to understand and to use them to address others. Yet, though verbal exchanges lie at the very root of speech as first acquired by us, it seemed desirable to set out here first the solitary functions of articulation and take up only afterwards, as I propose to do now, its interpersonal functions.

Some of these have of course been extensively referred to already by implication. I have been talking about natural science, technical knowledge and mathematics, which extend far beyond the intellectual performances of any single individual. The wide range achieved by these intellectual operations is due to the fact that articulation not merely enables individuals to engage in discursive thought but also allows them to share their thoughts with others who use the same symbols, attaching to them the same

meaning as they do. This makes intellectual co-operation possible not only contemporaneously, but also from generation to generation, and science, technology, mathematics are the product of such collective efforts. But I do not wish to proceed now to a study of these intellectual structures. For I must first deal with the fundamental interpersonal functions of articulation which will involve a considerable extension of our conception of articulation.

Pause Summary

13. Before proceeding to this step let me take stock for a moment of the progress made up to this point towards the purpose for which this survey of intelligent performances was undertaken. It would seem that so far no clear indication has yet emerged of the place of philosophy and of the necessity of its cultivation. Science, technology and mathematics are not philosophy and though a survey of science, technology and mathematics (as briefly attempted here) does raise topics which belong to neither of these fields and which may be classed as philosophic, no vital problems have yet become apparent in this connection. It has not become evident that any reflection on the general principles involved in the arts of scientific observation, of technical invention or mathematical speculation is indispensable to the proper and effective conduct of these activities. The necessity for such reflection will in fact emerge only when the object of study is a person, and in particular, the intellectual activity of persons.

14. The intelligent activities I have hitherto surveyed may be contrasted to those to which I am now passing on by calling them 'object-directed'. Mathematics can be included under this designation as either actually or potentially object-directed. For the moment I shall distinguish only two kinds of intelligence: the object-directed and the interpersonal. In surveying the field of object-directed intelligence we could delimit without great difficulty intelligent capacities from the sub-intelligent by the fact that they were acquired by learning. We could rely on a wide

range of animal experiments illustrating a variety of inarticulate proficiencies which were not innate but learned, and the process of learning itself offered us a clear manifestation of intelligence. This is not true for inter-personal intellectual exchanges. They do occur among animals and there is some evidence that they are developed by learning, but the experimental material is scanty. For a study of inter-personal articulation we shall have to merge therefore all inarticulate performances and contrast them jointly to their articulate superstructures.

However, sub-intelligence as manifested in relations between persons is closely germane to sub-intellectual activities directed from persons to objects. So these have to be mentioned here now. They fall into two divisions: Drive-satisfaction and Perception. These embody two essential features of animal life. The first is rooted in the animal's motility and its capacity to feed itself and to flee from danger. We have here the most primitive practical proficiencies of living beings in the animal kingdom. The second is rooted in the sensibility of such living beings and is thus related to their primordial cognitive capacities. The two are closely interwoven, since all drives are actuated either by desire or pain and are guided throughout by the senses. The connection between the sub-intellectual and the intelligent reactions of persons to objects will be examined later; for the moment we shall return to inter-personal relations.

15. Drives, when directed from one person to another may be mutual or antagonistic. Sexual partners represent the most outstanding case of the first kind, while beasts of prey and their victims are obvious instances of the second. Drives may also set up rivalry between two persons, the outcome of which may be the more or less permanent dominance of one person by another. Among animals which breed their young there arise parental and filial relations in which are combined certain mutual satisfactions, along with the instinct of familial defence. Altogether, animals reveal

a variety of ordered interaction in groups. The way in which such groups hold together, forming herds, packs, shoals or flights is a primordial example of social co-ordination. We have here some of the most primitive forms of practical relations between living beings.

Closely allied to these are two classes of cognitive relations between persons. The first I should describe as physical sympathy. There is an irresistible transmission of sharp experience from one person to another. Men have specially to train themselves in order to stand the sight of a surgical operation. Even experienced doctors may faint or get sick at the sight of a deep incision into the eye of a patient. Sadism is a perversion of these transmitted pangs into pleasurable excitement; it is a masochistic reception of another man's suffering or mutilation and is known to be associated with masochism in the recipient. There is a telling photograph by W. Koehler of a chimpanzee watching a fellow animal's attempt to perform a difficult feat and revealing by gesture that it participates in the other's efforts. (SLIDE). Interpersonal transmission is at work whenever animals learn by example. They readily do so. A trick invented by a more intelligent chimpanzee is immediately taken up by another who would never have been able to think of it on its own. Koehler, giving examples of this, makes it also clear that this is no blind parrot-like imitation, but a genuine transmission of an intellectual performance from one animal to another. It amounts to a <u>communication</u> on the inarticulate level.

Another cognitive interpersonal relation, also operating on the inarticulate level, consists in the simple fact that animals and men have the capacity of knowing each other personally. We may be able to identify a person after many years, though his features had greatly changed through age or even mutilation. Our knowledge of a person involves a sense of his continuity through

time and amid varying circumstances and if we know a person well, we shall be able to appreciate an indefinite range of reactions from our understanding of his character. We may describe this as the <u>understanding</u> of persons on an inarticulate level.

To show the wider scope of this principle we may recall the part played by personal understanding in the study of behaviour, even at the lowest levels of animal life. In his classical study of the flatworm Planaria, carried out about 50 years ago, Pearl concludes that "it is almost an absolute necessity that a person should become familiar or perhaps better, intimate, with an organism, so that he knows it in something the same way that he knows a person, before he can hope to get even an approximation of the truth regarding its behaviour". This maxim is confirmed by the authority of H.S. Jennings, who says that it might be extended to most of the lower animals.

In my next lecture I shall expand this survey first of all by describing the articulate level of interpersonal exchanges erected on these inarticulate foundations. But before closing for today we may sum up the main headings of what has been said in a tabulated form as follows. In this list the sequence of items does not follow throughout in the order in which they were presented.

INTELLECTUAL PERFORMANCES.

1. Object-directed.

1(1) Inarticulate

1.11 Sub-intelligent.

1.111 Drive-satisfaction (practical)

1.112 Perception (cognitive)

1.12 Intelligent.

1.121 Sign-event cognition

1.122 Mean-ends manipulation

1.123 Knowledge of alternative part-relations

1.124 Articulation of 1.121-1.123, based on a combination of 1.121-1.123 performances.

1(2) Articulate

1.21 Observation (natural science)

1.22 Invention (technology)

1.23 Interpretation (deductive sciences)

2. Inter-personal.

2(1) Inarticulate

2.11 Communication (cognitive)

2.12 Practical interaction

2.13 Understanding of persons.