CHAPTER III.
The A Priori and the Formal

In this chapter we analyse the concept of the formal to determine its relation to a priori. The word 'formal' is derived from the noun 'form' which is unfortunately ambiguous. We shall examine here three different meanings of this term: form as shape, form as the interrelation of the parts, and form as essence.

I. Form as shape.

The term 'form' is commonly used in the sense of shape. Thus the form of a statue or a pot is its physical shape. It is obvious thought cannot have any form in this sense, because as something in the mind, it lacks any shape whatsoever. Common though this meaning of 'form' is, yet it leads to a fundamental change in the concept of logic itself. Logic as a 'science of forms' cannot now refer to thought or anything in the mind of the subject. "'It is usual to say that logic is formal, in so far as it is concerned merely with the form of thought, that is with our manner of thinking irrespective of the particular objects about which we are thinking.' This is a quotation from the well-known text book of formal logic by Keynes. And here is another quotation from the History of Philosophy by Father Copleston: 'The Aristotelian Logic is often termed formal logic. Inasmuch as the Logic of Aristotle is an analysis of the forms of thought—this is an apt characterisation.'
In both quotations I read the expression 'form of thought', which I do not understand. Thought is a psychical phenomenon and psychical phenomena have no extension. What is meant by the form of an object which has no extension? The expression 'form of thought' is inexact and it seems to me that this inexactitude arose from a wrong conception of logic. If you believe indeed that logic is the science of the laws of thought, you will be disposed to think that formal logic is an investigation of the forms of thought.

It is not true, however, that logic is the science of the laws of thought. It is not the object of logic to investigate how we are thinking actually or how we ought to think. The first task belongs to psychology, the second to a practical art of a similar kind to mnemonics. Logic has no more to do with thinking than mathematics has. You must think, of course, when you have to carry out an inference or a proof, as you must think, too, when you have to solve a mathematical problem. But the laws of logic do not concern your thoughts in a greater degree than do those of mathematics. What is called 'psychologism' in logic is a mark of the decay of logic in modern philosophy. For this decay Aristotle is by no means responsible. Throughout the whole Prior Analytics, where the theory of the syllogism is systematically exposed, there exists not one psychological term. Aristotle knows with an intuitive sureness what belongs to logic, and among the logical problems treated by him there is no problem
connected with a psychical phenomenon such as thinking." 1

Thus the meaning of 'form' as 'shape' leads to the theory that logic cannot be a science of thought. Logic, to be formal, has to deal with physical objects which alone have shape. What are these physical objects the shape of which logic studies? These are the shapes of signs or marks.

Lukasiewicz, however, gives another reason why logic concerns itself with written marks rather than with thought. He says, "Modern formal logic strives to attain the greatest possible exactness. This aim can be reached only by means of a precise language built up of stable, visually perceptible signs. Such a language is indispensable for any science. Our own thoughts not formed in words are for ourselves almost inapprehensible and the thoughts of other people, when not bearing an external shape, could be accessible only to a clairvoyant." 2

This logic is formal in the sense that it can decide the truth of a statement by merely inspecting the pattern of the written signs or marks. Quine, for example says,

2 Lukasiewicz, ibid, p. 15
3 Lukasiewicz, however, makes a distinction between 'formal' and 'formalistic'. The meaning of 'formal'
"Confronted with any logical truth or indeed any true statement of mathematics, no matter how complex, we recognize its truth if at all merely by inspecting the statement and reflecting or calculating ........... Insofar then as logical truth is discernible at all, standards of logical truth can be formulated in terms merely of more or less complex notational features of statements." 1 But such a formalization of language requires a number of steps. "If standards of logical and mathematical truth are to be formulated in terms merely of the observable features of statements a first important step is revision and schematization of language in such fashion as to put the relevant features of statements into the simplest possible forms ........... It is helpful to reduce the notions of logic and mathematics to a minimum by defining some in terms of others, for this reduces the variety of statements which the truth criterion must cover. "2

R. M. Martin enumerates the following features of a formalized logistic system:

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that we are discussing here, seems to be his meaning of 'formalistic'. (Ibid, p.15). We shall discuss his meaning of 'formal' below.

1 Quine - *Mathematical Logic*, p. 4
2 Ibid, p. 5.
Roughly speaking, a calculus or formalized logistic system consists of the following:

(i) a complete specification of the primitive vocabulary,

(ii) a definition (recursive or otherwise) of the notion of being a formula, and possibly terms, of that system,

(iii) a list of formulae as axioms or primitive formulae,

(iv) some statements about the system, rules of inference, stating the circumstances under which a formula is to be regarded as an immediate consequence of or as immediately provable from a formula or formulae,

(v) a list of formulae explicitly shown to be theorems or provable from the axioms by means of the rules of inference, and

(vi) a list of statements about the system allowing us to abbreviate expressions in specified ways.¹

As an example of logic which is formal in this sense we may cite Quine's system.

Let us use 'S_1', 'S_2', ..., 'S_9' as names of the respective signs or typographic shapes 'w', 'x', 'y', 'z', 'l', '(', ')', 'v', and 'e'; thus

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\begin{align*}
S_1 &= w = \text{double - yu}, \\
S_2 &= x = \text{ex}, \\
S_3 &= y = \text{wye}, \\
S_4 &= 'z' = \text{zee = zed = izzard}, \\
S_5 &= 'l' = \text{accent}, \\
S_6 &= '(' = \text{left parenthesis}, \\
S_7 &= ')' = \text{right parenthesis}, \\
S_8 &= 'v' = \text{down arrow}, \\
S_9 &= 'e' = \text{epsilon}.
\end{align*}
\]

Further, let us use the arch '(' to indicate concatenation of expressions. Into this rudimentary notation of logic, it is possible to translate 'x is a variable' ....... 'x is an atomic logical formula' ..... ..... 'x is a logical formula'. 1 Whatever is "formal", in the sense intended by the earlier loose phrase 'speaking only of the typographical constitution of the expressions in question', admits of "translation into this

1 Mathematical Logic, pp. 283-84
language. We are thus led to the following more rigorous
criterion of formality: translatability into a notation
containing only names of signs, a connective indicating
concatenation, and the notation of logic. Discourse
which is "formal" in this sense, and hence translatable
into the notation just now described, is called metamathematics, formal syntax, or briefly syntax. Since joint denial,
quantification, and the membership notation suffice for logic,
these same devices plus names of signs plus a notation indi-
cating concatenation suffice for syntax. A similar expla-
nation of formal is given by Carnap, Church and Martin. Carnap
was explicit enough when he said "An investigation, a method,
a concept concerning expressions of a language are called
formal if in their application reference is made not to the
designate of the expressions but only to their forms, i.e.,
to the kinds of signs occurring in an expression and the
order in which they occur. Hence anything represented in
a formal way belongs to syntax."

Here syntax must be taken as logical syntax, not
grammatical syntax. Logical syntax includes the theory of

1 Ibid, p. 286
2 Ibid, p. 286
3 R Carnap, Introduction to Semantics, p. 10
formal deduction and restricts itself only to the formal analysis without any reference to the designata. To construct such a formal system we need the distinction between object-language and metalanguage. In setting up any formal system we require a language in order to talk about the formal system which is being set up. This is the metalanguage. The formal system which is being constructed is, on the other hand, different from the metalanguage itself; if the formal system is itself a language and not merely an uninterpreted calculus, it is called 'the object-language'. If, however, the object-language is sufficiently strong to include ordinary arithmetic, then the syntactical metalanguage itself may be translated into the object-language while the semantical metalanguage of an object-language cannot be wholly translated into the object-language itself without giving rise to paradoxes like the Liar. There is no harm, as Gödel has shown, in reducing the syntactical metalanguage to the object-language when it is rich enough. Initially, however, the distinction between metalanguage and object-language is necessary.

The concepts which are formal in the sense of being syntactically definable may, however, differ among themselves in respects which are fundamental. The concepts of primitive symbol, formula, logical formula, axiom and proof share a common characteristic which the concept of theorem lacks. Given any expression, we can decide once and for all by a
systematic procedure of inspection whether or not it is a logical formula.* 1 Similarly the systematic recognizability which attaches to the notion of logical formula, attaches to the notion of primitive symbols, axioms and proofs. Church means the same thing by the term 'effectiveness' as Quine's 'systematic recognizability'. But the notion of a theorem lacks this feature, though retaining a partial sort of recognizability; appropriate to each formula which is a theorem there is a device (a so-called proof), discoverable in general only by luck, which once discovered enables us to see by a finite amount of inspection that the formula is a theorem.* 2 Church also says the notion of a proof is effective in the sense that there is a method by which whenever a finite sequence of well-formed formulas is given, it can always be determined effectively whether or not it is a proof. But the notion of a theorem is not necessarily effective in the sense of existence of a method by which, whenever a well-formed formula is given, it can always be determined whether or not it is a theorem for there may be no certain method by which we can always either find a proof or determine that none exists.* 3

1 *Mathematical Logic*, p. 291
2 Ibid, p. 291.
3 Alonzo Church, *Introduction to Mathematical Logic* p. 51
But here we should note one point. Although the conception of logical truth as formal in this sense has been bound up with the axiomatization of logic and mathematics, yet these two different concepts, the notion of formal truth and the notion of an axiomatic system, are independent of each other. Quine remarks, "it is helpful to reduce the notions of logic and mathematics to a minimum, by defining some in terms of others, for this reduces the variety of statements which the truth criterion must cover." And again, "If standards of logical and mathematical truth are to be formulated in terms merely of the observable features of statements a first important step is revision and schematization of language in such fashion as to put the relevant features of statements into the simplest possible forms." 1 Thus Quine points out that axiomatization is 'helpful' for formalization. Yet axiomatic systems have been developed long before any rigorous formulation of the notion of 'formal truth'. As a matter of fact an axiomatic system is not necessarily the same as a formal system. Even now axiomatic systems are developed either as purely formal systems (as calculi) or as interpreted semantical systems.

Thus the notion of validity of an inference can be given either a syntactical or a semantical definition. An inference may be regarded as valid either because it is in accordance with a formal rule (syntactical definition of validity) or

1 Mathematical Logic, P. 5.
because the form of the inference is such that it never leads to a false conclusion from true premises (semantical definition of validity). 1 As a matter of fact, to prove the consistency or the completeness of the purely syntactical rules, the method of interpretation is usually required. 2

Just as an axiomatic system is not necessarily formal so also the notion of formal truth does not necessarily involve the notion of axiomatization. Axiomatization is necessary if we want to prove that all logical truths are formal. As the number of logical truths is infinite we cannot prove by examining all individual instances that they are formal. If we can show that all logical truths follow from a finite number of axioms or axiom-schemata, and show that the rules of generating logical truths from the axioms depend only on the forms of the axioms which are themselves regarded as formally true then we can show that all truths of logic are formal. If we can have an alternative method of proving this, axiomatization will not be necessary for a formal study of logic.

1 We study the relation between semantics and syntax in detail below. (See pages 77 ff.).

2 "For a syntactic formulation would have to be preceded by the proof of completeness for a certain system of axioms, which can only be done by semantic methods" (W. Ackermann, Solvable cases of the decision problem, p. VII).
There are, however, logicians, according to whom formalization admits of various degrees. "If Euclid thought wrongly that his axiom system was completely formal, how do we know that a system considered formal now will not turn out to be imperfectly formalized?"

"In the evolution of axiom systems, there has emerged a sharp criterion of formalization in terms, not of meaning and concepts, but of notational features of terms and formulae. From now on we shall speak of formal or axiomatic systems only when the system satisfies the following criterion: there is a mechanical procedure to determine whether a given notational pattern is a symbol occurring in the system, whether a combination of these symbols is a well-formed formula or an axiom or a proof of the system. Thus the formation rules, i.e., rules for specifying well-formed formulae, are entirely explicit in the sense that theoretically a machine can be constructed to pick out all well-formed formulae of the system if we use suitable physical representation of the basic symbols. The axioms and rules of inference are also entirely explicit. Theoretically, for each such formal system, we can also construct a machine which continues to print all the different proofs of the system from the simpler ones to the more complex until the machine finally breaks down through wear and tear. If we
suppose that the machine will never break down, then every proof of the system can be printed by the machine.  

Thus according to Wang a formal truth is not merely a formula true by virtue of its notational features, but also one which is mechanically decidable as a formal truth. He, however, distinguishes between formal systems and quasiformal systems.

A quasiformal system is obtained from a formal system by adding "non-constructive rules of proof," which superficially provide definite methods of proof but really leave open the methods of proof.

Thus we find that there are three different senses in which a formal truth may be regarded as 'formal'—

(a) a truth is formal if and only if its truth is completely determined by the mere notational features of the formula;
(b) a truth is formal if and only if it is a theorem in a syntactical system;
(c) a truth is formal if and only if it is mechanically determinable as a truth.

So far we were concerned only with logical syntax or the purely formal part of a formalized language in abstraction from the interpretation. But in analysing a

2 Ibid., p. 4.
language three different approaches can be made.

"If in an investigation explicit reference is made to the speaker, or, to put it in more general terms, to the user of a language, then we assign it to the field of pragmatics. (Whether in this case reference to designates is made or not makes no difference for this classification). If we abstract from the user of the language and analyze only the expressions and their designates, we are in the field of semantics. And if, finally, we abstract from the designates also and analyze only the relations between the expressions, we are in (logical) syntax. "¹ Thus the expressions of a language can be studied in any of the above three ways. Here we shall not deal with the pragmatics. But the semantics or the semantical study of language requires some discussion because the syntax and semantics are closely related, or as Carnap says, they are complimentary to each other. ²

Thus the things " which are intelligible only through an understanding that the well-formed formulas have meaning in the proper sense, e.g., that certain of them express propositions or that they denote or have values

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¹ Carnap, Introduction to Semantics, p. 9.
² See Carnap, Formalization of Logic, Preface, P.ix
Thus the study of the interpretation of the language as an interpretation is called semantics. The requirements of a semantical system are the following: like the syntax-system a specified classification of all the signs, and rules of formation are laid down, here also. In addition to these, two other types of rules are also required, the rules of designation and the rules of truth. The formation rules define the "sentence of the system", the designatory rules define "designation in the system" and the rules of truth define "true in the system". As an example of a semantical system we give here a summary from Carnap's *Introduction to Semantics*.

The semantical system $S_1$ contains seven signs: three individual constants, $s_1, s_2, s_3$, two predicates, $p_{n_1}, p_{n_2}$, and the two parentheses "(" and ")".

Next the rules of designation, here, namely five particular rules each specifying the designatum of one of the five chief signs, and also one general rule for the truth conditions of sentences, are laid down. Sentences of

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1 *Introduction to Mathematical Logic*, p.64.
$S_1$ are the expressions of the form Pr (I).

Rules:

1. $I_1$ designates Chicago.
2. $I_2$ designates New York.
3. $I_3$ designates Carmel.
4. Pr$_1$ designates the property of being large.
5. Pr$_2$ designates the property of being a harbour.

A sentence Pr$_i$ (I$_j$) is true if and only if the designation of I$_j$ has the designation of Pr$_i$ (i.e., the object designated by I$_j$ has the property designated by Pr$_i$).

Thus the sentence Pr$_1$ (I$_2$) is true in the system $S_1$ because it satisfies the truth-condition above.

Carnap’s system is, however, a pure semantical system, in the sense that the very semantical concepts e.g. ‘designation in $S$’ ‘true in $S$’ are defined by the rules of the semantical system. But broadly speaking, the terms ‘true’ ‘false’ ‘tautology’ are semantical concepts because they require some kind of interpretation of the formula in question. They cannot be defined in terms of merely the ‘typographical constitution’ of the formula. The terms ‘true’ and ‘false’ refer to the designation in addition to the terms and their interrelations. Thus in the truth-table
method we give an interpretation of the terms 'if-then', 'and', 'or', 'not' and so on, in terms of truth and falsity. The concepts of truth and falsity and all the other concepts which involve them are obviously semantical concepts.

There are two different ways in which semantical terms can be introduced into a metalanguage. First, one may introduce such terms by defining them all in terms of the specifically non-semantical terms already available in one's metalanguage. These latter terms fall into three distinct groups: (1) the logical vocabulary, of M including the logical constants and variables; (2) the syntactical vocabulary including names of each of the primitive symbols of the object-language L, a sign for concatenation, and syntactical variables ranging over the expressions of L; and finally (3) the translation vocabulary, which must permit us to translate into M all the meaningful expressions of L.

This method of defining all semantical terms exclusively in terms of non-semantical terms gives a kind of guarantee that the paradoxes associated with the use

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of semantical terms will not appear in one's meta-language supposing, of course, that these paradoxes are not already present in some form in the non-semantical part of that language." 1

"A second way in which one might introduce semantical terms into $M$ is one in which we do not define all such terms in the manner discussed above, but introduce certain of them as undefined terms of $M$, and then lay down axioms governing these terms. We then define the remainder of our semantical terms by means of these primitive terms." 2

Both these methods have advantages as well as disadvantages. We have already noted an advantage of the first method over the second — that of guaranteeing consistency. The disadvantage of this method has been stated by Rogers as follows: "In order to define truth-concept for a given language $L$ Tarski must speak within its meta-language $M$, of infinite sequences of the kinds of entities that are discussed within $L$. This forces him to use as a meta-language $M$ a language which employs variables of higher type than any of the variables appearing within $L$ ....... An alternative approach to semantics ... is one that Carnap has examined extensively. Here

1 Rogers, ibid., p. 22.
2 Ibid., p. 22.
Carnap takes as basic the semantical concept of designation. He interprets the individual and predicate constants of \( L \) by specifying just which individuals and properties and relations are designated by those constants. And he argues that we may even go further and take whole sentences of \( L \) to be designatory expressions, designating propositions. Within this method of semantical analysis, we speak not of infinite sequences of entities discussed within \( L \), but of the individuals, properties, relations and propositions designated by the designatory expressions of \( L \). This approach, too, forces us to adopt as a metalanguage for \( L \) one that employs variables of a higher type than that of any of the variables of \( L \); viz., variables ranging over properties, relations and propositions.

Now it is known that any meta-language in which we can define the concept of truth for a given object-language \( L \) must be essentially richer than \( L \), roughly in the sense that although \( M \) contains an interpretation of \( L \), it is impossible to give an interpretation of \( M \) within \( L \). If this requirement were not satisfied, we could introduce the paradox of the liar into \( L \), by first defining 'true in \( L \)' within \( L \), and then interpreting \( M \) within \( L \), thereby obtaining a definition of 'true in \( L \)' within \( L \) itself.
The requirement of essential richness is met by both Tarski and Carnap by using as a meta-language for \( L \) one that employs variables of higher type than any of the variables of \( L \) ..... Indeed, it is precisely because they have such variables at their disposal that they are able to introduce all of their semantical terms by way of definition. From a 'nominalistic' point of view, however, one might be interested in the question whether it is possible to develop a semantical approach that does not force one to use in one's meta-language variables of higher type than those of the object-language being investigated ....... As a matter of fact, such nominalistic requirements can be satisfied. It is possible to construct a satisfactory approach to semantics, up to the point of defining truth at any rate, which does not require that our meta-language contain variables of higher type ...... Within such an approach the requirement that the meta-language \( M \) be essentially richer than \( L \) is met, not by introducing into \( M \) variables of higher type than any of the variables of \( L \), but by introducing into \( M \) one or more undefined semantical constants.  

All this suggests that semantics also can be reduced to syntax so that the so-called truth and falsity of statements can be decided by a finite amount of inspection of the form 

1 Ibid, p. 28-29.
of the expression in question. Thus both syntax and pure semantics are formal in the sense that they study the mere form of the expression without referring to facts. As Carnap says, "pure semantics" is entirely analytic and without factual content" because the so-called rules of designation "do not make factual assertions as to what are the designata of certain signs. There are no factual assertions in pure semantics."

We may now return to Quine's definition of 'formality' as translatability into a notation containing a limited number of signs, and which is recognizable by a systematic procedure of inspection. To recognize a sentence as formally true, we need inspection, calculation, and reasoning, but it is inspection of the form of the sentence but not of the designata of the terms of the sentence.

Now our question is, what is the relation between this concept of formal and the concept of a priori. Can the two be identified and if so, on what grounds? At first sight it appears that the two terms have quite different connotations and so can in no way be said to be synonymous. An a priori truth in the epistemological sense is known independently of experience; while a formal truth is one which can be

1 Introduction to Semantics, p. 12, p. 25.
decided by a finite amount of inspection. So it seems that
the formal far from being identical with the a priori is
rather to be identified with a type of the a posteriori;
for the knowledge of the truth that is formal in this sense
is derived from inspection which is, no doubt, one kind of
sense-experience. But when logicians such as Carnap explains
formal as recognizable by mere inspection of forms, they
certainly do not have the least intention of equating it with
the so-called empirical knowledge. Thus Carnap distinguishes
between two types of sentences. (1) One type consists of sen­t­
ences which to be known as true require a knowledge not merely
of the form and the meanings of the terms but also of "the
actual state of the affairs to which the sentence refers."
This type of sentences Carnap calls empirical, non-logical
or synthetic. (2) The second type consists of only and all
those sentences whose truth can be determined merely by the
analysis of their form and the senses of their terms. These
are the formally true sentences. Now it is obvious that
according to Carnap the formally true sentences are known
as true independently of all knowledge of the facts to which
their terms refer. They indeed involve inspection but then
they cannot be regarded as empirical for that reason. They
They are a priori in the sense that besides a knowledge of their form no knowledge of facts referred to in them is required for determining their truth.

Thus although Carnap would like us to believe that the a priori and the formal are identical still we may point out that this identification is valid only if we do not admit a priori knowledge of particulars. If we believe that reason is intuitive and can by self know objects which are not merely universal but also particular then the a priori and the formal cannot be identified. As we have already mentioned, Coplston suggests that Plato's mathematical entities are "intelligible particulars" (See above p. 14); thus Carnap's theory is based on a denial of intuitive reason.
II. Form as Interrelation of Parts

The meaning of 'form' as shape makes the phrase 'form of thought' nonsensical. If we want to use the phrase 'form of thought' significantly, we need to change the meaning of 'form'. We may argue that the form of a thing in the sense of its shape, may also mean that which determines the shape. The shape of a thing is dependent on the interrelation of the parts which constitutes the matter of the thing. The same parts when combined or related differently give rise to different forms, as for example, in a kaleidoscope. So also 'the form' of a thought is determined by the interrelation of its parts. This will however imply that no simple thing can have any form. If we interpret 'form' in this way then a physical thing can possess form as much as a thought or judgment.

In the case of physical things the interrelation between elementary physical parts determines their shapes; e.g. the interrelation of the bricks determines the shape of a building and makes it what it is. In the case of thought, the different forms or interrelations between the simple ideas determine the different types of judgments and the interrelation between the judgments determine the form of inference. If by 'thought' we mean judgment or still higher or more complex types of thought such as inference, then we can say

1 Analytic-Synthetic, Sibajiban Bhattacharyya.
that thought has form. For a judgment is 'a synthesis of two ideas' which are the parts synthesised or related in the judgment. The form of a judgment depends on the way in which the ideas are synthesised. Taking the ideas of man and mortal as material we can so arrange them as to get an A or E or O or I proposition. Thus we get the four forms of judgment in traditional logic."¹ If we arrange the two ideas humanity and mortality in such a way that the one is wholly included or contained in the other we get an A proposition, 'All men are mortal'. When the inclusion of one idea into another is partial we have the two forms of propositions, namely 1 and 0, 'Some men are mortal' and 'Some men are not mortal'. The mutual exclusion of the two ideas results in the E proposition 'No men are mortal'. In all these four forms of propositions, the material is the same, namely the ideas humanity and mortality. But the difference in their arrangements makes the form different in the four cases. Here, the ideas which are synthesised in judgements, the concepts, perhaps do not have any form, for they are the ultimate building material out of which more complex thoughts are built. One thing is to be noted here except the elementary concepts, which perhaps have no form, any form may be treated as the matter of further

¹ Sibajiban Bhattacharyya, ibid,
higher complex forms. Thus judgments may also be arranged in such a way as to give rise to different forms of inferences. The various interrelations between the judgments give rise to the various forms of syllogism, i.e. the moods and figures of syllogism such as Barbara, Celarent etc. Thus by changing the mere order of the premises of a syllogism in the First figure we get the premises of a syllogism in the Fourth figure. (As the figure of a syllogism is determined by the position of the middle term in the premises the conclusion is irrelevant for the determination of the figure. The mood of a syllogism however, is sometimes determined by the form, i.e. the quality and quantity, of all the three propositions of a syllogism. Thus it is usual to regard Barbara, Celarent etc. as moods of syllogism where the form of the conclusion also has been taken into account). Here the building material is judgment, which is matter in relation to the form of inference, but is itself form in relation to ideas or concepts out of which it is formed. Further, more complex forms of thought can be made out of the forms of inference related or arranged in different ways. Thus the forms of Sorites or trains of Syllogism are determined by the different interrelations of the different forms of inferences.

Form as understood in this sense is metaphysically neutral. It can be regarded either as subjective or as
objective. It may be thought that if the elements interrelated are objective, then their interrelation also is objective. Modern logicians like Lukasiewicz and others who regard logic as an objective science subscribe to this view. The followers of Mill, on the other hand, reduce the laws of logic to psychological laws — the forms of inference, for example, are determined by the forms of judgments which in their turn are determined by interrelations of ideas which are subjective entities. But really it is not necessary to regard forms as objective even if the matter is objective. Kant, for example, makes a sharp distinction between the forms and matter of thought so far as their ontological status is concerned. According to him the discrete atomic sensations which may be said to be the 'influences' of things-in-themselves are the matter of thought. But as thought is always something complex, so Kant had to ascribe this complex interrelation of parts (that is the peculiar form) to the subjective side and not to the object or to the thing-in-itself. Thus there is no independent object of thought, only the matter comes from outside, but the forms of the so-called objects of thought are really the forms of the subject. This does not, however, mean that we get the sensations first which are discrete and devoid of all relations and then impose the subjective forms on them.
According to Paton, Kant differs from Hume fundamentally on this 'point'. According to Kant, "if we abstract from the spatial and temporal form of intuition, what is left in intuition is sensation which can have no extensive quantity. It is equally obvious that if we abstract from the unity of intuition (which as universal, is for Kant due to the mind), what is left will be a mere 'manifold' without a unity". 1

In the same vein, Paton asserts that only what is strictly universal is imposed by the mind upon objects. Kant goes on to say that all empirical laws are particular determinations of the pure laws of understanding, just as all appearances are subject to the conditions of the pure form of sensibility, whatever be the differences in their empirical form. On the prevailing view when Kant says 'empirical form', he would have to mean 'matter'. It seems to me that he is referring (at least partly) to shape and perhaps size, and if this form is empirical it must be known through sensation. 2 So Paton identifies the empirical form with the matter of thought. But then the cleavage between form and matter seems to disappear. Yet Paton is not wholly successful in his attempt, because the 'empirical form' is not the original matter, it already presupposes the universal forms of space.

2 Paton, *ibid*, p.140.
and time. Thus in Kant the forms of the objects of thought are necessarily the forms of the subject and the matter, though it appears to thought as always informed matter, yet is wholly outside the mind or the subject.

The case is wholly different in the Aristotelian philosophy and in the recent Hegelian thought as well. In Aristotle the form and matter are not different in kind, they differ only in degree. Matter as wholly unrelated to form, cannot be real in the Aristotelian sense. Matter is always informed matter. Form and matter are necessarily correlated terms, and specially the latter is real only in relation to the form. Thus change or development in a thing presupposes the gradual increase of form over against matter, but this matter in itself is also an informed matter.

The implication of Aristotle's theory is that it is more appropriate to regard a thing a union of potentiality and actuality than to regard it as a concrete unity of matter and form. The form is the reality or actuality in the thing and the matter is the potentiality to be actualized. Matter is not mere matter, it is the potentiality containing in itself the actuality of the thing. "If we think in terms of matter and form we must say that in every concrete the form is the real and intelligible factor. It is the shape
of the statue which makes it what it really is, it is its peculiar unity of vital functions, its 'soul' or 'life-principle', which makes the animal an animal ...........

Definition must be in terms of form, and the material factor is subservient to the form: it exists only in order to be the 'medium' or 'vehicle' of the form. It is indispensable to its concrete, but it is as such not intelligible or real.¹

In the development of any being or thing form can work in three different phases. First, the potentiality or the first 'informed matter', is originated from an already full-fledged 'form' or actuality. Thus the seed of a tree comes from a full-grown tree. The full grown tree which has already achieved the highest form or actuality is the 'originating form' of the seed. Secondly, the seed itself as a potentiality contains some form or actuality. Seed as a mere matter cannot exist by its own right. So far as it is real, it is form. And lastly there is the teleological form or the maximum actuality that the seed as the potentiality contains in it and gradually realizes in the course of the development. Matter, as such, is always formed matter in some degree or other. So far as a thing is less developed, it is only potentially, which means that it is more

matter and less form; but so far as it is developed it is actually or really, and so it is more form and less matter.

From the Aristotelian position it is clear that the forms of thought are also the forms of objects and only the form is real. So only the form is intelligible and not the matter. But this seems to contradict our conception of matter. It may be objected that the matter of a statue, say the bronze, is as much an intelligible factor as the form or shape of the statue. The bronze and the shape of the statue are the two constituents of the bronze statue. But to say so is to forget that every perceptible thing can be analysed into matter and form, and that the analysis will therefore apply just as well to the original mass of bronze as to the finished statue. The mass of bronze is a form — in this case a certain structural principle, a certain precise quantitative formula — which combines and unifies a matter consisting of simpler physical constituents that they make bronze and not some other thing.¹ This Aristotelian distinction of form and matter later on influenced the Hegelian thinkers. To them also the form and matter of thought are different only in degree. They reject the Kantian distinction of matter and form, one objective

¹ More, ibid., pp. 6-7.
and the other subjective, but they assert that the form is as much real as the objects and as the real is rational; so the forms of thought are also the forms of real. As matter and form are not different in kind, so the matter of thought also is not something external to it. This position has been explained by Joseph. He puts it in the following way: "Just as the form and matter of a coin are both in the coin, so the form and matter of thought (if we are to keep the meaning of the antithesis) must be both in the thought; we must not suppose that the formal identity is in the thought, the material differences in the things thought about. An analogy may help to make this point clearer ..........

Hunger and thirst are formally the same as being both appetites, materially different as being the one for food, the other for drink; but the material difference is not the difference between food and drink, nor the material of the appetites food and drink respectively; the matter is rather the special character which the appetites have through being for these objects. So the matter of a thought is the special character which it has through being about a certain subject, not the subject which it is about ........what is different in particular thoughts is not related to their common form as the gold or silver of two coins to their common device, ........ but rather as the speciality of their structures to
the generic identity, or as particular instances to the common nature of which they are instances."

Here we cannot discuss the metaphysical question whether the forms of thought are subjective and objective. The point is that, the form and matter of thought whether he subjective or objective, both are in the thought itself. The matter of thought is not outside of thought. In fact the thorough study of the form of thought involves the consideration of material differences in the thoughts also. But logicians who emphasise the purely formal character of Logic maintain that it can exhaust the form of thought in treating that as one and the same in every possible instance of thinking; an impracticable task, because the form itself .... is modified according to the instance in which it appears. 

1 H.W.B. Joseph. An Introduction to Logic, p. 5 footnote.
2 Ibid, p.7.
III. Form as Essence.

The term 'form' embraces a variety of meanings. So far we have dealt with two of them. A third notion of 'form' now requires consideration. A form is sometimes thought as the inner nature of a thing—the common structure and the principle of definition. This conception of 'form' identifies itself with the notion of essence. In fact it is Aristotle who used the two terms as synonyms. The essence of a thing is that because of which it is what it is. It is the inner nature of a thing which it cannot change without losing its identity. Essence as the core of reality of a thing has often been conceived as the universal, especially in Platonic philosophy. Plato's Ideas or Universals are nothing but the essences. Plato's dialogues are devoted largely in the attempt at definitions by finding out the essence of the things to be defined. Thus on this view essence is the essential character that belongs to a certain thing, say, a triangle, through all its kinds and instances. It is the universal that gives the essential reality to the thing. "Whenever we say anything about men or pebbles or the state, Socrates suggested, we are using universals; we are ascribing a character to a class in virtue of its belonging to, or following from, a core of
qualities essential to that class;" 1 Plato thus pointed out that the main concern of reason is solely at finding out essences and thus forming definitions. His main contribution was, thus 'induction and general definition'. From this it follows that essence as universal is wholly rational. Thinking is possible with the help of the universals or Ideas and is directed also to the essences of things. If form is understood as the essence then 'form of thought' in Platonic philosophy at least invariably signifies the universals or Ideas. In this sense form of thought is wholly rational also, because the universals have nothing to do with the particulars. But apart from the dangers of searching after essences as the forms of things two other questions arise from the above view. First, if the essences are universals then the particulars cannot have any essence by which one particular, say, a right-angled triangle can be different from an isosceles one. Even this can be done if we consider the essence of right-angled triangle and the essence of isosceles triangle by dividing the genus into two further sub-classes. But in this way when we come to the infimal species, then the question is: how to differentiate the one member from the other?

1 Brand Blanshard, *Reason and Analysis*, p. 57.
Secondly, can the form be always universal? In the case of two universals, say, horse and dog, the form is certainly different. But no less different is the form of two dogs belonging to the same universal.

These questions were treated and seemed to be answered in a different way by Aristotle.

According to Aristotle the form of a thing is its essence and primary substance. Forms are substantial and actual as opposed to matter. The matter is something definite in virtue of the form or the substance of it. In the Metaphysics in Book 2 Aristotle declares that the substantial element in things is the form or the essence. But this essence or form is not the same as the universal. The universal is not a substance, not an actual particular thing. As Aristotle says, "It seems impossible that any universal term should be the name of a substance. For the substance of each thing is that which is peculiar to it, which does not belong to anything else; but the universal is common, since that is called universal which is such as to belong to more than one thing." 1

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1 Aristotle, Metaphysics, 1038 b
Although Aristotle distinguished between essence and the universal, yet he had to face the difficulty of recognising particular essences belonging to particular members of the same species. According to Aristotle, forms or essences can be differentiated up to the level of the infima species. Thus the essences of horse and dog are different because the two forms themselves are different. The essence is the fixed combinations of characteristics which form the inner nature of all the members of the species. Any other difference pertaining to the members of the same species is the result of the union of identical form with different matter. So it appears that the specific form of two horses is the same, their difference is due to the matter. But unless the matter is qualitatively different, i.e. in form, the two horses cannot be different in character. Socrates and Callias, while agreeing in their specific form, must differ in the form of their matter. So this line of thinking leads us to the acceptance of individual essences but of which there is no evidence that Aristotle thought it so. Aristotle emphasised upon this fact that the essence is not to be thought of either as a component existing with the material components, or as consisting of the matter of the things. Yet because it is the essence that is the primary substance or form, it
is not to be identified with the universal. But the treat-
ment of essence and form of Aristotle seems nothing but a
reminiscent of Plato's transcendental doctrine of the uni-
versals. These essences are wholly rational and so Aristotle
finds it difficult to admit the individual essences or forms
which are only sensible particulars and cannot be wholly
accessible to reason. So far as they have the specific form
they are knowable, but their individual sensible differences
are something exclusively material and as such in themselves
unknown.

If we say that the essences are the forms of things and
as such define their true nature, then Husserl's view of
essences or universals seems on the same line with this view.
Husserl seemed to follow the Platonic tradition in maintain-
ing the reality of essences or universals. Husserl rejects
the empiricist presumption that we are directly acquainted
only with the particulars. 'The truth is ', so he summarised
his view in his 'Ideas for a pure phenomenology, and Pheno-
menological Philosophy', 'that everyone sees ideas, "essences",
and sees them, so to speak continuously; they work with them
when they think and they also pass judgments about them.'
According to Husserl propositions and universals are not
entities or things existing in the world, but they are the
unity or essence of a set of entities, whiteness of white
things, propositions of statements. But Husserl believes in the self-evidence or the direct intuition of these essences. Such intuition gives us a certainty far beyond the reach of any empirical science and the task of pure logic consists wholly on the elucidation of the basic essences — involved in every form of enquiry.

So far 'Form as Essence' entails the view that form is universal because essence and universal are more or less the same. According to this view, particular things cannot have essences. But the definition of essence as the inner nature of a thing necessitates the notion of particular essences also. There must be some essential characteristic that differentiates Socrates from Callias. Sometimes the Idealist thinkers try to define the essence of particulars by the particular combinations of universals. Thus the essence of Socrates consists in the combination of a number of universals such as humanity, mortality, truthfulness etc., some of which at least are absent in the combination of universals in making the essence of Callias. But this view cannot wholly explain the particularity of a particular. The form of one man is certainly different from another, though their specific form is the same.
On this point Russell's view expressed in his *An Inquiry into Meaning and Truth* is interesting. When Russell says that "what would commonly be called 'thing' is nothing but a bundle of coexisting qualities such as redness, hardness etc."¹, he seems to define a thing as 'a meeting-place of universals'. But he is actually holding a quite different view. He is maintaining that the so-called qualities of a thing which are generally regarded as universals, are themselves particulars. A red thing is the occurrence in a certain place of a specific shade of colour which ought to have a proper name. So here, form of a thing appears to be wholly particular. Moreover Russell points out that the particular qualities reside in a thing in wholly different manner from the way in which a universal resides in its species or instances. The Nyaya theory holds that the specific qualities reside in a thing in the same relation — samavaya — as that in which a universal resides in the things and qualities. But if the specific essences are different from the universals, then their relation of inherence also cannot be the same.

The search for the essence of particular beings, i.e. the essential self, led Bradley to his thorough analysis of self in 'The Meaning of Self' and 'The Reality of Self' — the two chapters in his book *Appearance and Reality*.

¹ *An Enquiry into Meaning and Truth*, p. 97.
Sometimes it is thought the personal identity of a man is the true essence of his self. But this conception of personal identity is so vague that it hardly explains the problem of essence. Thus Bradley arrives at a negative answer in his search for the essence or form of self. "In the self there is a variety, and in the self there is a unity; but, in attempting to understand how, we fall into inconsistencies which, therefore, cannot be truth ........ The self is no doubt the highest form of experience which we have, but for all that, is not a true form. It does not give us the facts as they are in reality, and, as it gives them, they are appearance, appearance and error. "

The form as essence or universal leads to the necessary corollary that form is rational also. If by form we mean the essence or the universal element common to many then it is undoubtedly rational. Reason deals with the general and the universal. So forms are wholly rational and in this sense we can significantly use the term forms of thought also. Here the forms of thought are nothing but the essences or the universals and these essences or the universals and these essences of thought are the concepts by which reason works effectively. Thus the forms are rational and these rational essences are the concepts which are also the forms or essences

1 Appearance and Reality, pp. 102-103.
of thought. But thought cannot grasp the sensible particulars and as such the particular essences or the specific characteristic forms are unknowable by the thinking mind. Perhaps in this sense Bradley is right in saying that the self in its essential nature cannot be understood by thought.

Here it is essential to distinguish between the form and matter of thought. The form is the essence or the common element in many matters. Thus it seems that the form is the universal or the concept and the matter of thought is the particular of the sensible world. But here Joseph rightly pointed out that the form and matter of thought both belong to the realm of thought itself. If form implies the general structure or essential characteristic of all thought in general, by matter of thought is also meant the particulars of sense that are none the less thought about. "The most general forms of thought exist diversely modified in thinking about different subjects; and they can no more be fully known without attending to the different matters in which they appear differently," 1 The distinction between form and matter of thought is thus somewhat

1 Joseph, An Introduction to Logic, p. 6.
The truth that form cannot be studied apart from matter might be otherwise expressed by saying, that the general form can only be studied in one or other of the special forms in which it is manifested; and these special forms can only be illustrated in examples that are materially different from one another. The proposition 'London is London' is a special form of proposition equally well-exemplified in 'Köln is Cologne', as Bucephalus is an animal of a special form equally well-exemplified in Black Bess. What is important to realise is the need of following the common form out into the differences which it displays in different matter. Thus according to Joseph one must create the matter of thought by thinking it if he wishes to think; and the task is not an easy one.

Finally comes the question of the apriority of the forms of thought as essences or universals. In the Platonic and Husserlian sense the forms of thought are certainly a priori. In Plato the Ideas or the universals are identical with the forms of thought and as such wholly a priori. The 'essences' of Husserl which are the only realities are none the less a priori, because they are independent of the sense-particulars and intuited directly. But whether these 'essences' though they are the main objectives of pure logic, can be the forms of thought also, is a debatable point. These essences

1 Ibid, P.7.
are self-evident, intuitively true, but can their self-evidence be proved by thought also? Secondly if the forms of thought are essences, i.e. the universals, then, what will be the matter of thought? However, the question of apriority of the forms of thought (taking the forms or essences of thought as the concepts or the universals, because thinking always works with the general) depends upon the view one takes about the nature of the universals or the concepts. A Platonic realist who believes the universals as rational, and independent of the sense-particulars, will at once consider the forms as a priori. But the empiricists, possibly of the Berkeleyan type, may argue against the a priori nature of the forms of thought. The apriority of the forms of thought is determined by and is connected with the particular philosophy one holds about the nature of the universals. But the view that the forms are rational, tends to support the view that in this sense they are a priori also.