An Outline of Traditional Logic

Introduction. Logic is the art of reason. As Jacques Maritain said, logic “studies reason itself as an instrument of knowledge, or as a means of acquiring and possessing the true.” In order to understand logic better, let us look at the structure of philosophy, of which logic is a part. One way of understanding a concept better is to see where it fits in relation to some larger concept. We will do this with the concept of logic. The procedure of showing how a concept is a part of some larger, more general concept is called division. We will explain the rules of this procedure later in the book, but we perform it all the time.

Logic is one of the three branches of philosophy. The first branch of philosophy is theoretical philosophy, or philosophy proper. The sciences in this branch of philosophy are employed solely for the pleasure of knowledge. These include the philosophy of mathematics, which studies the being of things by virtue of their quantity (ens quantum); the philosophy of nature, which studies the being of things by virtue of their sensible properties (ens mobile), and finally, metaphysics, which studies the being of things by virtue of their being (ens in quantum ens). The formal object of theoretical philosophy is the being of things.

The second branch of philosophy is practical philosophy. While the object of theoretical philosophy is a knowledge of the first principles of the theoretical order, the object of the study of practical philosophy is a knowledge of the first principles of the practical order. These would include the philosophy of art, which has to do with man's ability to make or create, and ethics, or moral philosophy, which has as its object the absolute good of man. The formal object of practical philosophy is human acts.
Chapter 1

Logic is a third branch, although it is more properly considered to be the introduction to the rest of philosophy, since it provides the methods used in the other two branches. In this sense, logic is less a division of philosophy than the science or art of which the rest of philosophy makes use. Logic studies conceptual being (ens rationis) and directs the mind toward truth.

The Two Kinds of Logic. At its most basic level, logic can be divided into formal and material logic. Formal logic is the branch of logic that studies the form or structure of arguments in order to see how reasoning proceeds from premises to a conclusion. Specifically, formal logic studies terms, propositions, and arguments in order to see more clearly how conclusions are derived from premises through deductive or inductive inference.

Many people associate logic exclusively with formal logic, but there is another branch of traditional logic called material logic. It does not deal with the form or structure of arguments, but rather with their content. While formal logic deals with how you get from one truth to another, material logic deals with the truths themselves. It studies terms, propositions and arguments in order to understand the intelligible content or rational structure of ideas.

For example, look at the following argument expressed in the form of a classical categorical syllogism:

All men are mortal
Socrates is a man
Therefore, Socrates is mortal

From the perspective of formal logic, we would want to know whether the argument is valid. By this we mean that we would want to know whether the conclusion (“Socrates is mortal”) logically follows from the two premises (“All men are mortal” and “Socrates is a man”). From the perspective of material logic, we would want to know whether the argument is sound. Soundness involves not only the validity of an argument, but the truth of an argument’s premises. We would want to know, in other words, whether the two premises are really true, what the terms ‘men,’ ‘mortal,’ and ‘Socrates’ refer to and how, and many other things not directly related to the form of the argument.

The distinction between these two branches of logic was nicely described by G. K. Chesterton:

Logic and truth ... have very little to do with each other. Logic is concerned merely with the fidelity and accuracy with which a certain process is performed, a process which can be performed with any materials, with any assumption. You can be as logical about griffins and basilisks as about sheep and pigs ... Logic, then, is not necessarily an instrument for finding out truth; on the contrary, truth is a necessary instrument for using logic—for using it, that is, for the discovery of further truth ... Briefly, you can only find truth with logic if you have already found truth without it.¹

This last remark of Chesterton’s is important. It is not the immediate purpose of formal logic to discover truth. That is the business of everyday observation and, in certain more formal circumstances, empirical science. Formal logic serves only to

lead us from one truth to another. Truth is, however, an important consideration in the second major branch of logic: material logic. Truth is an important consideration (and is, in fact, the aim) of logic when considered in its totality—both formal and material.

In formal logic you study the form of an argument apart from or irrespective of its content, even though some content must be used in order to show the form. Maritain put it this way:

To study any complicated machine, a reaper for instance, we must begin by making it work in the void, while we learn how to use it correctly and without damaging it. In the same way we must first of all learn how to use reason correctly ... without damaging it.2

__________ What is Formal Logic? Formal logic, the study of the form of arguments, is divided into deduction and induction. At the most fundamental level, the difference between the two is that in a valid deductive argument, the conclusion asserts no more than what is contained in the premises, while in an inductive argument, more is asserted in the conclusion than is contained in the premises. That is why, in a valid deductive argument, the truth of the premises guarantees the truth of the conclusion, while, in a valid inductive argument, the truth of the premises only makes the conclusion probable.

Valid deductive arguments offer sufficient proof for their conclusions, whereas valid inductive arguments only offer good grounds for believing in the conclusion. In fact, because induction is a weaker form of proof than deduction, many people do not even use the term ‘valid’ for a good inductive argument, because validity has the sense of necessary proof, which is absent from even a good inductive argument. They say instead that a good inductive argument is cogent, a term which has the sense of convincing, rather than demonstrative.

This distinction—between deductive and inductive inference—is often misunderstood in common language. Sir Arthur Conan Doyle, for example, has his character Sherlock Holmes refer to his own style of inference as “deduction,” when, in fact, Sherlock Holmes is not notable for his deduction, but rather his induction. Holmes reasons from particular observations to more general conclusions.

In deduction, there are two kinds of reasoning: categorical and hypothetical. Categorical reasoning orders thought according to the connection between terms. For example, in the syllogism above, it is the arrangement of the terms ‘man,’ ‘mortal,’ and ‘Socrates’ that will determine the validity of the syllogism. Hypothetical reasoning orders thought according to the connection between whole statements. An example of hypothetical reasoning would be:

If all men are mortal, then Socrates is mortal
All men are mortal
Therefore, Socrates is mortal

The proper connections between the statements “all men are mortal” and “Socrates is mortal” will determine whether the argument is valid or invalid.

Categorical reasoning encompasses three areas of study: simple apprehension, judgment, and deductive inference. Simple apprehension, says Maritain, “is the act by which the intellect grasps or perceives something without affirming or denying anything about it.” Under simple apprehension, a student studies individual words, and

through an understanding of what words mean, he gets a solid grounding in what we mean when we say we know something. This is important in argumentation because if we use words in different senses in the same argument, we can end up coming to the wrong conclusions.

Judgment is the act by which we unite concepts by affirming or divide concepts by denying. In judgment, we study whole statements: we study the four ways in which statements can be opposite one another and the three ways in which statements can be transformed into other statements that mean the same thing. But it is in deductive inference that formal logic culminates.

Deductive inference is the act by which we acquire new knowledge by means of what we already know. Under deductive inference, the student learns the seven rules for validity and how to apply them. Once he has understood these, he is then shown the 64 different forms of arguments, with special attention to the 19 valid forms.

Advanced study in categorical reasoning includes an analysis of complex syllogisms, such as polysyllogisms, sorites, epicheirema, and dilemmas. In addition to categorical syllogisms (see p. 14), a study of formal deductive logic includes the study of hypothetical syllogisms (see p. 15).

In hypothetical syllogisms, the major premise is a compound proposition. There are three types of hypothetical syllogisms: conditional syllogisms (where the major premise is an “if … then” statement), disjunctive syllogisms (where the major premise is an “either … or” statement), and conjunctive syllogisms (where the major premise is a “both … and” statement).

The Special Case of Modern Logic. In addition to traditional logic, there are other systems widely considered to be examples of deductive formal logic. The two most widely used are modern propositional logic and modern predicate logic. Traditional logic, as we have said, concerns itself with the relationships between and among the terms ‘man,’ ‘mortal,’ and ‘Socrates.’

Modern propositional logic, however, deals with the relationship between propositions in an argument without taking the interior structure of the statements into account. It restricts itself to hypothetical reasoning and ignores categorical reasoning altogether.

According to traditional logicians Peter Kreeft and Ronald Tacelli, the reason for this has to do with the differing philosophical assumptions behind traditional and modern systems of logic:

This [traditional logic] is a logic of (linguistic) terms, which express (mental) concepts, which represent (real) essences, or the natures of things. (The Greek word logos has all three of these meanings.) Many modern philosophers are suspicious and skeptical of the venerable and commonsense notion of things having real essences or natures and of our ability to know them. Aristotelian logic assumes the existence of essences and
our ability to know them, for its basic units are terms, which express concepts, which express essences. But modern symbolic logic does not assume what philosophers call metaphysical realism (that essences are real), but implicitly assumes instead metaphysical nominalism (that essences are only nomina, names, human labels), since its basic units are not terms but propositions. Then it relates these propositions in argumentative structures just as computers can do: if p, then q; p; therefore q. 

The mention of computers is very much to the point. In many respects, modern logic is an expression of the way computers think. In this respect, it is quite useful as preparation for computer programming. But many traditional logicians contend that while modern logic reflects the way that computers think, only traditional logic adequately reflects the thinking of human beings—beings who have a soul and who are able to apprehend the natures of things. Some traditional logicians even claim that modern logic is not logic at all, but rather that it is primarily a study of other mathematical, nonlogical, relations.

In any case, it should be pointed out that since modern logic is mathematical rather than linguistic, it has little use in the classical trivium, since the trivium (grammar, logic, and rhetoric) is language study. If it is to be considered a part of classical education, its place would better be considered to be in the quadrivium, since the quadrivium is the mathematical side of the liberal arts.

For example, take the following hypothetical syllogism as expressed in traditional logic:

If all men are mortal, then Socrates is a mortal
All men are mortal
Therefore, Socrates is a mortal

In propositional logic, this argument would be put in the form of symbols, as follows:

\[ P \rightarrow Q \]
\[ P \]
\[ \rightarrow Q \]

This kind of an argument deals with the relationships between the statements “All men are mortal” and “Socrates is a mortal”—in other words, between whole statements.

Modern predicate logic deals with the relationship between and among terms and propositions. It can use many kinds of connectors:

Some angels are evil. Furthermore, some animals are rational.
If there are any angels, then animals are sinful if they are rational.
Therefore, some animals are rational.

Modern logicians would also put this argument into symbolic form so that it could be analyzed using various rules. Both forms of modern logic contain some assumptions that conflict with those of traditional logic.

Inductive Reasoning. In addition to deduction, formal logic also encompasses induction. Generally speaking, try to think of reasoning as movements of the mind. While deductive reasoning (the kind of reasoning described above) moves from universal principles to particular conclusions, inductive reasoning moves from particular facts to universal conclusions.

There are three kinds of induction: complete induction, incomplete induction, and reasoning by analogy. In complete induction, all of the parts of the possible whole are enumerated in the premises; in incomplete induction, only some of the parts of the possible whole are enumerated; reasoning by analogy reasons from a particular fact or set of facts to another particular fact or set of facts.

What is Material Logic? Material logic, as we said, is concerned with the content of argumentation: the what, rather than the how, of reasoning. Although material logic is not quite as systematic as formal logic, there are three general divisions we can identify.

Division I: Under the first division, we study the modes of being—the different ways in which being can be expressed. The first division of being is according to its comprehension (this will be made clearer in a later chapter). This division is called the ten categories of being, which are the ten ways being may be said according to comprehension (in other words, according to the thing’s intelligible content). These would include the following:

- **Substance**: the names of people, animals, plants, and other natural things
- **Quantity**: how much, how many, etc.
- **Quality**: the names of dispositions, habits, abilities, inabilities, sensible qualities, figures, and forms
- **Relation**: how a thing is related to other things
- **Action**: how a thing acts mentally or physically
- **Passion**: how a thing is affected by other things
- **Time**: when a thing is, was, or will be
- **Place**: where a thing is, was, or will be
- **Posture**: the order or disposition of the parts of a thing
- **Possession**: the state of having something

In other words, something can be said to “be” in any one of these ten respects. Additionally, under the first division of material logic, we would also study the five predicables. These are the five ways that being may be expressed according to extension (in other words, there are five ways you can say something about a thing with respect to what it refers to). They are as follows:

- **Genus**: what general class a thing falls into
- **Species**: what specific group under the general class a thing falls into
- **Difference**: how a thing differs from other things in the same species
- **Property**: the features or characteristics of a thing
- **Accident**: what a thing happens to be
Division II: Under the second division, material logic encompasses the *modes of knowledge*, of which there are three: *definition*, *division*, and *argumentation*. Through the techniques of definition, we study what a thing is according to its *composition* or *intelligible content*. Through division, we learn what a thing is according to its *extension* (in other words, we learn what specific things a certain concept applies to). Under argumentation, we would study the value of an argument. This would include *necessary* arguments, *probable* arguments, and *fallacious* arguments.

Under definition, one of the things we would study would be the *four causes*:

- **Formal cause**: what *kind* of thing it is
- **Material cause**: what a thing is *composed of*
- **Efficient cause**: who or what *made* a thing or *keeps it in existence*
- **Final cause**: the *purpose* or *potential* use of a thing

Division III: Under the third division of material logic, we study *demonstration* and analyze argumentation into the different *modes of argument*. These would include *judicative*, *dialectical*, *rhetorical*, and *poetic* reasoning. Judicative reasoning is reasoning based on facts, self-evident principles, or true definitions. If the facts, principles or definitions on which it is based are true, the conclusion will necessarily be true. Dialectical reasoning is based on theories or opinions and yields only probable conclusions. Rhetorical reasoning is based on popular sayings, mottoes, proverbs, and examples. It is used to persuade people psychologically to accept a certain viewpoint. Finally, poetical reasoning is based on stories, songs, poems, or fables. Its chief appeal is to the imagination, and it seeks to attract the listener to the truth.

As traditional logician Edward Simmons has put it, “A knowledge of these relations, in addition to a knowledge of those which are of formal import, should equip a man to reason with total effectiveness.”

Summary. Logic is the branch of philosophy that studies reason as an instrument for attaining truth. It is divided into *formal* logic, which studies the form or structure of arguments, and *material* logic, which studies the content of arguments. Formal logic is divided into *deductive* reasoning, which reasons from general principles to particular conclusions, and *inductive* reasoning, which reasons from particular premises to general conclusions.

*Material* logic is divided into three main parts:

I. Modes of being
   a. the *ten categories*—ten ways in which being can be expressed
   b. the *five predicables*—five ways something can be said about something else

II. Modes of knowledge
   a. *definition*
   b. *division*
   c. *argumentation*

III. Modes of argumentation, or demonstration
   a. *judicative*
   b. *dialectical*
   c. *rhetorical*
   d. *poetic*