Logica Algazelis

Treatise on Logic: Proemium and Fifth Maneria

by al Ghazali

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(Draft)

by

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<Proemium>

A chapter about what must be presupposed (praeponi) to understand logic, and to show its utility, and what its parts are.

1. <u>Now what must be presupposed is this, namely that</u> although there are many branches of the sciences, there are but two primary parts, imagination and belief. Imagination is the grasp of realities that singular expressions (<u>singulae dictiones</u>) signify in order that they might be understood and made certain. For instance, there is a grasp of the signification of the names "stone," "tree," "angel," "spirit," and the like. Belief, on the other hand, is that which is said, for instance, that the world began, and obedience has its reward.

Now it is necessary that every belief be preceded by at least two imaginations, for whoever does not understand the signification of this expression "world" by itself, and of this expression "began" by itself, will not understand this belief that the world began. But this name "world," if its signification is not imagined, will signify nothing, like "borld." And in the same way the signification of this verb "began," if it is not understood, will be like the signification of the utterance (<u>vocis</u>) "cegan," that is, nothing. And if someone were to say "the borld cegan" one would neither believe it nor contradict it, for how can anyone grant or deny what he does not understand?

Further, imagination and belief are each divided into that which is grasped by itself without inquiry and thought (<u>excogitatione</u>), and that which is not grasped without inquiry. Those things that are imagined immediately without inquiry are, for instance, "being," "reality," and the like; those, on the other hand, that are not imagined without inquiry are, for instance, "spirit," "angel," and the imagination of realities (<u>rerum</u>) of which the essences are hidden.

Now a belief that occurs immediately without inquiry is like the opinion that two is more than one, and whatever things are equal to the same thing are equal to one another. And along with these there are also sensibles and probables and many other sorts of opinions, and in receiving them everyone agrees without preceding inquiry, and they are embraced in the thirteen species about which we will speak below. But beliefs that are not grasped without inquiry are, for instance, that the world began, that there is a resurrection of the body, that there is reward and retribution for good and evil, and the like.

Whatever cannot be imagined without inquiry cannot be grasped without definition; and whatever cannot be believed without inquiry cannot be grasped without argument.

But before this it is undoubtedly necessary that some knowledge should precede. For were we are ignorant of the signification of the name "man" and were to ask "what is it?", and if it were answered us that "it is a rational mortal animal," then it would be necessary that "animal," and similarly "rational," be known to us in order that we might acquire from the cognition of these two the cognition of man of which we were ignorant.

Again, as long as we did not believe that the world began, even if someone told us that the world was formed, but everything that was formed began, so the world began, certainly all of this would not make us know that which we did not know about the beginning of the world, unless the belief that the world has a form, and that everything with a form began, preceded, and in that case, from these two opinions we would acquire knowledge of that of which we were ignorant.

Now it is obvious from this that no knowledge which is inquired into is acquired except through some knowledge preceding it. And this does not go on to infinity, for it is necessary that it arrive at first things which are founded on the nature of the intellect without inquiry or research (meditatione).

This, then, is what must be presupposed in a treatise on logic. What follows concerns the utility of logic.

2. Now that it is clear that what is unknown cannot become known except through what is known already, it is also established that not everything unknown can be known through just one thing that is known, but each unknown thing has its own thing that is known agreeing with it, which is the way of arriving at it and representing it to the intellect, for this is the way by which the unknown is made clear. Now that which leads to the cognition of imaginative knowledge is called definition and description. That which leads to the knowledge of belief is called argument. Of arguments, one sort is syllogism, another induction, another example, and so on. Definition and syllogism are also divided into the correct sort through which truth is acquired and the false sort that has a likeness to the truth.

The science of logic gives a rule by which one can tell whether a definition and syllogism are faulty or not, so that one can tell true knowledge from the untrue. And this is, as it were, the weight and measure of all the sciences. And in that which is not weighed by this weight, increase and decrease, gain and loss, will not be cognized.

Now if someone asks, "If the utility of logic is to tell knowledge from error, then what is the utility of science generally?", we would reply that all utility is vile in comparison with eternal happiness, which is the happiness in the next life, but this happiness depends on the perfection of the soul, and the perfection of the soul consists in two things, namely purification and adornment. Purification of the soul occurs when it has expiated its unclean habits, and been made holy from filthy imaginings. It is adorned when certainty concerning the truth is painted upon it, so that divine truths are revealed to it, and, indeed, the being of the whole in its order--I mean by true revelation that which agrees with the truth in which there is no error and nothing hidden.

For instance, it is like a mirror which does not have its perfection unless a beautiful form appears in it, in such a way that the form is without deformity or change. This would not occur unless it was cleansed of dirt

and rust, and then the correctness of a beautiful form was placed before it. So the soul is a mirror, for the forms of the whole of being are painted on it when it has been purified and cleansed of unclean habits (sordidis moribus). Nor can it tell between honorable and dishonorable habits except through knowledge, and the forms of all things which are painted on the soul are nothing except the knowledge of all being within it.

And there is no way of coming to knowledge except through logic. Therefore the utility of logic lies in the grasp of knowledge. But the utility of knowledge lies in the acquisition of eternal happiness. If, then, it is established that eternal happiness cannot be attained except through the perfection of the soul, which does not occur without purification and adornment, surely logic is a science of the greatest utility.

What follows concerns the parts of logic.

3. The parts of logic and their order are cognized by showing the aim of logic. Its aim is to define and prove, and tell the faulty from what is not faulty, or the true from the false. Hence proof is quite necessary. But a proof is certainly a composite thing, for a proof cannot be marshalled from fewer than two propositions, as we will show below; and in every proposition there is a predicate and a subject; and in every predicate and subject the expression (dictio) is what signifies wholly some concept.

If someone wishes to grasp the composite in being or in knowledge, he can arrive at it only with difficulty unless he has cognition of each of the parts beforehand. For just as the builder of a house first needs to prepare the bricks, the wood, the mortar, so that afterwards he might build the house from these, so knowledge runs according to the form of the known. For knowledge is a parallel example related to what is known. Therefore the one seeking knowledge of the composite must first grasp the knowledge of the parts.

So it follows that (1) we will first speak about words and how they signify concepts, (2) then about concepts and their divisions, (3) then about statements, namely about their composition from subject and predicate, and their species, (4) and last about proof, which arises from two statements. But we will speak of proof in two ways, in one of the matter, in the other of the form, as you will see below. And in these alone will be contained everything there is to be said about logic.

<Fifth Maneria>

The fifth maneria is about those books which follow the book of arguments, in which is the utility of demonstration.[1] These are divided into four species.

1. The first species is about those questions to which one can learn the answers (quaestionibus disciplinabilibus), namely, about the four questions that are treated in the sciences.[2] Of these the first is "whether it is?", by which it is asked whether a reality has being. The second is "What is it?", by which it is asked concerning the quidity of the reality. The third is "Of what sort is it (quale est)?", by which the difference of the reality is sought by which it is separated from what agrees with it in its genus. The fourth is, "Why is it?",

by which the cause of the reality is sought.

Now the question "whether it is?" arises in two ways, in one, when it is asked whether the reality has being, as when it is asked if God is, and if foolishness is; in the second way when the disposition of the reality is sought, as when it is asked whether God is willing or whether the world began.

The question "what is it?" likewise arises in two ways: one, when it is asked about the interpretation of the name in order to find out the sense of the speaker, as when it is said "anthropos nekten," and it is asked "what is to be understood by this?," and it is replied, "a man walks"; in the second way when the truth of a reality in itself is sought, as when it is asked, "what is a man?", and it is answered, "a rational, mortal animal."

The question "what is it?" in the first way precedes the question "whether it is?" for whoever does not understand the name of a reality does not ask whether that reality is. But taken in the second way it is posterior to "whether it is?", for whoever does not know whether a thing has being deos not inquire what it is.

The question "of what sort is it? inquires about the difference, or about a property.

the question "why is it?" arises in two ways: in one, the cause of the being of a reality is sought, as when it is asked "why was the bread burned?", and it is answered, "because it fell in the fire"; in another way, the cause of the opinion is sought, as when it is said, "why do you say it fell in the fire?", and it is answered, "because it was found burned."

The question "what is it?" and "what sort is it?" pertain to the imagination, but the question "whether it is?' and "why is it?" pertain to belief.

2. The second species: Demonstrative syllogism is divided into that by which the cause of being of the conclusion is acquired and that by which faith that it is a being is acquired. The first is called demonstration why it is so (de quare); the second is called demonstration that it is so (quia est).[3]

For example, if someone held that there is smoke in that place and someone said to him "why do you say this?", he would say, "because there is fire there, and wherever there is fire there is smoke, therefore there is smoke there." He produces for us a demonstration why it is so, that is, a demonstration of the cause of his believing there is smoke and of the cause of the smoke itself.

But when he has said "there is fire there," and someone has asked him "why do you say this?", and he responds "because there is smoke there, and where there is smoke there is fire," he has assigned the cause of his believing fire is there, not the cause of the fire's being there.

For the caused always suggests the cause, and the cause suggests the caused. But the caused does not make it the case that the cause must be, though the cause does make it the case that the caused must be. And this is our sense. And one of the things caused does not make it the case that anything else among the things

caused must be, even if they are concomitantly caused things falling under the same cause.

Being the cause of the discovery of the major term absolutely considered is not something that belongs to demonstration why, but if it is the cause why the minor term is informed by the major term, this is enough, namely that it be the cause of its being contained in it. So when it is said, "man is an animal, and every animal is a body, therefore man is a body," this demonstration is a demonstration why, for the middle term is the cause of the discovery of the major and minor terms. For man is a body because he is an animal, since corporeality is an essential property of animals, which comes to it because it is an animal, not from anything more common, as, for instance, from being, nor from anything less common, as from the man's being a writer.

3. The third species concerns those things with which demonstrative sciences are most concerned; and these are four, namely subjects, essential accidents, questions, and principles.

(1) On the first, that is, subject, it is understood that every science undoubtedly has a subject of which it treats, and the properties (proprietates) of which are sought in it.[4] For instance, the subject of medicine is the human body, and the subject of geometry is measure, and the subject of arithmetic is number, and the subject of music is tone, and the subject of the science of civil law is controversy. Now the investigator (speculator) of each science ought not to prove the subject in his science, for neither does a musician prove that tone is, nor does a geometer prove that measure is an accident and is, but these must be proved in another science.[5] And still it is necessary to wholly understand these subjects and their definitions according to imagination.

(2) By the second, essential accidents, are understood properties, accidents of that subject alone and not of any other, just as being a triangle and quadrangle are accidents of certain measures, and being curved or straight of certain other measures, and these are essential accidents of the subject in geometry; and just as evenness and oddness are accidents of number; and just as consonance and dissonance are accidents of tones to which proportions belong; and just as health and sickness are accidents of the bodies of animals.

Now it is necessary to understand in the principles of each science these essential accidents with their definitions according to imagination. But it is not cognized that these exist in their subjects except from the fabric of this very science. For the aim of the science is nothing except to inquire about these accidents within it.

(3) By the third, questions, we seek the coherence of these essential accidents with their subjects. And this is what is sought (petitur) in every science, and what is asked in it.

As they are asked about in it they are called the questions of the science, but as they are sought they are called petitiones. As they are concluded in demonstrations they are called conclusions. In all of these one thing is named, but the names are varied according to the variety of interpretations.

And since every question is to be proven in some science, the subject of the question will be either the subject of that science or the essential accidents of the subject of that science. Now should the subject of the

science be the subject of the question, then either (1) it would be the subject alone, as it is is said in geometry, "every measure is either common with a measure of the same genus, or not common." And this <that is, measure> is what is customarily sought in geometry. And like this is what is said in arithmetic, that "every member is a middle between two equally distant extremes," so that five is the middle between six and four, and seven and three, and eight and two, and nine and one. (2) Or else it would be that very subject, but with an essential impression, that is, an essential accident. For instance, it is said in geometry that "every measure which is not common with a given measure is not common with any measure common with the given measure." For here measure that is not common with any measure common with the same, not measure without qualification, is taken as subject. And it is like this which is said in number, that if any number is divided in two, and the halves are multiplied together, the result will be one quarter of that obtained from multiplying the whole by itself. For here number halved, not number without qualification, is taken as subject. (3) Or there would be a subject of the question which is only a species of the subject of the science, so when it is said that six is a perfect number, for six is a species of number. (4) Or it would be a species, but with an impression, as when it is said in geometry that every straight line meeting a straight line makes two angles equal to two right angles. For line is a species of measure, which is the subject of the science, but straightness is an essential accident of it. (5) Or it would be the impression alone, as when it is said in geometry that in every triangle the three angles are equal to two right angles. It is impossible, then, for the subject of demonstrative sciences to be anything except one of these five, the predicates of which are essential accidents of the subject itself.

4. By the fourth, which is principles, we understand the propositions granted in that art by which the questions in the art are proved. The principles themselves are not proved in the art. They are either: (1) First principles. And these are said to be known per se. For instance, this is said in the beginning of Euclid, "when equals are subtracted from equals, the remainders are equal, and if equals are added to equals, the sums are also equal. Or (2) they are not first principles, but are accepted by the teacher, and should he accept them and believe them, they are called "proposed principles," but should he doubt them, it is called "prologue."[6] He accepts these, holding them in his heart, only until they are proven by him in another art. For instance, this is said in the beginning of Euclid, "it is necessary to grant a circle can be drawn at every point, occupying any space, and all lines from the center of the circle to its circumference are equal." For there are many men who do not know that a circle is such that all lines from its center to its circumference are equal, and this is proposed to them in the beginning of the science.

4. The fourth species concerns all the conditions on the propositions of a demonstration, which are four. They are true, necessary, primary, and essential.[7]

(1) True <propositions> are understood as the most certain, for instance, the per se known, sensible, and those which are with these, as was said before.

(2) Necessary <predications> are like animal of man, not like writer of man. Now this is a condition <on the premises> when a necessary conclusion is sought concerning these things, and when a proposition is not necessary the wise ought not to believe the conclusion necessarily.

(3) <Propositions> are primary when the predicate of the proposition is proximate to the subject, because of the subject. For instance, this, "every animal is a body." For an animal is a body because it is an animal, not because of something else at a distance from this. And this, for instance, is not <primary>, "Man is a body," for a man is not a body because he is a man, but because he is an animal, and since he is an animal he is a body. Corporeality is primary in animal, and is in man mediated by animal, nor is it more distant under that than writer under animal, for writer is in animal only because of humanity, which is not so distant. Therefore those are primary which have no middle term between subject and predicate in the subject beforehand, and mediating another (quarum nihil est medium cui insit prius, et eo mediante alii). This condition is preserved in a primary proposition.

But in propositions that were already the conclusions of arguments, and are propositions <that is, premisses> in other arguments, this condition is not preserved, but we <still> posit necessary and essential <propositions> in these <arguments>.

(4) Essential propositions are those in which there is nothing about extraneous accidents, for one does not proceed from these in the sciences. A geometer does not consider whether a straight line is more beautiful than a curved one, or whether a circle is contrary to a line, for beauty and contrariety are extraneous to the subject of his art, namely measure. These belong to measure not because it is measure, but because of another that is more general (communis) that that, being or something of that sort. For a doctor does not consider whether a wound is round or not, since roundness does not belong to a body because there is a wound in it, but because of something more general. For when a doctor says, "this wound is difficult to cure, since it is round, and a circle is larger than other figures," this is not from medical science, nor does he say this because he knows medicine, but because he knows geometry.

It is necessary, then, that in the sciences the predicate of a question should be essential, and be in essential propositions. But there are different kinds of essential propositions, for it is taken in these two ways: (1) in one way, as the predicate enters into the essential definition of the subject, for instance, animal in man, since it is essentially in man, and enters into its definition. The sense of "man" is nothing but "animal of such a sort." (2) In the second way, as a subject enters into a definition of the predicate, and not conversely. For instance, as snub in nose, and straightness in line. For the understanding of snub is nothing but having a certain sort of nose, and so nose is without any doubt in the definition of snub.

Now to be essential in the first way is unnecessary for a predicate in the questions that occur in the sciences. For the subject is only known through the predicate <when a proposition essential in the first way is concerned>. Hence the cognition of the predicate is prior to the cognition of the subject. In what way, then, is the existence of the predicate in the subject sought? Whoever does not understand triangle with its definition according to imagination does not seek that which is predicated of it, but afterwards he can ask if all its angles are equal to two right angles or not. But to ask whether it is a figure or not is unnecessary, since figure is understood beforehand, and then is divided into <figure> contained by three lines, which is triangle, or four, which is quadrilateral, or more. Knowledge of the predicate, therefore, precedes knowledge of the subject.[8]

It is necessary, then, that <in a demonstration> the predicates of the propositions <i.e. the premisses> be essential. And it can be granted that two predicates of two propositions are essential according to the second meaning <u>intentionem</u>>, but that they are essential according to the first meaning cannot be granted. For the conclusion is cognized before the proposition, since the essential is essential according to the first meaning (<u>quoniam essentiale essentialis secundum primam intentionem essentiale est</u>).[9] Therefore it ought not to be said that every man is an animal, and every animal is a body, therefore every man is a body; even though this can be asked, for the cognition of corporeality is prior to the cognition of humanity. Since, then, man is the subject of a question, it is necessary first that man be imagined, then it is asked what is said about man. It is without doubt necessary that whoever imagines man first imagines animal and body, because first body is imagined, then it is divided into animal, and so on, and then animal is divided into rational and so on. But it is granted that <there are demonstrations in which> the minor proposition is essential according to the first meaning, and the major is essential according to the second meaning, and conversely.[10]

And this is what we wish to show and make understood about logic.

NOTES

[1]The fifth <u>maneria</u> gives an outline (and interpretation) of the contents of Aristotle's <u>Posterior Analytics</u>.

[2]For the classification of questions, see <u>Posterior Analytics</u> II 1.

[3]For the distinction between demonstration why and demonstration that, see <u>Posterior Analytics</u> I 13. There is a reference to the distinction in <u>Posterior Analytics</u> II 1, so that al-Ghazali feels it natural to bridge over to this subject from his concern with questions. The example of fire and smoke is not from Aristotle, but is a commonplace for the discussion of causal connections in Arabic and Indian logic.

[4]See <u>Posterior Analytics</u> I 7, 75a39-b2; I 10, 76b11-22, for the subject and essential accidents (<u>pathema</u> or <u>pathos</u> in Aristotle).

[5]See Aristotle, <u>Physics</u> I 2; <u>Posterior Analytics</u> 10, 76a31 ff.

[6]For propositions and postulates, see Posterior Analytics I 10, 76b27 ff.

[7]For true and primary, <u>Posterior Analytics</u> I 2, for necessity, <u>Posterior Analytics</u> I 4 73a24-25, for essentiality of the two sorts, <u>Posterior Analytics</u> I 4 73a34 ff.

[8]The point here is that when a proposition is essential in the first way, one must know the truth of the proposition in order to understand what the subject is in the first place. So man is animal, but we have to know that to know what man is in the first place, and so such a proposition cannot be demonstrated to us by an argument, since we must know that it is true already to understand the premises of the argument.

[9]The idea here seems to be that one cannot construct a syllogism from two premises essential according to the second meaning, since then the conclusion would be essential according to the second meaning, and would be known as soon as the subject is grasped. Thus the conclusion would be known without the use of a demonstration, even though the conclusion is not primary. Also, of course, al-Ghazali has said that the conclusion of a demonstration always concerns the inherence of an essential accident in the subject, and no conclusion that is essential in the second way does this. Note that he seems to insist here that a demonstration must have <u>both</u> premises essential according to the second meaning. But surely it is not so. He considers the case of mixed premises only at the end of the next paragraph, after disposing of the case in which both premises are essential according to the first meaning.

[10]So a demonstration might run, "Everything rational is capable of laughter, man is rational; therefore man is capable of laughter." The major premise here, "Everything rational is capable of laughter," is essential according to the second meaning, since the capacity to laugh, being an essential accident, can only exist by inhering in something rational, and so its definition (at least implicitly) includes a reference to the rational as its necessary subject of inherence, just as the definition of snub includes nose. The minor premise is clearly essential according to the first meaning. But why does he add "and conversely"? Does he think a demonstration can be constructed in which the major premise is essential in the first way, and the minor premise in the second? This won't work in Barbara, but let us try a demonstration in Celarent. (For negative demonstrations see <u>Posterior Analytics</u> I 15, 21 and elsewhere.) "No man is a donkey, every brayer is a donkey; therefore no man is a brayer." Here the major premise would seem to be essential according to the first meaning, and the minor premise essential according to the second meaning, and so it may be that al-Ghazali has negative demonstrations in mind. What sort of

demonstration would have both premisses essential according to the second meaning? Perhaps he allows demonstrations in which one premise predicates an essential accident of the subject, and the other predicates a second essential accident of the first essential accident, thus: "A triangle is something with the sum of its three angles equal to two right angles, and such a thing is something that can be inscribed in a circle; therefore a triangle can be inscribed in a circle."