that the beasts are entirely destitute of it. A beast may experience the same sensation of hot water that we do, but is unable to separate the idea of heat and that of the water itself: it knows heat only in so far as it is connected with the water, but has not the abstract idea of heat which we have. It is said, that these notions are general ideas, which extend to several things at once, as we may find heat in stone, wood, water, or any other body; but our idea of heat is not attached to any one body; for if my idea of heat were attached to a certain stone, which first supplied me with that idea, I could not affirm that wood or other bodies were hot. Hence it is evident, that these notions, or general ideas, are not attached to certain objects, as sensible ideas are; and as they distinguish man from the brute creation, they properly exalt him to a degree of rationality wholly unattainable by the beasts.

There is still farther a species of notions, likewise, formed by abstraction, which supply the soul with the most important subjects on which to employ its powers: these are the ideas of *genus* and *species*. When I see a pear-tree, a cherry-tree, an apple-tree, an oak, a fir, &c. all these ideas are different; I, nevertheless, remark in them several things which they have in common; as the trunk, the branches, and the roots; I stop short only at those things which the different ideas have in common, and the object in which all such qualities meet I call a *tree*. Thus the idea of tree, which I have formed in this manner, is a *general notion*, and comprehends the sensible ideas of the pear-tree, the apple-tree, and, in general, of every tree that exists.

Now, *the tree* which corresponds to my idea of tree, no where exists; it is not the pear-tree, for then the apple would not be comprehended under it; for the same reason, it is not the cherry-tree, nor

the plumb, nor the oak, &c.; in a word, it exists only in my soul; it is only an idea, but which is realized in an infinite number of objects. In like manner, when I speak of a *cherry-tree*, it too is a general notion, which comprehends all the cherry-trees that exist: this notion is not restricted to a particular cherry-tree in my garden: for then every other cherry-tree would be excluded.

With respect to general notions, every existing object, comprehended under one, is denominated an *individual*, and the general idea, say that of the cherry-tree, is denominated *species* or *genus*. These two words signify nearly the same thing, but genus is the more comprehensive, including in it a variety of species. Thus the notion of a tree may be considered as a genus, as it includes the notions of pear-trees, apple-trees, oaks, firs, and so on, which are species; and of so many others, each of which contains a great number of existing individuals.

This manner of forming general idea is, therefore, likewise performed by abstraction; and it is here chiefly that the soul exerts the activity, and performs the operations from which all our knowledge is derived. Without these general notions, we should differ nothing from the brutes.

7th February 1761.

LETTER CI.—OF LANGUAGE; ITS NATURE, ADVANTAGES, AND NECESSITY, IN ORDER TO THE COMMUNICATION OF THOUGHT, AND THE CULTIVATION OF KNOWLEDGE.

WHATEVER aptitude a man may have to exercise the power of abstraction, and to furnish himself

with general ideas, he can make no considerable progress without the aid of language, spoken or written. Both the one and the other contains a variety of words, which are only certain signs corresponding to our ideas, and whose signification is settled by custom, or the tacit consent of several men who live together.

It would appear from this, that the only purpose of language to mankind is mutually to communicate their sentiments, and that a solitary man might do very well without it; but a little reflection only is necessary to be convinced, that men stand in need of language, as much to pursue and cultivate their own thoughts, as to keep up a communication with others.

To prove this, I remark, first, that we have scarcely a word in any language whose signification is attached to one individual object. If each cherry-tree in a whole country had its proper name, as well as every pear-tree, and, in general, every individual tree; what an enormous complication in language would result from it? Were I under the necessity of employing a particular term to denote every sheet of paper in my bureau, or if I should, from caprice, think fit to give each a particular name, this would be as useless to myself as to others.

It is, then, a very imperfect description of language to say, that men have, from the first, imposed on all individual objects certain names to serve them for signs. The words of a language express general notions; and you will rarely find one which marks only a single individual. The name, *Alexander the Great*, is applicable to one particular person; but then it is a compound name. There may have been many thousands of Alexanders; and the epithet *great* extends to an infinite number of things. It is thus that all men bear names, to dis-

tinguish them from others, though these names may be frequently common to many.

The essence of a language consists rather in its containing words to denote general notions, as that of tree corresponds to a prodigious number of individual beings. These words serve not only to convey to others, who understand the same language, the same idea which I affix to the words; but they are likewise a great assistance to me in representing this idea to myself. Without the word tree, which represents to me the general notion of a tree, I must imagine to my myself at once a cherry-tree, a pear-tree, an apple-tree, a fir, &c. and thence extract what they have in common. This would necessarily oppress the mind, and speedily involve in it the greatest perplexity. But having, once for all, determined to express by the term tree the general notion formed by abstraction, this term always excites in my soul the same notion, without my having occasion to recollect its origin; and accordingly, the word *tree* alone, for the most part, constitutes the object of the soul, without the representation of any real tree.

The word *man* is, in like manner, a sign to denote the general notion of what all men have in common; and it would be very difficult to tell or to make the enumeration of all that this notion contains. Would you say that he is a living two-legged being? A cock would likewise be included in this description. Would you say, in words of Plato's definition, that he is a two-legged animal without feathers? You have only to strip the cock of his feathers, in order to obtain the Platonic man.

I do not know whether those who say that man is an animal endowed with reason, express themselves more accurately; for how often do we take for men certain beings of whose rationality we have no assur-

ance. On viewing an army, I have not the least doubt that every soldier is a man, though I have not the smallest proof that they are all endowed with reason. If I were to make an enumeration of all the members necessary to constitute a man, some men would always be found defective in one, perhaps in several of these, or we might find some beast who had them all. On investigating, therefore, the origin of the general notion of man, it is almost impossible to say wherein it consists.

No one, however, has any doubt respecting the signification of the word; because every one, wishing to excite this notion in his soul, has only to think on the word *man*, as if he saw it written on paper, or heard it pronounced, according as the respective language of any one may be.

Hence we see that, for the most part, the objects of our thoughts are not so much the things themselves, as the words by which these things are denoted in language; which greatly facilitates the exercise of thought. What idea, in fact, do we associate with the terms *virtue*, *liberty*, *goodness*, &c.? Not surely a sensible image; but the soul, having once formed the abstract notions which correspond to these terms, afterwards substitutes them in its thoughts, in place of the things which they denote.

You may easily conceive how many abstractions it was necessary to make, in order to arrive at the notion of *virtue*. The actions of men were first to be considered; they were then to be compared with the duties imposed on them; in consequence of this, we give the name of *virtue* to the disposition which a man has to regulate his actions conformably to his duties. But, on hearing the word *virtue* rapidly pronounced in conversation, do we always connect with it this complex notion? And what idea is excited in the mind, on hearing the particle *and* or

also pronounced? It is readily seen, that these words import a species of connexion; but take what pains you please to describe this connexion, you will find yourself under the necessity of employing other words, whose signification it would be equally difficult to explain; and if I were to attempt an explanation of the import of the particle *and*, I must make frequent use of that very particle.

You are now enabled to judge of what advantage language is to direct our thoughts; and that, without language, we should hardly be in a condition to think at all.

10*th February* 1761.

LETTER CII.—OF THE PERFECTIONS OF A LANGUAGE. JUDGMENTS AND NATURE OF PROPOSITIONS, AFFIRMATIVE AND NEGATIVE; UNIVERSAL, OR PARTICULAR.

I HAVE been endeavouring to show you how necessary language is to man, not only for the mutual communication of sentiment and thought, but likewise for the improvement of the mind and the extension of knowledge.

These signs or words represent, then, general notions, each of which is applicable to an infinite number of objects: as, for instance, the idea of hot, and of heat, to every individual object which is hot; and the idea, or general notion of *tree*, is applicable to every individual tree in a garden or a forest, whether cherries, pears, oaks, or firs, &c.

Hence you must be sensible how one language may be more perfect than another. A language always is so, in proportion as it is in a condition to express a greater number of general notions, formed by abstraction. It is with respect to these notions that we must estimate the perfection of a language.

Formerly, there was no word in the Russian language to express what we call *justice*. This was certainly a very great defect, as the idea of justice is of very great importance in a great number of our judgments and reasonings, and as it is scarcely possible to think of the thing itself without a term expressive of it. They have accordingly supplied this defect, by introducing into that language a word which conveys the notion of justice.

These general notions, formed by abstraction, are the source of all our judgments and of all our reasonings. A *judgment* is nothing else but the affirmation, or negation, that a notion is applicable, or inapplicable; and when such judgment is expressed in words, we call it a *proposition*. To give an example: *All men are mortal*, is a proposition which contains two notions; the first, that of men in general—and the second that of mortality, which comprehends whatever is mortal. The judgment consists in pronouncing and affirming, *that the notion of mortality is applicable to all men*. This is a judgment, and being expressed in words, it is a proposition; and because it affirms, we call it *an affirmative proposition*. If it denied, we would call it *negative*, such as this, *no man is righteous*. These two *propositions*, which I have introduced as examples, are *universal*, because the one affirms of *all* men, that they are mortal, and the other denies that they are righteous.

There are likewise *particular propositions*, both negative and affirmative; as, *some men are learned*, and *some men are not wise*. What is here affirmed, and denied, is not applicable to all men, but to *some* of them.

Hence we derive four species of propositions. The first is that of *affirmative and universal propositions*, the form of which in general is:

Every A is B.

The second species contains *negative and universal propositions*, the form of which in general is:

No A is B.

The third is, that of *affirmative propositions*, but *particular*, contained in this form:

Some A is B.

And, finally, the fourth is that of *negative* and *particular propositions*, of which the form is:

Some A is not B.

All these propositions contain essentially two notions, A and B, which are called the *terms of the proposition*: the first of which affirms or denies something,—and this we call the *subject*; and the second, which we say is applicable, or inapplicable, to the first, is the *attribute*. Thus, in the proposition, *all men are mortal*, the word *man*, or *men*, is the subject, and the word *mortal* the attribute: these words are much used in logic, which teaches the rules of just reasoning.

These four species of propositions may likewise be represented by figures, so as to exhibit their nature to the eye. This must be a great assistance toward comprehending more distinctly wherein the accuracy of a chain of reasoning consists.

As a general notion contains an infinite number of individual objects, we may consider it as a space in which they are all contained. Thus, for the notion of *man* we form a space (PLATE III. *Fig.* 1.) in which we conceive all men to be comprehended. For the notion of *mortal*, we form another, (*Fig.* 2.) in which we conceive every thing mortal to be comprehended. And when I affirm *all men are mortal*, it is the same thing with affirming, that the first figure is contained in the second.

I. Hence it follows, that the representation of an affirmative universal proposition is that in which the space A (*Fig.* 3.), which represents the *subject* of the

proposition, is wholly contained in the space B, which is the *attribute*.

II. As to negative universal propositions, the two spaces A and B, of which A always denotes the *subject*, and B the *attribute*, will be represented thus (*Fig.* 4.), the one separated from the other; because we say *no A is B*, or that nothing comprehended in the notion A, is in the notion B.

III. In affirmative particular propositions, as, *some A is B*, a part of the space A will be comprehended in the space B (*Fig.* 5.); as we see here, that something comprehended in the notion A, is likewise in B.

IV. For negative particular propositions, as, *some A is not B*, a part of the space A must be out of the space B, (*Fig.* 6.) This figure resembles the preceding; but we here remark principally, that there is something in the notion A, which is not comprehended in the notion B, or which is out of it.

14th February 1761.

LETTER CIII.—OF SYLLOGISMS, AND THEIR DIF-FERENT FORMS, WHEN THE FIRST PROPOSITION IS UNIVERSAL.
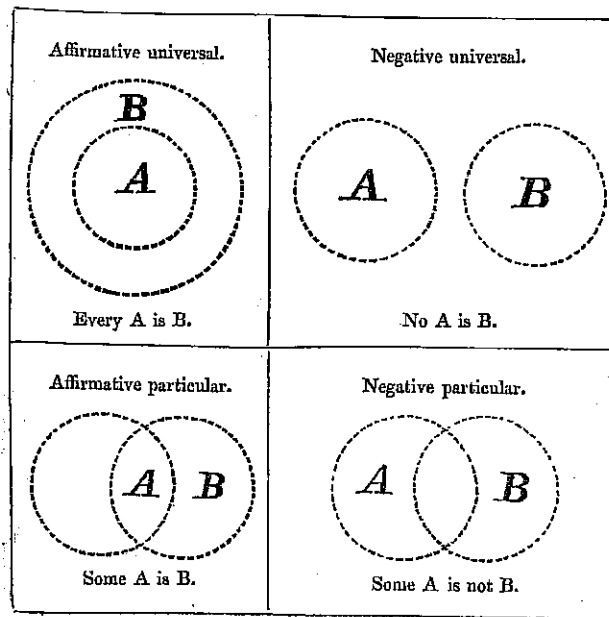
THESE circles, or rather these spaces, for it is of no importance of what figure they are of, are extremely commodious for facilitating our reflections on this subject, and for unfolding all the boasted mysteries of logic, which that art finds it so difficult to explain; whereas, by means of these signs, the whole is rendered sensible to the eye. We may employ, then, spaces formed at pleasure to represent every general notion, and mark the subject of a proposition by a space containing A, and the attribute

by another which contains B. The nature of the proposition itself always imports, either that the space of A is wholly contained in the space B, or that it is partly contained in that space; or that a part, at least, is out of the space B; or, finally, that the space A is wholly out of B.*

The two last cases, which represent particular propositions, seem to contain a doubt, as it is not

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* Our Author subjoins here the following diagram, with this short introduction :—" I shall once more give you a visible representation of these figures or emblems of the four species of propositions."

Emblems of the four Species of Propositions.

Affirmative universal.	Negative universal.
Every A is B.	No A is B.
Affirmative particular.	Negative particular.
Some A is B.	Some A is not B.

decided whether it be a great part of A which is contained, or not contained in B. It is even possible, in the case of a particular proposition, that the notion A may contain the notion B entirely, as in PLATE III. *Fig*. 7; and that, at the same time, as is clear from the figure, a part of the space A may be in the space B, and that a part of A may not be in B. Now, if A were, for example, the idea of *tree* in general, and B that of *oak*, which is contained wholly in the first, the following propositions might be formed:

   I. All oaks are trees.
   II. Some trees are oaks.
   III. Some trees are not oaks.

In like manner, if of two spaces one is entirely out of the other, as in PLATE III. *Fig*. 4, I can as well say, *no A is B*, as *no B is A*; as if I were to say, no man is a tree, and no tree is a man.

In the third case, where the two notions have a part in common, as in PLATE III. *Fig*. 5, it may be said,

   I. Some A is B.
   II. Some B is A.
   III. Some A is not B.
   IV. Some B is not A.

This may suffice to show you how all propositions may be represented by figures; but their greatest utility is manifest in reasonings which, when expressed in words, are called *syllogisms*, and of which the object is to draw a just conclusion from certain given propositions. This method will discover to us the true forms of all syllogisms.

Let us begin by an affirmative universal proposition: Every A is B (PLATE III. *Fig*. 3.), where the space A is wholly in the space B; and let us see how a third notion C, must be referred to each of the other two notions A and B, in order to draw

a fair conclusion. It is evident in the following cases.

I. If the notion C is entirely contained in the notion A, it will be so likewise in the notion B, (PLATE III. *Fig*. 8.); hence results this form of syllogism:

   Every A is B:
   But Every C is A:
   Therefore Every C is B.
Which is the conclusion.

Let the notion A, for example, comprehend all trees, the notion B every thing that has roots; and the notion C all oaks, and then our syllogism will run thus:

   Every tree has roots:
   But Every oak is a tree:
   Therefore Every oak has roots.

II. If the notion C has a part contained in A, that part will likewise be so in B, because the notion A is wholly included in the notion B, (PLATE III. *Fig*. 9 and 10.)

Hence results the second form of syllogism:
   Every A is B:
   But Some C is A:
   Therefore Some C is B.

If the notion C were entirely out of the notion A, nothing would follow with respect to the notion B: it might happen that notion C should be entirely out of B (*Fig*. 11.), or wholly in B (*Fig*. 12.), or partly only in B (*Fig*. 13.), so that no conclusion could be drawn.

III. But if notion C were wholly out of notion B, it would likewise be wholly out of notion A, as we see in *Fig*. 11. Hence results this form of syllogism.

   Every A is B:
   But No C is B, or no B is C:
   Therefore No C is A.

IV. If the notion C has a part out of the notion B, that same part will certainly likewise be out of the notion A, because this last is wholly in the notion B, (*Fig.* 14.)   Hence this form of syllogism:

Every A is B:

But Some C is not B:

Therefore Some C is not A.

V. If the notion C contains the whole of notion B, part of notion C will certainly fall into notion A, (*Fig.* 15.)   Hence this form of syllogism:

Every A is B:

But Every B is C:

Therefore Some C is A.

No other form is possible, while the first proposition is affirmative and universal.

Let us now suppose the first proposition to be negative and universal; namely,

No A is B.

It is represented in *Fig.* 4, where the notion A is entirely out of notion B; and the following cases will furnish conclusions:

I. If notion C is entirely in notion B, it must likewise be entirely out of notion A, (*Fig.* 16.) Hence this form of syllogism:

No A is B:

But Every C is B:

Therefore No C is A.

II. If notion C is entirely comprehended in notion A, it must also be entirely excluded from notion B, (*Fig.* 17.)   Hence a syllogism of this form:

No A is B:

But Every C is A:

Therefore No C is B.

III. If notion C has a part contained in notion A, that part must certainly be out of notion B; as in *Fig.* 18, or in *Fig.* 19, and 20.   Hence a syllogism of this form:

No A is B:

But Some C is A, or some A is C:

Therefore Some C is not B.

IV. In like manner, if notion C has a part contained in B, that part will certainly be out of A; as in *Fig.* 21, as also *Fig.* 22, and 23.   Hence the following syllogism:

No A is B:

But Some C is B, or some B is C:

Therefore Some C is not A.

As to the other forms, in which the first proposition is particular, affirmative, or negative, I shall show, in another letter, how they may be represented by figures.

17th February 1761.

LETTER CIV.—DIFFERENT FORMS OF SYLLOGISMS, WHOSE FIRST PROPOSITION IS PARTICULAR.

IN the preceding letter I have presented you with the different forms of syllogisms, or simple reasonings, which derive their origin from the first proposition, when it is universal, affirmative, or negative. It still remains that I lay before you those syllogisms, whose first proposition is particular, affirmative, or negative, in order to have all possible forms of syllogism that lead to a fair conclusion.

Let, then, the first proposition, affirmative, and particular, be expressed in this general form.

Some A is B.   (PLATE III. *Fig.* 5.)

in which a part of the notion A is contained in the notion B.

Let us introduce a third notion C, which being referred to notion A, will either be contained in notion A, as in *Fig.* 24, 25, and 26; or will have a part in the notion A, as in *Fig.* 27, 28, and 29; or will be entirely out of notion A, as in *Fig.* 30, 31, and 32.   No conclusion can be drawn

in any of these cases, as it might be possible for notion C to be entirely within notion B, or in part, or not at all.

But if notion C contains in itself notion A, it is certain, that it will likewise contain a part of notion B, as in *Fig.* 33 and 34. Hence results this form of syllogism:

Some A is B:
But Every A is C:
Therefore Some C is B.

It is the same when we compare notion C with notion B: we can draw no conclusion unless notion C contains notion B entirely (See *Fig.* 35 and 36.); for in that case, as notion A has a part contained in notion B, the same part will then certainly be contained likewise in C. Hence we obtain this form of syllogism: Some A is B:
But Every B is C:
Therefore Some C is A.

Let us finally suppose, that the first proposition is negative and particular, namely,
Some A is not B.
It is represented in *Fig.* 37, in which part of notion A is out of notion B.

In this case, if the third notion C contains notion A entirely, it will certainly also have a part out of notion B, as in *Fig.* 38 and 39; which gives this syllogism: Some A is not B:
But Every A is C:
Therefore Some C is not B.

Again, if notion C is wholly included in notion B, or A has a part out of B, that same part will likewise certainly be out of C (See *Fig.* 40 and 41). Hence this form of syllogism:

Some A is not B:
But Every C is B:
Therefore Some A is not C.

It may be of use to collect all these forms of syllogism into one table, in order to consider them at a single glance.

I.	Every A is B: But Every C is A: Therefore Every C is B.	XI.	No A is B: But Some C is B: Therefore Some C is not A.
II.	Every A is B: But Some C is A: Therefore Some C is B.	XII.	No A is B: But Some B is C: Therefore Some C is not A.
III.	Every A is B: But No C is B: Therefore No C is A.	XIII.	Some A is B: But Every A is C: Therefore Some C is B.
IV.	Every A is B: But No B is C: Therefore No C is A.	XIV.	Some A is B: But Every B is C: Therefore Some C is A.
V.	Every A is B: But Some C is not B: Therefore Some C is not A.	XV.	Some A is not B: But Every A is C: Therefore Some C is not B.
VI.	Every A is B: But Every B is C: Therefore Some C is A.	XVI.	Some A is not B: But Every C is B: Therefore Some A is not C.
VII.	No A is B: But Every C is A: Therefore No C is B.	XVII.	Every A is B: But Some A is C: Therefore Some C is B.
VIII.	No A is B: But Every C is B: Therefore No C is A.	XVIII.	No A is B: But Every A is C: Therefore Some C is not B.
IX.	No A is B: But Some C is A: Therefore Some C is not B.	XIX.	No A is B: But Every B is C: Therefore Some C is not A.
X.	No A is B: But Some A is C: Therefore Some C is not B.	XX.	Every A is B: But Every A is C: Therefore Some C is B.

Of these twenty forms I remark, that XVI. is the same with V.; the latter changing into the former, if you write C for A, and A for C, and begin with the second proposition: there are accordingly but nineteen different forms.

The foundation of all these forms is reduced to two principles, respecting the nature of *containing* and *contained*.

I. *Whatever is in the thing contained, must likewise be in the thing containing.*

II. *Whatever is out of the containing, must likewise be out of the contained.*

Thus, in the last form, where the notion A is contained entirely in notion B, it is evident, that if A is contained in the notion C, or makes a part of it, that same part of notion C will certainly be contained in notion B, so that some C is B.

Every syllogism, then, consists of three propositions; the two first of which are called the *premises*, and the third the *conclusion.* Now, the advantage of all these forms to direct our reasonings is this, that if the premises are both true, the conclusion infallibly is so.

This is likewise the only method of discovering unknown truths. Every truth must always be the conclusion of a syllogism, whose premises are indubitably true. Permit me only to add, that the former of the premises is called the *major* proposition, and the other the *minor*.

21st February 1761.

LETTER CV.—ANALYSIS OF SOME SYLLOGISMS.

If you have paid attention to all the forms of syllogism which I have proposed, you must see, that every syllogism necessarily consists of three propo-

sitions; the two first are called premises, and the third the conclusion.   Now the force of the nineteen forms laid down consists in this property, common to them all, that if the two first propositions, or the premises, are true, you may rest confidently assured of the truth of the conclusion.

Let us consider, for example, the following syllogism.

NO VIRTUOUS MAN IS A SLANDERER :
But SOME SLANDERERS ARE LEARNED MEN :
Therefore SOME LEARNED MEN ARE NOT VIRTUOUS.
Whenever you allow me the two first propositions, you are obliged to allow the third, which necessarily follows from it.

This syllogism belongs to form XII.   The same thing holds with regard to all the others which I have laid down, and which the figures whereby I have represented them render sensible.   Here we are presented with three notions (*Fig.* 42.), that of virtuous men, that of slanderers, and that of learned men.

Let the space A represent the first, space B the second, and space C the third.   It being said, in the first proposition, that no virtuous man is a slanderer, we maintain that nothing contained in the notion of the virtuous man, that is, in the space A, is comprehended in the notion of the slanderer, that is, space B; therefore space A is wholly out of space B, (see *Fig.* 43.)

But it is said, in the second proposition, that some men comprehended in notion B, are likewise contained in that of learned, that is, in space C; or else, you may say, that part of space B is within space C (*Fig.* 44.), where the part of space B, included in C, is marked with a *; which will be likewise part of space C.   Since, therefore, some part of space C is in B, and that the whole space B is

out of space A, it is evident, that the same part of space C must likewise be out of space A, that is, *some learned men are not virtuous.*

It must be carefully remarked, that this conclusion respects only the part * of notion C, which is comprehended in notion B; for as to the rest, it is uncertain whether it be likewise excluded from notion A, as in *Fig.* 45, or wholly contained in it, as in *Fig.* 46, or only in part, as in *Fig.* 47.

Now, this being left uncertain, the remainder of space C falls not at all under consideration; the conclusion is limited to that only which is certain, that is to say, the same part of space C, contained in space B, is certainly out of space A, for this last is wholly out of space B.

The justness of all the other forms of syllogism may be demonstrated in like manner; but all those which deviate from the nineteen forms laid down, or which are not comprehended under them, are destitute of foundation, and lead to error and falsehood.

You will clearly discern the fault of such a syllogism, by an example, not reducible to any of the nineteen forms:

SOME LEARNED MEN ARE MISERS:

But NO MISER IS VIRTUOUS:

Therefore SOME VIRTUOUS MEN ARE NOT LEARNED.

This third proposition may perhaps be true, but it does not follow from the premises. They too (the premises) may very well be true, and in the present instance they actually are so: but the third is not, for that, a fair conclusion; because it is contrary to the nature of just syllogism, in which the conclusion always must be true, when the premises are so. Accordingly, the fault of the form above proposed is immediately discovered, by casting your eyes on *Fig.* 42. Let space A contain all the learned,

space B all the avaricious, and space C all the virtuous. Now, the first proposition is represented by *Fig.* 48, in which part * of space A (the learned), is contained in space B (the avaricious); but it by no means follows *(Fig.* 49.*)*, that part of space C must be out of space A.

It is even possible for space C to be entirely within space A, as in *Fig.* 50, or entirely out of it, as in *Fig.* 51, and at the same time entirely out of space B.

A syllogism of this form, accordingly, is totally false and absurd.

Another example will put the matter beyond a doubt:

SOME TREES ARE OAKS:

But NO OAK IS A FIR:

Therefore SOME FIRS ARE NOT TREES.

This form is precisely the same with the preceding, and the falsehood of the conclusion is manifest, though the premises are undoubtedly true.

But whenever a syllogism is reducible to one of the above nineteen forms, you may be assured, that if the two premises are true, the conclusion unquestionable always is so too. Hence you perceive how, from certain known truths, you attain others before unknown; and that all the reasonings by which we demonstrate so many truths in geometry, may be reduced to formal syllogisms. It is not necessary, however, that our reasonings should always be proposed in the syllogistic form, provided the fundamental principles be the same. In conversation, in discourse, and in writing, we rather make a point of avoiding syllogism.

I must farther remark, that as the truth of the premises brings forward that of the conclusion, it does not thence necessarily follow, that when one or both of the premises are false, the conclusion must be

so likewise; but it is certain, that when the conclusion is false, one of the premises, or both, absolutely must be false; for if they were true, it would be impossible that the conclusion should be false. I have still some farther reflections to submit to you on this subject, which is the foundation of the certainty of all the knowledge we acquire.

24*th* *February* 1761.

LETTER CVI.—DIFFERENT FIGURES AND MODES OF SYLLOGISMS.

THE reflections which I have still to make on the subject of syllogism, may be reduced to the following articles:

I. A syllogism contains only three notions, named *terms*, in as far as they are represented by words. For though a syllogism contains three propositions, and each proposition two notions, or terms; it must be considered, that each term is twice employed in it, as in the following example:

EVERY A is B:
But EVERY A is C:
Therefore SOME C is B. .

The three notions are marked by the letters A, B, C, which are the three terms of this syllogism; of which the term A enters into the first and second proposition, the term B into the first and third proposition, and the term C into the second and third proposition.

II. You must carefully distinguish these three terms of every syllogism. Two of them, namely, B and C, enter into the conclusion, the one of which, C, is the *subject*, and the other, B, the *attribute*, or *predicate*. In logic, the subject of the conclusion, C, is called the *minor term*, and the *predicate* of the conclusion, B, the *major term*. But the

third notion, or the term A, is found in both premises, and it is combined with both the other terms in the conclusion. This term, A, is called the *mean* or *medium term*. Thus, in the following example.

NO MISER IS VIRTUOUS:
But SOME LEARNED MEN ARE MISERS:
Therefore SOME LEARNED MEN ARE NOT VIRTUOUS.

The notion *learned* is the minor term, that of *virtuous* is the major, and the notion of *miser* is the mean term.

III. As to the order of the propositions, it is a matter of indifference which of the premises is in the first or second place, provided the conclusion holds the last, it being the consequence from the premises. Logicians have, however, thought proper to lay down this rule:

The first proposition is always that which contains the predicate of the conclusion, or the major term; for this is the reason that we give to this proposition the name of the major proposition.

The second proposition contains the minor term, or the subject of the conclusion; and hence it has the name of the minor proposition.

Thus, the *major proposition* of a syllogism contains the mean term, with the major term, or predicate of the conclusion; and the *minor proposition* contains the mean term, with the minor term, or subject, of the conclusion.

IV. Syllogisms are distinguished under different *figures*, according as the mean term occupies the place of *subject*, or *attribute*, in the premises.

Logicians have established four figures of syllogisms, which are thus defined:

The *first figure* is that in which the mean term is the subject in the major proposition, and the predicate in the minor.

The *second figure*, that in which the mean term is the predicate in both the major proposition and the minor.

The *third figure*, that in which the mean term is the subject in both the major and minor propositions. Finally,

The *fourth figure*, is that in which the mean term is the predicate in the major proposition, and the subject in the minor.

Let P be the minor term, or subject of the conclusion; Q the major term, or predicate, of the conclusion; and M the mean term: the four figures of syllogism will be represented in the manner following:

Figure First.

Major Proposition	M — — Q
Minor Proposition	P — — M
Conclusion	P — — Q

Figure Second.

Major Proposition	Q — — M
Minor Proposition	P — — M
Conclusion	P — — Q

Figure Third.

Major Proposition	M — — Q
Minor Proposition	M — — P
Conclusion	P — — Q

Figure Fourth.

Major Proposition	Q — — M
Minor Proposition	M — — P
Conclusion	P — — Q

V. Again, according as the propositions themselves are universal or particular, affirmative or negative, each figure contains several forms, called *Modes*. In order the more clearly to represent these modes of each figure, we mark, by the letter A,

universal affirmative propositions; by the letter E, universal negative propositions; by the letter I, particular affirmative propositions; and, finally, by the letter O, particular negative propositions: or else,

A represents an universal affirmative proposition.

E represents an universal negative proposition.

I represents a particular affirmative proposition.

O represents a particular negative proposition.

VI. Hence our nineteen forms of syllogism above described are reducible to the four figures which I have just laid down, as in the following tables:

I. Modes of the First Figure.

1st Mode.	2d Mode.
A. A. A.	A. I. I.
Every M is Q;	Every M is Q;
But Every P is M:	But Some P is M:
Therefore Every P is Q.	Therefore Some P is Q.
3d Mode.	4th Mode.
E. A E.	E. I. O.
No M is Q;	No M is Q;
But Every P is M:	But Some P is M:
Therefore No P is Q.	Therefore Some P is not Q.

II. Modes of the Second Figure.

1st Mode.	2d Mode.
A. E. E.	A. O. O.
Every Q is M;	Every Q is M;
But No P is M:	But Some P is not M:
Therefore No P is Q.	Therefore Some P is not Q.
3d Mode.	4th Mode.
E. A. E.	E. I. O.
No Q is M;	No Q is M;
But Every P is M:	But Some P is M:
Therefore No P is Q.	Therefore Some P is not Q.

III. Modes of the Third Figure.

1st Mode. A. A. I. Every M is Q; But Every M is P: Therefore Some P is Q.	2d Mode. I. A. I. Some M is Q; But Every M is P: Therefore Some P is Q.
3d Mode. A. I. I. Every M is Q; But Some M is P: Therefore Some P is Q.	4th Mode. E. A. O. No M is Q; But Every M is P: Therefore Some P is not Q.
5th Mode. E. I. O. No M is Q; But Some M is P: Therefore Some P is not Q.	6th Mode. O. A. O. Some M is not Q; But Every M is P: Therefore Some P is not Q.

IV. Modes of the Fourth Figure.

1st Mode. A. A. I. Every Q is M; But Every M is P: Therefore Some P is Q.	2d Mode. I. A. I. Some Q is M; But Every M is P: Therefore Some P is Q.
3d Mode. A. E. E. Every Q is M; But No M is P: Therefore No P is Q.	4th Mode. E. A. O. No Q is M; But Every M is P: Therefore Some P is not Q.

5th Mode.
E. I. O.
No Q is M;
But Some M is P:
Therefore Some P is not Q.

You see, then, that the first figure has four modes, the second four, the third six, the fourth five; so that the whole of these modes together is *nineteen*, being precisely the same forms which I have above explained, and have just now disposed in the four figures. In other respects, the justness of each of these modes has been already demonstrated, by the spaces which I employed to mark the notions. The only difference consists in this, that here I make use of the letters P, Q, M, instead of A, B, C.

28th February 1761.

LETTER CVII.—OBSERVATIONS AND REFLECTIONS ON THE DIFFERENT MODES OF SYLLOGISM.

I FLATTER myself, that the following reflections will contribute not a little to place the nature of syllogisms in a clearer light. You must pay particular attention to the species of the propositions which compose the syllogisms of each of our four figures, that is to say, whether they are,

1. Universal affirmative, the sign of which is A; or,
2. Universal negative, the sign of which is E; or,
3. Particular affirmative, the sign of which is I; or, finally,
4. Particular negative, the sign of which is O; and you will readily admit the justness of the following reflections:—

I. In no one instance are both premises negative propositions. Logicians have hence formed this rule:

From two negative propositions, no conclusion can be drawn.

The reason is evident, for laying down P and Q as the terms of the conclusion, and M as the mean term, if both premises are negative, the affirmation

is, that the notions P and Q are either wholly or in part out of M : it is, accordingly, impossible to conclude any thing respecting the conformity, or disconformity, of the notions P and Q. Though I knew from history, that the Gauls were not Romans, and that neither were the Celtæ Romans, this would not contribute in the least to inform me whether the Celtæ were Gauls or not. Two negative premises, therefore, lead to no conclusion.

II. Both premises are in no one instance particular propositions; hence this rule is logic :

From two particular propositions, no conclusion can be drawn.

Thus, for example, because some learned men are poor, and some others malevolent, it is impossible to conclude that those who are poor are malevolent, or that they are not so. If you reflect ever so little on the nature of a consequence, you must immediately perceive, that two particular premises lead to no conclusion whatever.

III. *If either of the premises is negative, the conclusion too must be negative.*

This is the third rule which logic prescribes. When something is denied in the premises, it is impossible to affirm any thing in the conclusion; we must absolutely deny there likewise. This rule is perfectly confirmed by all the laws of syllogism, whose justice has been demonstrated.

IV. *If one of the premises is particular, the conclusion too must be particular.*

This is the fourth rule prescribed in logic. The character of particular propositions being the word *some,* if we speak only of some in one of the premises, it is impossible to speak generally in the conclusion; it must be restricted to some. This rule, likewise, is confirmed by all the laws of syllogism, whose justness is indubitable.

V. *When both premises are affirmative, the conclusion is so likewise. But though both premises may be universal, the conclusion is not always universal; sometimes it is particular only,* as in the *first* mode of figures third and fourth.

VI. Beside universal and particular propositions, we sometimes make use of *singular* propositions, the subject of which is an individual; as, when I say:

Virgil was a great Poet.

The name of *Virgil* is not a general notion, containing several beings in itself; it is the proper name of a real individual, who lived a great many years ago. This proposition is called *singular ;* and when it is introduced into a syllogism, it is of importance to determine, whether we are to consider it as holding the rank of an universal, or particular proposition.

VII. Certain authors insist, that a singular proposition must be ranked in the class of particulars; it being considered, that a particular proposition speaks only of some beings comprehended in the notion, whereas an universal proposition speaks of all. Now, say these authors, when we speak of only a singular being, this is still less than when we speak of some; and consequently, a singular proposition must be considered as very particular.

VIII. However well founded this reasoning may appear, it cannot be admitted. The essence of a particular proposition consists in this, that it does not speak of all the beings comprehended in the notion of the subject, whereas an universal proposition speaks of all without exception. Thus, when it is said :

Some citizens of Berlin are rich,

the subject of this proposition is the notion of *all the citizens* of Berlin; but this subject is not taken in all

its extent—its signification is expressly restricted to *some ;* and by this, particular propositions are essentially distinguished from universal, as they turn only on a part of the beings comprehended in their subject.

IX. It is clearly evident, from this remark, *that a singular proposition must be considered as universal ;* as, in speaking of an individual, say Virgil, it in no respect restricts the notion of the subject, which is Virgil himself, but rather admits it in all its extent; *and for this reason, the same rules which take place in universal propositions, apply likewise to singular propositions.* The following is accordingly a very good syllogism:

<div align="center">

VOLTAIRE IS A PHILOSOPHER;

But VOLTAIRE IS A POET:

Therefore SOME POETS ARE PHILOSOPHERS.

</div>

And it would be faulty, if the two premises were particular propositions; but being considered as universal, this syllogism belongs to figure third, and the first mode of the form A. A. I. The individual idea of Voltaire is the mean term, which is the subject of both major and minor; and this is the character of figure third.

X. Finally, I must remark, that hitherto I have spoken only of *simple propositions,* which contain only two notions, the one of which is affirmed or denied, universally or particularly. With respect to *compound propositions,* logic prescribes peculiar rules.

3*d March* 1761.

LETTER CVIII.—HYPOTHETICAL PROPOSITIONS, AND SYLLOGISMS CONSTRUCTED OF THEM.

WE have hitherto considered simple propositions only, or such as contain but two notions, the one of which is the subject, the other the predicate. These

propositions can form no other syllogisms, except those which I have laid before you, and which are contained in the four figures above explained. But we likewise, frequently employ *compound propositions,* which contain more than two notions, and respecting which other rules are to be observed, in order to deduce fair conclusions from them.

Of these compound propositions, the most common are those which are called *hypothetical,* or *conditional,* which contain two complete propositions, with an affirmation, that *if the one is true, the other is so likewise :* the following is an example of a conditional proposition :

<div align="center">

If the Gazette speaks truth, peace is not very distant.

</div>

Here are two propositions, the first, *the Gazette speaks truth,* or, *the Gazette is true :* and the other, *peace is not very distant,* or *peace is approaching.*

Now, these two propositions must be connected together in such a manner, that if the first is true, the second is so likewise; or it is maintained, that the second proposition is a necessary consequence of the first, so that the former cannot be true, without establishing the truth of the other also. Supposing, then, that the Gazettes announce the approach of peace, we are warranted in saying, that, *if the Gazettes are true, peace must be at hand.*

Without this condition, such a proposition leads to nothing; but if this condition is complied with, then, with the addition of some other proposition, there are two ways of drawing a conclusion from it : 1st. When some person assures us, *that the Gazette speaks truth ;* for, hence we conclude, *that peace is near :* 2d. When we are told, *that peace is still very distant ;* then we make no hesitation in thence concluding, *that the Gazette does not speak truth.*

You see that these two conclusions are general, and give two forms of hypothetical or conditional syllogisms, which may be thus represented:

First Form.

If A is B, C WILL BE D;
But A is B:
Therefore C is D.

Second Form.

If A is B, C WILL BE D;
But C is NOT D;
Therefore A is NOT B.

These two are the only just conclusions; and you must be carefully on your guard against the fallacy of the two following forms:

First erroneous Form.

If A is B, C WILL BE D;
But A is NOT B:
Therefore C is NOT D.

Second erroneous Form.

If A is B, C WILL BE D;
But C is D:
Therefore A is B.

These are both fallacious. In the example adduced I should reason inconclusively, if I argued in this manner:

If THE GAZETTE SPEAKS TRUTH, PEACE IS APPROACHING;
But THE GAZETTE DOES NOT SPEAK TRUTH:
Therefore PEACE IS NOT APPROACHING.

It is, undoubtedly true, that the Gazette may not speak truth; nevertheless, it is very possible that peace may be approaching.

The other form is equally erroneous;

If THE GAZETTE IS TRUE, PEACE AP-PROACHES;
But PEACE APPROACHES:
Therefore THE GAZETTE IS TRUE.

Let us suppose that this consolatory truth, *peace approaches*, were revealed to us, so as to be put beyond the possibility of doubt, it would by no means follow that Gazettes are true, or that they never contain untruths. I hope at least that peace is at hand, though I am very far from putting confidence in the truth of Gazettes.

These two last forms of syllogisms, therefore, are fallacious; but the two preceding are certainly good, and never lead into error, provided that the first conditional proposition is true, or that the last part be a necessary consequence of the first.

Of this conditional proposition:

If A is B, C will be D.

The first part, *A is B*, is called the *antecedent*, and the other, *C will be D*, the *consequent*. Logic prescribes the two following rules to direct us in this style of reasoning:

I. *Whoever admits the antecedent, must likewise admit the consequent.*

II. *Whoever denies or rejects the consequent, must likewise deny or reject the antecedent.*

But you may very well deny the antecedent without denying the consequent, and likewise admit the consequent without admitting the antecedent.

There are still other compound propositions, of which also syllogisms may be formed. It will perhaps be sufficient to produce a single example. Having this proposition,—

Every substance is body or spirit,—

the conclusion will run in the following manner:

I. But Such a substance is not body;
Therefore It is spirit.

II. But Such a substance is body;
Therefore It is not spirit.

But it is entirely unnecessary to detain you longer on this subject.

7th March 1761.